

Stress-preventive Leadership and Psychological Strain in the Workplace Hospital

Dissertation

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Erklärung / Declaration

Ich erkläre, dass ich die zur Promotion eingereichte Arbeit mit dem Titel „Stress-preventive leadership and psychological strain in the workplace hospital“ selbstständig verfasst, nur die angegebenen Quellen und Hilfsmittel benutzt und wörtlich oder inhaltlich übernommene Stellen als solche gekennzeichnet habe. Ich versichere an Eides statt, dass diese Angaben wahr sind und dass ich nichts verschwiegen habe. Mir ist bekannt, dass die falsche Abgabe einer Versicherung an Eides statt mit Freiheitsstrafe bis zu drei Jahren oder mit Geldstrafe bestraft wird.

I hereby declare that I have produced the work entitled 'Stress-preventive leadership and psychological strain in the workplace hospital', submitted for the award of a doctorate, on my own (without external help), have used only the sources and aids indicated and have marked passages included from other works, whether verbatim or in content, as such. I swear upon oath that these statements are true and that I have not concealed anything. I am aware that making a false declaration under oath is punishable by a term of imprisonment of up to three years or by a fine.

Tübingen, 08.03.2022

Felicitas Stuber

List of Abbreviations

BMBF	Bundesministerium für Bildung und Forschung
ERI	Effort-Reward Imbalance
FiF	Fragebogen zur Integrativen Führung
JDC	Job-Demand Control Model
LMX	Leader-Member-Exchange
RCT	Randomized controlled trial
SEEGEN	Seelische Gesundheit am Arbeitsplatz Krankenhaus
SOC	Sense of coherence
TFL	Transformational leadership
WHO	World Health Organization

List of Publications / Statement of Contribution

Erklärung nach § 5 Abs. 2 Nr. 8 der Promotionsordnung der Math.-Nat. Fakultät -Anteil an gemeinschaftlichen Veröffentlichungen

Study 1: Stuber, F., Seifried-Dübon, T., Rieger, M. A., Gündel, H., Ruhle, S., Zipfel, S., & Junne, F. (2020). The effectiveness of health-oriented leadership interventions for the improvement of mental health of employees in the health care sector: a systematic review. *International Archives of Occupational and Environmental Health*, 94(2), 203-220. <https://doi.org/10.1007/s00420-020-01583-w>

Contribution: **FS**, TS-D and FJ designed this study. **FS** created the search term, searched for studies, screened, and rated the results with contributions of TS-D. **FS** drafted the manuscript with all tables, and figures. **FS** interpreted the results. TS-D, MR, HG, SR, SZ and FJ gave feedback and support during the writing process of the manuscript.

Study 2: Stuber, F., Seifried-Dübon, T., Rieger, M. A., Contributors of the SEEGEN Consortium, Zipfel, S., Gündel, H., & Junne, F. (2019). Investigating the Role of Stress-Preventive Leadership in the Workplace Hospital: The Cross-Sectional Determination of Relational Quality by Transformational Leadership. *Frontiers in Psychiatry*, 10, 622. <https://doi.org/10.3389/fpsy.2019.00622>

Contribution: **FS**, TS-D, and FJ planned and conducted the study. **FS** and TS-D obtained the approval from the Ethics Committee of the Medical Faculty of the University Hospital Tuebingen. **FS** organized the data collection and was responsible for the quantitative data analysis. **FS** drafted the manuscript. TS-D, FJ, MR, SZ and HG as well as the Contributors of the SEEGEN Consortium gave feedback during the writing process of the manuscript.

Study 3: Stuber, F., Seifried-Dübon, T., Tsarouha, E., Rahmani Azad, Z., Erschens, R., Armbruster, I., Schnalzer, S., Mulfinger, N., Müller, A., Angerer, P., Helaß, M., Maatouk, I., Nikendei, C., Ruhle, S., Puschner, B., Gündel, H., Rieger, M. A., Zipfel, S., & Junne, F. (2022). Feasibility, psychological outcomes and practical use of a stress-preventive leadership intervention in the workplace hospital: the results of a mixed-method phase-II study. *BMJ Open*, 12(2), e049951. <https://doi.org/10.1136/bmjopen-2021-049951>

Contribution: **FS**, TS-D, SuS, MR and FJ developed the stress-preventive leadership intervention. **FS**, TS-D and FJ obtained the approval from the Ethics Committee of the Medical Faculty of the University Hospital Tuebingen. **FS**, TS-D and IA were responsible for the recruitment process, **FS**, TS-D and SuS designed the intervention material and organized the data collection. **FS**, TS-D and SuS conducted the focus groups. **FS** conducted the qualitative analysis with the interdisciplinary team including ET, TS-D, FJ and MR. **FS**, ZRA and IA conducted the quantitative analysis. **FS** drafted the manuscript with contribution from ZRA, IA, TS-D, FJ, RSE, NM, AM, PA, MH, CN, SR, BP, HG and MR.

Abstract

The significant increase of unfavorable work-stress among employees in German hospitals led to an increasing demand for stress-preventive measures on the part of employers. Previous research showed that leaders can be key figures of stress prevention in the workplace and thereby should be supported in this role, for example by leadership interventions. However, the evidence on stress-preventive leadership interventions for healthcare leaders is currently not unequivocal.

Therefore, this dissertation contributes to the research on stress-preventive leadership in the workplace hospital with three studies that examine the overall topic of stress-preventive leadership on a theoretical, an empirical and a practical level. Study 1 (a systematic review) summarizes the current research state on stress-preventive leadership interventions with respect to their structure, didactics, content, and effect on the mental health of healthcare leaders and followers. Study 2 assesses hospital leaders' and followers' perception of transformational leadership, as a stress-preventive leadership behavior, and the dyadic leader-follower relationship quality in a cross-sectional survey approach as an important influencing factor on strain in the workplace. Finally, Study 3 comprises the development of a new multimodal stress-preventive leadership intervention for leaders of middle management in the workplace hospital and its evaluation regarding feasibility, acceptance and leaders' subjective changes in mental health and transformational leadership behavior in a pilot study with a mixed method approach.

The results of Study 1 indicate sparse but promising data with half of previous leadership intervention studies showing an effect on the mental health of hospital employees. Study 2 points to the need to foster transformational leadership as a stress-preventive psychosocial working condition that is related to social well-being in the hospital. The previously mentioned results are supported by the pilot study (Study 3) which shows high feasibility and acceptance for the newly developed stress-preventive leadership approach as well as significant improvement in participants' mental health and transformational leadership over time.

Thus, this dissertation project makes an important contribution to the development of an evidence-based structured health management for hospital employees. If the results are

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confirmed in the randomized controlled trial already underway, this new leadership intervention might offer an essential opportunity to contribute to the stress prevention of healthcare employee.

Zusammenfassung

Der deutliche Anstieg an stress-bezogenen Beanspruchungsfolgen der Mitarbeitenden im deutschen Gesundheitswesen, führte zuletzt zu einem steigenden Bedarf an organisationalen stress-präventiven Maßnahmen. Bisherige Forschungsergebnisse zeigen, dass Führungskräften eine Schlüsselrolle im Bereich der Stressprävention am Arbeitsplatz zukommen könnte, und diese zum Beispiel durch Führungskräfteinterventionen in dieser Rolle unterstützt werden könnten. Aktuell liegt jedoch eine unklare Datenlage zu Weiterbildungsansätzen für Führungskräfte im Gesundheitswesen vor.

Dieses Dissertationsprojekt leistet mit Hilfe von drei Einzelstudien einen Beitrag zur Erforschung stress-präventiver Führungsinterventionen auf theoretischer, empirischer und praktischer Ebene. Studie 1, ein Systematisches Review, fasst dabei den aktuellen Forschungsstand zum Einfluss stress-präventiver Führungskräfteinterventionen auf die mentale Gesundheit der Mitarbeitenden im Gesundheitswesen zusammen und analysiert den Ablauf, die Didaktik, und den Inhalt der Interventionen ebenso wie die Qualität der zugehörigen Evaluationsstudien. Studie 2 erfasst im Rahmen einer querschnittlichen Befragungsstudie die Wahrnehmung transformationaler Führung sowie die dyadische Beziehungsqualität zwischen Führungskraft und Mitarbeitenden als wichtige Einflussfaktoren auf die Arbeitsplatz-bezogene psychische Beanspruchung in einem tertiären Krankenhaus. Basierend auf den genannten Vorarbeiten beinhaltet Studie 3 die Entwicklung einer neuen multimodalen stress-präventiven Führungskräfteintervention für Führungskräfte der mittleren Führungsebene am Arbeitsplatz Krankenhaus und deren Evaluation hinsichtlich deren Durchführbarkeit, Akzeptanz, sowie die längsschnittliche Erfassung der mentalen Gesundheit und des transformationalen Führungsverhaltens teilnehmender Führungskräfte.

Die Ergebnisse aus Studie 1 und Studie 2 zeigen einen Bedarf an mehr transformationalem Führungsverhalten als stresspräventive psychosoziale Arbeitsbedingung im Krankenhaus auf und weisen auf Basis einer zwar geringen, aber vielversprechenden Datenlage auf die Bedeutsamkeit des Einsatzes modularer Gruppenangebote hin, wobei die Hälfte der bisherigen Führungsinterventionen einen Effekt auf die psychische Gesundheit von Mitarbeitenden zeigt. Studie 3 ergänzt die geringe Datenlage aus Studie 1 und untersucht transformationale Führung in einem längsschnittlichen Design. Der neue Interventionsansatz

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weist, basierend auf der Selbsteinschätzung der teilnehmenden Führungskräfte, eine hohe Durchführbarkeit und Akzeptanz auf. Darüber hinaus zeigen die Daten für die teilnehmenden Führungskräfte eine signifikante Verbesserung hinsichtlich der selbst eingeschätzten mentalen Gesundheit und des selbst eingeschätzten transformativen Führungsverhaltens über die Zeit hinweg.

Das Dissertationsprojekt ist somit ein wichtiger Schritt hin zu einem evidenz-basierten und strukturierten Gesundheitsmanagement für Krankenhausmitarbeitende und leistet, wenn sich die Ergebnisse in der aktuell laufenden randomisiert-kontrollierten Studie bestätigen, einen wichtigen Beitrag zur Stressprävention von Mitarbeitenden im Gesundheitswesen.

1. Theoretical Background

In the past decades, research observed that reduced well-being and an increased number of work-related mental diseases (e.g., burnout; Maslach et al., 2001) in employees of the health care sector is leading to higher absence rates and economical loss (Badura et al., 2020, p. 368; Patel et al., 2018). To counteract this development the responsibility of employers to create favorable psycho-social working conditions has been even statutory established in Germany (Beck et al., 2016). From a scientific perspective, leaders were described as key figures of stress-prevention in the workplace (Montano et al., 2017). However, regarding the workplace hospital, context-specific research on stress-preventive leadership is still missing.

The following paragraphs summarize the current state of research on work-related mental health, psycho-social stressors, and stress-preventive leadership in the health care sector and hospitals (see Figure 5). Concerning stress and strain, the general distinction between stress and strain is explained, as well as the development of employees' mental health in the working world, especially in the health care sector. The paragraphs on psycho-social stressors summarize the three popular concepts of Effort-Reward Imbalance, Job Demand Control and Organizational Justice with their current state of research. Moreover, the paragraph on stress-preventive leadership gives an overview on different influence pathways of leaders on followers' mental health. With view to the literature, different research approaches use different terminologies for the same entities. In the present dissertation, the author uses the term *leader* for employees with leadership responsibilities, *follower* for employees with no leadership responsibilities and *employees* to summarize leaders and followers.

1.1 Definitions of the concepts stress and strain from an occupational psychology perspective in the context of this dissertation

In occupational psychology research, the concepts of *stress* and *strain* (Rohmert, 1984) describe the relationship between working conditions and the individual employee. Based on these concepts, *stress* is defined as the entirety of all external positive and negative detectable influences (stressors) that affect a person (e.g., working quantity, support from employees in the workplace, noise; Deutsches Institut für Normung e.V. (ed.), 2011, DIN EN ISO 10075-1:2000-

11). This means *stress*, on the one hand, is a neutral overarching concept that comprises different psycho-social working conditions. *Strain*, on the other hand, is defined as the direct impact of stress on an individual employee depending on his / her individual long- and short-term prerequisites (e.g., motivation, skills, age), and coping strategies. It can take on favorable and unfavorable forms and consequences depending on the person (e.g., career development, well-being, dissatisfaction, workplace absenteeism; Deutsches Institut für Normung e.V. (ed.), 2011, DIN EN ISO 10075-1: 2000-11). Thus, readers must keep in mind that the strain of psycho-social stressors on employees varies. Nevertheless, research found some overarching psycho-social work stressors in the health care sector (see paragraph 1.3 and 1.4 for more details) that impacts employees' mental health as one strain outcome. To understand this link fully, the concept of mental health must first be explained.

1.2. The understanding of mental health in the occupational sector of health care from a theoretical, empirical, and psychometric point of view

The following paragraph defines the understanding of mental health in this dissertation and summarizes the current empirical research results on employees' mental health in the health care sector with a more distinct view on Germany. Moreover, it points out the possibilities for measuring mental health and introduces the psychometric constructs used in this dissertation.

1.2.1 Defining mental health as a continuum concept from impaired health to hedonistic well-being

Mental health or psychological health comprises a variety of different concepts since Aristoteles gave a guideline of good life with his *Nicomachean Ethics* (Pech et al., 2010). The modern understanding of health is characterized by a bio-psycho-social health approach which comprises mental health as one part. This more dimensional understanding views mental health in the context of different reference systems. In more detail, mental health is depicted in individual well-being and especially in the functioning of a person within the social context (e.g., in the workplace, Engel, 1977; Pech et al., 2010). One definition of mental health which is especially important for occupational research and the development of targeted preventive approaches is the definition of the World Health Organization (WHO). They define mental health *'as a state of well-being in which every individual realizes his or her own potential,*

can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community' (Topp et al., 2015; World Health Organization, 2019). Thereby, the WHO emphasizes, that the concept of mental health is not only the absence of mental health impairments but also a state of stable functioning (cf. also Montano et al., 2017; World Health Organization, 2001). In the following work, the author refers to this definition of mental health and understands mental health as a continuum from impaired mental health to a state of hedonistic well-being and social functioning. Therefore, both poles of mental health (psychological strain and well-being) will be assessed in the workplace hospital.

1.2.2 Empirical findings on health care employees' mental health and its implications

With respect to mental health in the workplace generally, the Occupational Safety Act (Arbeitsschutz Gesetz) has been expanded in 2013 in Germany. Since then, it comprises an obligation for the employer to care for the mental health of employees, (e.g., Working Program Psyche of the Joint German Occupational Safety Strategy, Beck et al., 2016) and underscores the growing importance of mental health and thereby stable functioning in the workplace for society.

From a bio-psychological perspective, negative workplace stressors can be associated with impaired mental health in the form of depression (e.g., Theorell et al., 2015) or anxiety disorders (e.g., Melchior et al., 2007). Although, employment itself is a protective factor regarding mental ill-health (Jacobi et al., 2014; Jacobi et al., 2015), that is, employed people are less likely to develop a mental illness than the unemployed. Mental illnesses can be seen as one kind of long-term consequence of unfavorable psychological strain with high loss of quality of life for individuals and high global estimated economical costs for society (US\$16 trillion between 2010-2030; Patel et al., 2018).

In Germany, the health care and social sector (e.g., hospitals, retirement homes) showed the highest proportion of inability of work due to mental illnesses with 16.1% of AOK insured persons compared to the other sectors (Badura et al., 2020, p. 368). In surveys, 26.3% of general practitioners and assistance showed a high stress level (Viehmann et al., 2017). With view to German hospitals, over 25% of German physicians (Klein et al., 2011) and over 20% of German nurses (Schulz et al., 2009) were affected by negative work-related strain. A survey conducted by the Marburger Bund with 6500 participants showed that 49% of physicians working in German hospitals experienced work strain frequently, 10% even permanently. Moreover, 15%

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of the participants stated that they visited a psychotherapist because of work related stressors (Korzilius, 2020). Focusing on the international data basis, Dollard et al. (2007) found in their review an increased level of distress in workers of the health and community sector compared to the general population in Australian and international studies. In a U.S. American survey, 54.4% of the participating physicians reported at least one burnout symptom (Shanafelt et al., 2015). Moreover, a survey of the British Medical Association 2019 reported that 80% of participating physicians in the health care sector were at risk of burnout with younger physicians at higher risk (The Lancet, 2019). A meta-analytical approach showed that 25% of nurses working in mental health sections in hospitals suffer from high emotional exhaustion, 22% suffered from low personal accomplishment and 15% from high depersonalization (López-López et al., 2019). A meta-analysis from Petrie et al. (2018) took a close look at ambulance employees and found an increased prevalence rate of post-traumatic stress disorder (PTSD, 11 %) compared to the general population. This result was in line with Kunzler et al. (2020) who summarized that employees working in the health care sector show an increased risk of psychological illnesses such as depression, post-traumatic stress disorder and even higher suicide rates compared to other sectors. Moreover, due to acute crises such as the COVID-19 pandemic, psychological strain in hospitals even increased globally. A systematic review reported high prevalence of depression (24.3%) and anxiety (25.8%) in employees working with COVID-19 patients (Salari et al., 2020).

Negative psychological strain in the health care sector has not only unfavorable health consequences for those affected themselves; there are also negative consequences for patient safety and the economic situation of health care institutions (Wallace et al., 2009). In a systematic review from Hall et al. (2016) poor well-being in health care workers was associated with poor patient safety in 59% of included studies. Nurses with reduced mental health were at higher risk of medical errors in comparison to nurses with good mental health (Melnik et al., 2018). Furthermore, absenteeism caused by mental illnesses lead to high costs. For example, the National Health Service in Great Britain estimated the costs caused by anxiety, depression and stress in the health care sector at 425 million pounds a year (Hassard et al., 2014).

To sum up, employees in the health care sector seem to be mentally strained to an alarming extent on a subsyndromal and syndromal level especially with view to burnout symptoms. This is true for the German and international health care systems with far-reaching

consequences for individuals, economics, and patient safety. To assess the mental health of healthcare employees, various measurement methods and theoretical constructs were used in previous research. In the next paragraph different measurement methods are briefly presented with a special focus on two subjective constructs of mental health and their related measurement method which were used in the here presented dissertation project.

1.2.3 Psychometric measurements of mental health within this dissertation and their current empirical use

Overall, mental health can be measured in different ways. Besides biological measurements, methods like α -amylase that depicts the activity of the sympathetic nervous system or salivary cortisol which indicates the activity of the hypothalamic-pituitary-adrenal axis (e.g., Limm et al., 2011), organizational measurement such as turn over intention or days of sickness absence are used in previous literature. To assess the individual subjective psychological health perception of employees, questionnaires are widely established. Two in previous literature often used and well-established scientific constructs are *irritation* (Mohr, 1986, 1991) and *well-being* (World Health Organization, 2019). Whereas irritation can occur as a short-term facet of work-related mental health, mental health is reflected in the extent of a person's well-being long term and beyond the working context.

1.2.3.1 Irritation

Irritation is defined as a state of subjective perception-aim-discrepancy that can be divided in the two sub-constructs *cognitive irritation* and *emotional irritation*. It occurs as a result of social stressors in the workplace (Mohr, 1986, 1991). Cognitive irritation comprises the cognitive incapacity to switch off from work and rumination, emotional irritation is defined as irritability that is shown through mild verbal-aggressive behavior against a person him- / herself or against others (Müller et al., 2004). Irritation has been shown to precede depressive symptoms in time and to mediate the effect of social stressors on depression symptoms (Dormann & Zapf, 2002). Thus, irritation can be seen as a kind of early warning signal and short-term parameter of unfavorable psychological strain.

The concept of irritation has been examined in different working contexts in cross-sectional as well as in intervention studies by using the irritation scale (Mohr et al., 2005). When comparing irritation of different professions in the health care sector in Germany, one cross-

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sectional study showed that over 50% of physicians and psychologist suffered from high irritation and irritation increased significantly with their age (Hiemisch et al., 2011). Furthermore, Baethge and Rigotti (2013) reported an association between work interruptions and irritation in the evening that was mediated by time pressure and psychological demands in nurses. Moreover, an intervention study used the concept of irritation to evaluate a stress-coping intervention for teachers and showed a reduction of irritation directly after the intervention in the intervention group (Stück et al., 2004).

To sum up, irritation can be seen as a sensitive measurement construct to capture subjectively impaired mental health in an early state. Moreover, there is a growing number of studies investigating the concept of irritation, particularly in the German health care and social sector which also comprises intervention studies concerning mental health prevention.

1.2.3.2 Well-being

Well-being is a concept with many different facets and conceptualizations (Diener & Seligman, 2004). In this dissertation, the author focused on the well-being approach of the World Health Organization (WHO). In their approach, the WHO defined positive well-being as a synonym of mental health that is understood in the sense of salutogenesis (see section 1.2.1, Topp et al., 2015; World Health Organization, 2019). Based on this definition, the WHO-5 Well-Being Index was developed as a part of a project to assess well-being in primary care patients. The WHO-5 Well-Being Index is a short global questionnaire to measure subjective positive well-being which is used world-wide in over 30 languages (Topp et al., 2015).

Employees' well-being in the workplace has been subject of research for several years. In systematical reviews and meta-analysis, psycho-social working conditions (e.g., working demands, working control, social support) and leadership has been associated with employee's well-being multiple times (e.g., Häusser et al., 2010; Montano et al., 2017; Skakon et al., 2010). Employees' well-being has been associated with different productivity outcomes in the health care sector as well. For example, low well-being was associated with poor patient safety (Hall et al., 2016), whereas a high perceived well-being of employees was associated with high workplace productivity (Nielsen et al., 2017).

Different intervention approaches have been explored to promote employee well-being in the workplace through preventive measures. Ruotsalainen et al. (2015) found evidence for cognitive-behavioral therapeutic as well as relaxation approaches to reduce strain, while

almost all organizational preventive measures showed no strain-reducing effect. Besides this meta-analytically approach, single studies underline the effect of behavioral and relaxation approaches on well-being in the health care sector (Gardiner et al., 2013; Murray et al., 2016).

In summary, employees' well-being has been associated with an extensive amount of psycho-social working conditions and was related to multiple productivity outcomes. Regarding intervention research, current results show small effects from behavioral and relaxation interventions, while organizational interventions show almost no effects on health care employees' well-being so far.

Decisive working conditions that can have an influence on employees' mental health in the health care sector are psycho-social stressors such as social support, leadership behavior or perceived justice (e.g., Greenberg, 2006; López-López et al., 2019). Within the next paragraph, the author will have a closer look on psycho-social stress models and their impact on employees' mental health in the health care sector.

1.3 Psycho-social stress models and their impact on employees' mental health in the health care sector

Psycho-social stressors were named as strain sources for hospital employees in several reviews (e.g., Freimann & Merisalu, 2015; López-López et al., 2019). Schneider and Weigl (2018), for example, found in their systematic review on emergency departments a high number of psycho-social stressors (e.g., a lack of social support from colleagues, reduced leadership quality, traumatic events) associated with nurses' and physicians' mental ill-health and emphasize hospitals as challenging work environments. The same systematic work found peer support, reward systems for employees and good organizational structures as positive psycho-social factors on employees well-being (Schneider & Weigl, 2018). These results show that several psycho-social working stressors decisively contribute to employees' mental health in the health care sector.

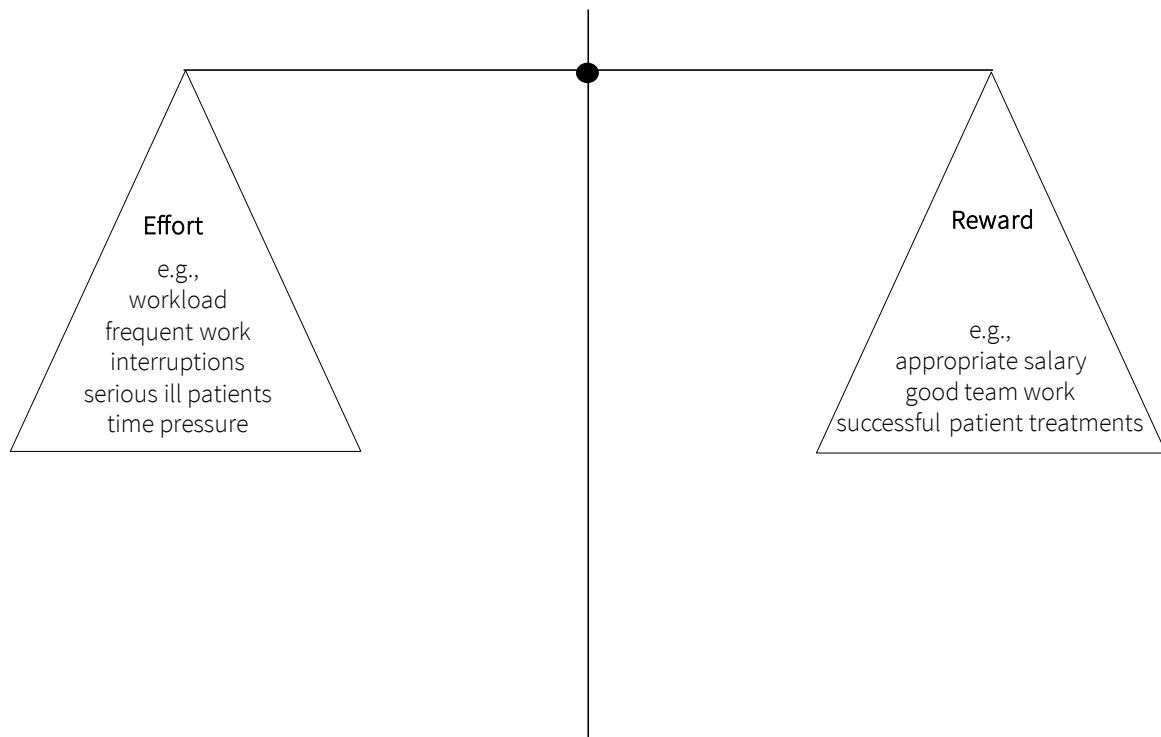
To structure and abstract the different psycho-social working conditions, the three work stress models Effort-Reward-Imbalance Model (ERI, Siegrist, 1996, 2012), Job Demand Control Model (JDC, Karasek Jr, 1979; Karasek & Theorell, 1990) and Model of Organizational Justice (Greenberg, 1987), which refer to the development of straining work conditions, will be described in the following paragraphs. Moreover, their meaning for employees' mental health and the current state of research in the health care sector will be taken up.

1.3.1 Effort-Reward-Imbalance

The *Effort-Reward Imbalance Model* (ERI, Siegrist, 1996; Siegrist, 2012) describes the reciprocal relationship between *effort* and *reward* in the workplace. Effort comprises extrinsic components such as physical, psychological, and social working demands or obligations as well as intrinsic components such as the individual need for control in demanding working situations or work-related overcommitment. Reward includes the variables money, esteem, and job prospects (e.g., having an unlimited employment contract). When effort and reward are balanced, a person gets enough reward for his/her effort. This state has been associated with positive health outcomes. When the relation between effort and reward is imbalanced and a person perceives more effort than reward, this is called an effort-reward imbalance and has been associated with negative psychological strain and a large amount of health impairments (Siegrist & Marmot, 2004). Consequently, to reduce or prevent health impairments, the two components effort and reward need to be balanced by reducing effort or increasing reward (see Figure 1).

Figure 1

Effort-Reward (Imbalance) Model



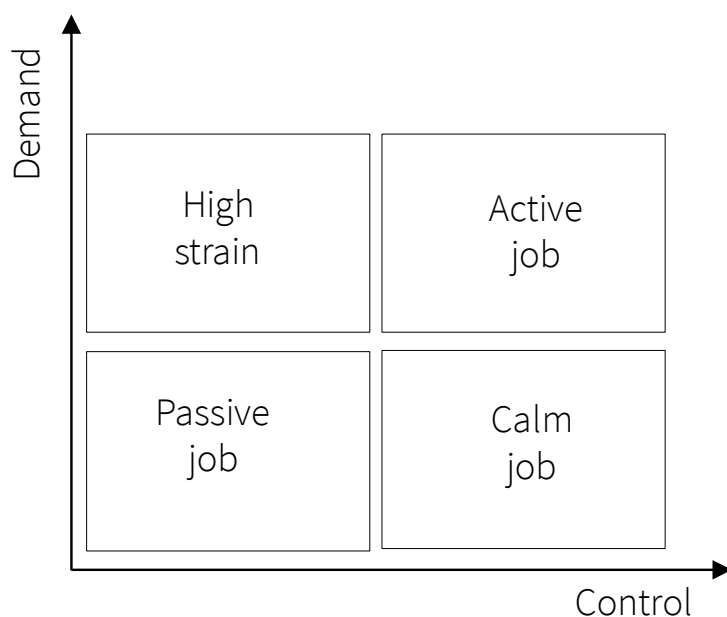
Note. Adapted from Siegrist (2012, p. 3)

1.3.2 Job Demand Control Model

The *Job Demand Control Model* (JDC, Karasek Jr, 1979; Karasek & Theorell, 1990) describes the relationship between work demands (e.g., workload) and a person's subjective experienced work control. Four different work strain scenarios can be developed from these two dimensions (see Figure 2).

Figure 2

Job Demand Control Model



Note. Adapted from Karasek Jr (1979, p. 288)

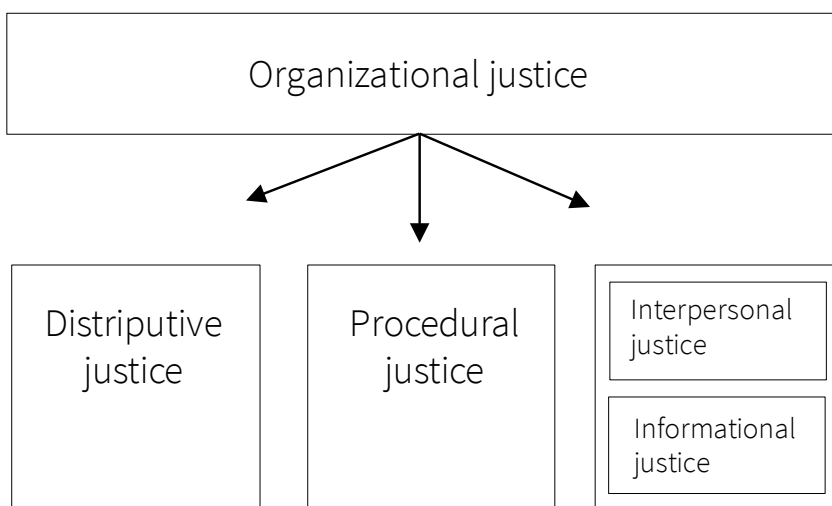
With view to the individual work performance, the conditions of high control and high demands lead to the scenario with the best personal developmental conditions. This scenario can lead to subjective strain but is balanced by a high amount of subjective control. The combination of high control and low demands lead to lower developmental opportunities but mark a scenario of a calm working situation. Whereas the combination of low control and low demands leads to a passive working situation. In terms of mental health, the constellation of high demands and low experienced control is the most unfavorable and is also called the state of 'high strain'. Accordingly, high work demands are not generally associated with unfavorable psychological strain, but in the combination with subjective low work control.

1.3.3 Model of Organizational Justice

The Model of *Organizational Justice* first conceptualized by Greenberg (1987) captures the subjective perceived justice of an employee in the workplace (cf., Junne et al., 2017). Overall, the model distinguishes between three different constructs of justice: the *distributive justice*, the *procedural justice* and the *interactions justice* (Greenberg, 1990). The *distributive justice* describes the relationship between performed work and salary relative to colleagues. *Procedural justice* maps perceived justice concerning decision processes. It occurs when employees affected by a decision have influence on the decision-making process, can participate in the decision-making process, and can appeal against a decision (Badura et al., 2020; Colquitt, 2001). *Interactional justice* can be further distinguished in two subconstructs the *interpersonal* and the *informational* justice (Colquitt, 2001; Greenberg, 1990). Both subconstructs are related to interactions between an employee and his/her leader. The *interpersonal justice* refers to the perceived esteem, respect and courtesy within the interaction (Elovainio et al., 2002). *Informational justice* refers to the perceived openness, honesty and comprehensibility with which a manager communicates information or decisions (Badura et al., 2020, pp. 18, see Figure 3).

Figure 3

Model of Organizational Justice



1.3.4 Research evidence on psycho-social stress models in the health care sector

There is an extensive amount of research investigating the ERI, JDC and Organizational Justice models and their association with physical, psychological and behavioral health outcomes. Results point towards an association between ERI, high demand / low control working conditions and organizational injustice with physical and psychological health impairments in different working contexts (Kivimäki et al., 2012; Madsen et al., 2017; Ndjaboué et al., 2012; Robbins et al., 2012; Siegrist, 2012).

Regarding the health care sector, nurses reported higher emotional exhaustion and depersonalization when perceiving an effort reward imbalance (ERI, Bakker et al., 2000). With view on the German health care sector, Siegrist et al. (2010) reported the highest rate of ERI in German physicians compared to physicians of USA and UK. Moreover, physicians working in the German health care sector perceived a higher ERI than emigrated German physicians in Sweden (Ohlander et al., 2015). ERI also predicted the intention to leave in nurses (Li et al., 2013) and led to less patient care in physicians (Loerbroks et al., 2016). Work-place intervention based on the effort-reward model indicate a decrease of work related strain (Li et al., 2017; Limm et al., 2011). Regarding the JDC model, high work demands and low work control were associated with higher depression symptoms and lower job satisfaction in general practitioners (O'Connor et al., 2000). And an intervention study in teachers showed that a training intervention based on the JDC model decreased burnout symptoms in the intervention group by increasing job control in comparison to a control-group (Żołnierczyk-Zreda, 2005). Lindfors et al. (2009) found in a cross-sectional study a relationship between Organizational Justice and lower strain symptoms in physicians with on-call duty, that was in line with the results of Kivimäki et al. (2003). They reported that low procedural and low interactional justice increased the risk of sickness absence in comparison to high procedural and interactional justice in hospital employees. The concept of Organizational Justice was also addressed in intervention studies. For example, Greenberg (2006) examined an interactional justice training for hospital leaders and found a buffering effect of the intervention concerning followers' sleeping problems.

Taken together, the ERI model, the JDC model, and the Model of Organizational Justice show a growing body of evidence for associations between their postulated psycho-social working conditions and mental health in the health care sector. Furthermore, all models were applied in a small amount of intervention studies. To reduce strain in the health care sector, it

could be one way to raise awareness for the named work stress models and to reflect how these dimensions could be addressed contexted specifically. Employees with leadership responsibility play a major part here, as they have the power to influence ERI, JDC and Organizational Justice through their hierarchical position, at least partly. In addition, leaders themselves are important psycho-social stressors for their followers. Thus, *leaders* can be seen as *key-figures of psycho-social stress management* in the workplace and their role is therefore depicted in a separate paragraph.

1.4 Leaders as key-figures in psycho-social stress management in the health care sector

Leadership is a construct with multiple facets and can be defined as a target-related influence from leaders on followers, with the aim to enable followers to reach a district goal (von Au, 2016; von Rosenstiel, 2014, p. 3). Thus, it is first and foremost the task of leadership to ensure the achievement of the organizations' goals. In addition, the mental health of followers has recently become a leadership issue to secure mental health protecting working conditions as mental health is no longer only an individual but also an organization issue (GDA-Arbeitsprogramms Psyche, 2017). The author defines stress-preventive leadership in this work as a multi-layer concept with four different pathways based on the concept of Elprana et al. (2016) with which leaders can shape the working environment of followers (e.g., task related working conditions, relationships) in a way that maintains or even promotes mental health. Pathway one highlights the aspect of leaders' potential stress-preventive influence on work conditions as important mediators of followers' mental health. The second pathway outlines leaders' leadership behavior, especially transformational leadership (TFL) and its stress preventive potential. Pathway three goes into detail how leaders could contribute to stress-preventive workplace relationships as a form of social well-being and pathway four comprises leaders' own stress-coping and personal strain and its relation to followers' psychological strain. In the following paragraphs the four different pathways of leaders' influence on followers' mental health and their related current state of research will be explained especially within the health care sector.

1.4.1 The mediating role of psycho-social working conditions in health care leaders' stress management

Leaders can change followers' psycho-social working conditions through their leadership behavior and thereby contribute to followers' mental health (Arnold, 2017). Psycho-social working conditions comprise mainly the work stress models of ERI, JDC and the Model of Organizational Justice (introduced in paragraph 1.3) as well as a non-exhaustively defined number of further psychological and social dimensions at the workplace. Recent research emphasized the mediating role of such psycho-social working conditions. For example, Arnold (2017) found in their systematic review in various work sectors over 18 different work demands and work resources as mediators. She reported a high level of evidence for the work resources meaningful work, trust in the leader and followers' self-efficacy, whereas work demands were investigated less often. Regarding the workplace hospital, a cross sectional study found distributive and interactional justice (parts of organizational justice) as mediators of the relationship between transformational leadership behavior and nurses' life quality (Gillet et al., 2013). In addition, self- as well as team efficacy, role clarity, meaningfulness of work and development opportunities mediated the relationship between TFL and followers' well-being in elderly care (Nielsen, Yarker, et al., 2008; Nielsen et al., 2009).

The number of leadership interventions that deal with changing psycho-social working conditions is very small compared to the number of theoretical approaches. Kuehnl et al. (2019) only identified five intervention studies (Barrech et al., 2018; Dahinten et al., 2014; Hardré & Reeve, 2009; Odle-Dusseau et al., 2016; Weir et al., 1997) in their meta-analytical approach out of these five, three were conducted in the health care sector (Dahinten et al., 2014; Odle-Dusseau et al., 2016; Weir et al., 1997) which had no significant effect on followers' mental health. Regarding psycho-social working conditions in hospitals, one intervention study investigated an organizational justice training for leaders to target followers' sleep as indicator for followers' well-being and found an improved self-reported sleep in followers after leaders got the organizational justice training (Greenberg, 2006).

To sum up, there is a high level of evidence concerning the mediating role of psycho-social working conditions with view to the relationship between leadership behavior and followers' well-being in the health care sector as well as in other work sectors. However, there are very few previous intervention studies investigating the training of leaders in psycho-social

work models to improve the mental health of followers which showed mixed effects. Moreover, leadership intervention studies on established psycho-social work models such as ERI, JDC and the Model Organizational Justice are almost missing.

1.4.2 Transformational leadership (TFL) as a promising stress-preventive leadership behavior in the workplace hospital

Leadership behavior is another way of influencing followers' mental health. For example, a lack of supportive leadership behavior was related to a higher risk of reduced health of male employees ten years later, even after controlling for health status and job strain at baseline (Schmidt et al., 2018). Meta-analyses revealed a negative relationship between destructive / abusive leadership behavior with followers' mental health as well as a positive relationship between constructive leadership behavior and followers' mental health (Harms et al., 2017; Schyns & Schilling, 2013).

One constructive leadership behavior is *transformational leadership behavior (TFL)*. The concept of TFL was introduced in the research literature by McGregor Burns (1978) in combination with the concept of *transactional leadership behavior (TAL)*, Burns, 1978). Bernhard M. Bass and Bruce Avolio continued to develop the two concepts over the next twenty years (Avolio et al., 1999; Bass, 1985, 1990, 1999). In their understanding TAL is based on the principle of exchange between leaders and followers (e.g., salary in return for performance) and primarily emphasizes the self-interest of the respective party. TAL is considered the basis of a working relationship. TFL focuses on the common interests of employees and the organization in which they work. Thus, transformational leaders help to align the goals, values, and behaviors of followers with those of the organization. Consequently, TFL is a concept in its own right, but can be seen as a complement and extension of TAL (Seifried-Dübon et al., 2019).

TFL can be divided in different core behaviors of a leader. Whereas one concepts of TFL postulated four different leadership behaviors (Bass, 1999), Podsakoff et al. (1996); Podsakoff et al. (1990) differentiates between six different behaviors. The latest concept of TFL was introduced by Rowold and Poethke (2017) within their framework of an integrative leadership questionnaire (Fragebogen zur integrativen Führung, FiF) and is based on the six core behaviors of Podsakoff et al. (1990). They describe a transformational leader as a person who *fosters innovations, develops a team spirit, has high performance expectations, has a focus on*

followers' individuality, provides a vision and is a role model (cf., Stuber et al., 2019). For a detailed description of the core behaviors see Table 1.

Table 1

Description of core behaviors of TFL

Core behavior	Description: The Leader...
Fostering innovations	<ul style="list-style-type: none"> - tries to provide background information concerning work tasks. - tries to show new ways to solve a problem or difficult task. - is willing to discuss work routine and wants his or her staff members to do so. - is open minded for improvements.
Team spirit development	<ul style="list-style-type: none"> - tries to generate a positive team climate. - phrases team spirit as a group aim. - wants his or her followers to help each other.
Performance development	<ul style="list-style-type: none"> - verbalizes ambitious goals which contribute to the organization's aims. - explains why his or her followers are able to fulfill his or her expectations.
Individuality focus	<ul style="list-style-type: none"> - deploys his or her followers on the basis of individual talents. - tries to take individual wishes of followers into account. - is aware of followers' individual aims and long-term perspective.
Providing a vision	<ul style="list-style-type: none"> - verbalizes appreciation for his or her followers. - has a positive and clear idea how the situation for his or her future work group looks like. - will share the vision with the other group members and this vision motivates followers and brings the superior work group and company aims to life.
Being a role model	<ul style="list-style-type: none"> - lives up to the workgroup value concepts.

Note. Transformational leadership (TFL), table was cited from Stuber et al. (2019, p. 4)

TFL has been extensively researched and often associated with positive followers' variables (Hoch et al., 2018). Research indicates that TFL goes along with, for example, higher work satisfaction in hospitals (Boamah et al., 2018), higher work motivation (Judge & Piccolo, 2004), higher well-being and reduced strain (Nielsen, Randall, et al., 2008) in health care followers. In systematic reviews, low levels of TFL were associated with followers' mental ill-health (Arnold, 2017; Skakon et al., 2010) and high levels of TFL were associated with followers' well-being (Arnold, 2017; Gregersen et al., 2011; Montano et al., 2017; Skakon et al., 2010) in different work sectors. Furthermore, the positive effect of TFL on followers' health has been

Theoretical Background

shown across different nations (Zwingmann et al., 2014). Supplementing evidence for this direct relationship between TFL and followers' mental health, some studies pointed to a mediated relationship, where psycho-social working conditions such as role clarity play an important role (see section leaders' influence on psycho-social working-conditions, Arnold et al., 2007; Vincent-Höper et al., 2017).

A positive relationship between TFL and followers' mental health has been found not only in the industrial and service sector but also in the health care sector. In cross-sectional studies, TFL was negatively related to absenteeism, emotional exhaustion and turnover intention (Green et al., 2013; Lee et al., 2011) and TFL was positively related to adverse patient outcomes via workplace empowerment (Boamah et al., 2018). To the broad evidence of associative approaches, only few intervention studies can be added that target TFL as an outcome variable in the health care sector or adjacent work environments. For example, Saravo et al. (2017) reported significant improvement in TFL in the intervention group compared to the control group in both self- and external-assessments following a TFL training intervention for resident physicians. Another TFL intervention conducted in a laboratory found an improvement of TFL after 6 months (Abrell et al., 2011). A randomized controlled trial in an adjacent work sector reported reduced sickness absence in fire-fighters after a mental health related leadership intervention in the intervention group compared to the control group (Milligan-Saville et al., 2017). Although the latter result seems to be promising, leadership interventions that can be used to support the mental health of followers are rare, particularly in hospitals.

In a recent meta-analysis on controlled leadership training intervention, no effect on followers' mental health could be shown (Kuehnl et al., 2019). The authors included controlled studies from all working-sectors that aimed to improve leaders' interaction or leaders' ability to shape working conditions with the aim to improve followers' well-being, absenteeism, or psychological strain. The authors, however, pointed out the small number of only twenty-one suitable studies and emphasized the need for more leadership intervention studies. Regarding the health care sector, a systematic overview is missing to estimate their potential benefits sector specific.

Taken together, leaders' behavior seems to be associated with followers' mental health. A widely used constructive leadership concept is TFL, that was also related to positive health

outcomes of followers in the health care sector. However, leadership interventions aiming to improve the health of followers have so far been too few. Moreover, approaches to date have not shown sufficient effect. With respect to the health care sector, a systematic overview on leadership interventions targeting followers' mental health is missing.

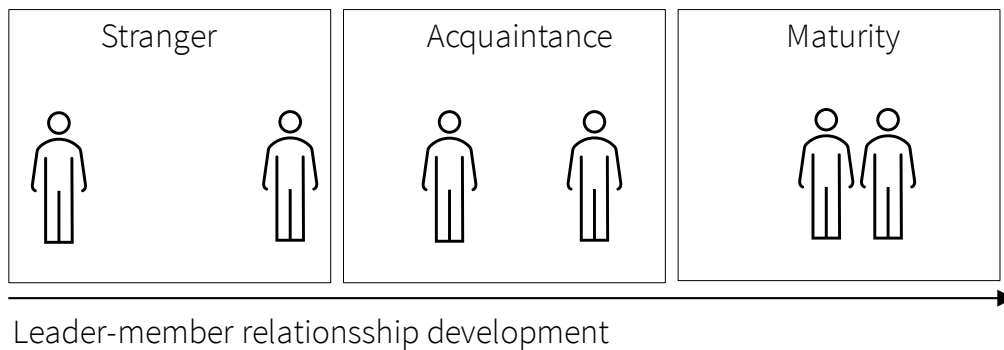
1.4.3 The dyadic leader-follower relationship as a potential path of leaders' stress-preventive influence

The relationship between leaders and their followers is another pathway that has been associated with followers' mental health (Montano et al., 2017). A relational approach that takes the individual, dyadic leader-follower relationship into consideration is the leader-member exchange concept (LMX, Graen & Uhl-Bien, 1995). It postulates that every leader-follower dyadic has a different reciprocal workplace relationship.

Beginning in 1975, Dansereau et al. (1975) investigated this dyadic relationship with a longitudinal qualitative approach. In more detail, they conducted 4 interview waves within 8 months with 60 dyadics of leaders and followers of a public university. They found a division of followers in an "in-group" and "out-group" whereby followers of the former showed a more trustful relationship to their leader as well as better performance. In further studies, Graen and colleagues (Graen et al. (1986); Graen and Uhl-Bien (1995)) investigated how this trustful relationship between a follower and a leader develops. They found three different developmental stages named: "stranger", "acquaintance" and "maturity" (Graen & Uhl-Bien, 1991). Within the "stranger"-stage leader and follower are both mainly interested in their own advantage, they try to meet each other's expectations but do not exceed them. Then one part of the dyad, that is, either the leader or the follower, makes a so-called relationship offer. Upon acceptance of this offer, the stage of "acquaintance" begins, in which a more trustful interactions starts, and information and resources get shared. The third stage is the stage of "maturity" and is characterized by reciprocal respect, trust, esteem, and a high grade of interaction (see Figure 4). But not every leader-follower dyad reaches a mature relationship and not all relations pass through all stages in sequential order, stagnation and repetitions are possible. To measure the LMX quality, the LMX-7 scale has been developed (Graen & Uhl-Bien, 1995).

Figure 4

Leader-member exchange model (LMX)



Note. Adapted from Seifried-Dübon et al. (2019, p. 260)

Research shows an association of a high relationship quality with work-related outcomes like turn over intention, work-performance, or commitment and a high LMX- quality in followers (Dulebohn et al., 2011; Gerstner & Day, 1997; Harris et al., 2009) as well as an association with mental health related outcomes in general as well as in the health care sector. In meta-analytical approaches, a high-quality LMX was associated with followers' mental health and was found to determinate followers' burnout and strain (Harms et al., 2017; Montano et al., 2017). This association was also reported on a day-to day level, as a high LMX was associated with a feeling of belongingness which led to higher well-being in followers (Ellis et al., 2019). The meta-analytical approach from Dulebohn et al. (2011) revealed that the LMX quality was not effected by participants country or work setting.

With view to the health care sector, study results are in line with results from other sectors as LMX effects the turnover intention and job satisfaction of nurses (Kim & Yi, 2019; Pan et al., 2021). Regarding the German health care sector, Gregersen et al. (2014) compared different leadership behaviors and LMX as indicators of followers' well-being, and found high quality LMX as the best predictor. However, in few studies the LMX model has also been associated with followers' or leaders' impaired well-being. Harris and Kacmar (2006) found in their study a curvilinear relationship between followers' strain and their LMX assessment to their leader. Thus, an average LMX quality was associated with the lowest strain values, whereas a high LMX quality was associated with higher strain values on followers' side. The authors explain this relationship through followers working beyond their job description which goes

along with increased stress to reduce their feeling of obligation. Concerning leaders' mental health, the perceived difference in LMX among followers could contribute to the explanation of leaders' job strain and positive affect. Results show that high perceived difference in LMX among followers of one work group was associated with negative well-being in leaders (Bernerth & Hirschfeld, 2016). More recent approaches consider a mature LMX-relationship as an outcome variable itself and define a mature LMX relationship as a kind of social well-being (Stein et al., 2021).

As leaders and followers both contribute to the development of a vertical relationship, the question arises who has the greater influence on the developmental process. Therefore, Dulebohn et al. (2011) investigated in their meta-analysis how the influence on the dyadic relationship development is distributed and found that leader variables (e.g., leadership behavior) could explain the largest variance part of LMX-relationships, thus, leaders seem to play an important part to shape a mature LMX. In line with this, Bass (1999) associated TAL with the unmaturing stage of LMX, while he associated TFL with a mature LMX theoretically. This was also confirmed by several research results, as TFL was strongly associated with a high quality LMX (Lee, 2008; Ng, 2017). Thomas Ng (2017) investigated in his meta-analytical approach a complex mediation model with motivational, social, identical, affective and justice enhancement mechanisms to enlighten the relationship between TFL and followers' performance. LMX as one mediator plays the most important role and mediates the relationship between TFL and all other postulated mediators and the outcome of followers' performance. Thus, LMX plays a crucial role in the way transformational leadership effects follower variables such as performance.

In their article on further research directions on the concept of LMX, Erdogan and Bauer (2015) point out that there is still a limited understanding what leaders can do to develop a mature LMX. Furthermore, there is almost no information how interventions could increase a mature LMX. This is also true for the relationship of single *TFL dimensions* and LMX. To the authors' knowledge, only one study from Ronald Deluga (1992) investigated the association of TFL dimensions and LMX in the context of US military. He found the subdimensions *charisma* and *individual considerations* of a four-dimensional approach of TFL (Bass, 1990) as two predictors of higher LMX.

To sum up, research showed that a mature leader-follower relationship can positively contribute to followers' mental-health and can have an influence on leaders' affective state. Current research defines LMX as social well-being and thereby as an outcome variable by itself. With view to the association of TFL and LMX, previous studies suggest that leaders can positively influence the LMX through their TFL, but it remains unclear which specific TFL dimensions are responsible for this beneficial effect. In addition to date, there has been little research on leader-follower relationships in the German health care sector (Gregersen et al., 2014).

1.4.4 Leaders' own stress-coping as potential indirect pathway on followers' mental health

In a survey from Campbell et al. (2007) on participants of a leadership training center 88% of leaders agreed that work is the major strain source in their lives and that having a leadership position increases their strain. This is not surprising, as leaders are confronted with demanding psycho-social working conditions (e.g., high responsibility, organizational competition, Harvey et al., 2017). Work-related stress is accompanied with the consumption of cognitive resources (Arnsten, 1998), that under no-strain conditions would be available for leaders to form work-place relationships and to lead their followers (Diebig, Poethke, et al., 2017; Harms et al., 2017). Consequently, leaders need sufficient stress-coping skills to reduce unfavorable psychological strain for themselves but also *indirectly* for their followers (Hartney, 2018). First meta-analytically findings show that leaders' own strain and burnout was positively related to abusive leadership behavior and leaders' well-being was associated positively with constructive leadership behavior (Harms et al., 2017; Kaluza et al., 2020). Furthermore, leaders' emotional well-being and strain was associated with followers' mental health (Skakon et al., 2010), and leaders' mindfulness was positively related to followers' well-being and satisfaction (Arendt et al., 2019; Reb et al., 2014).

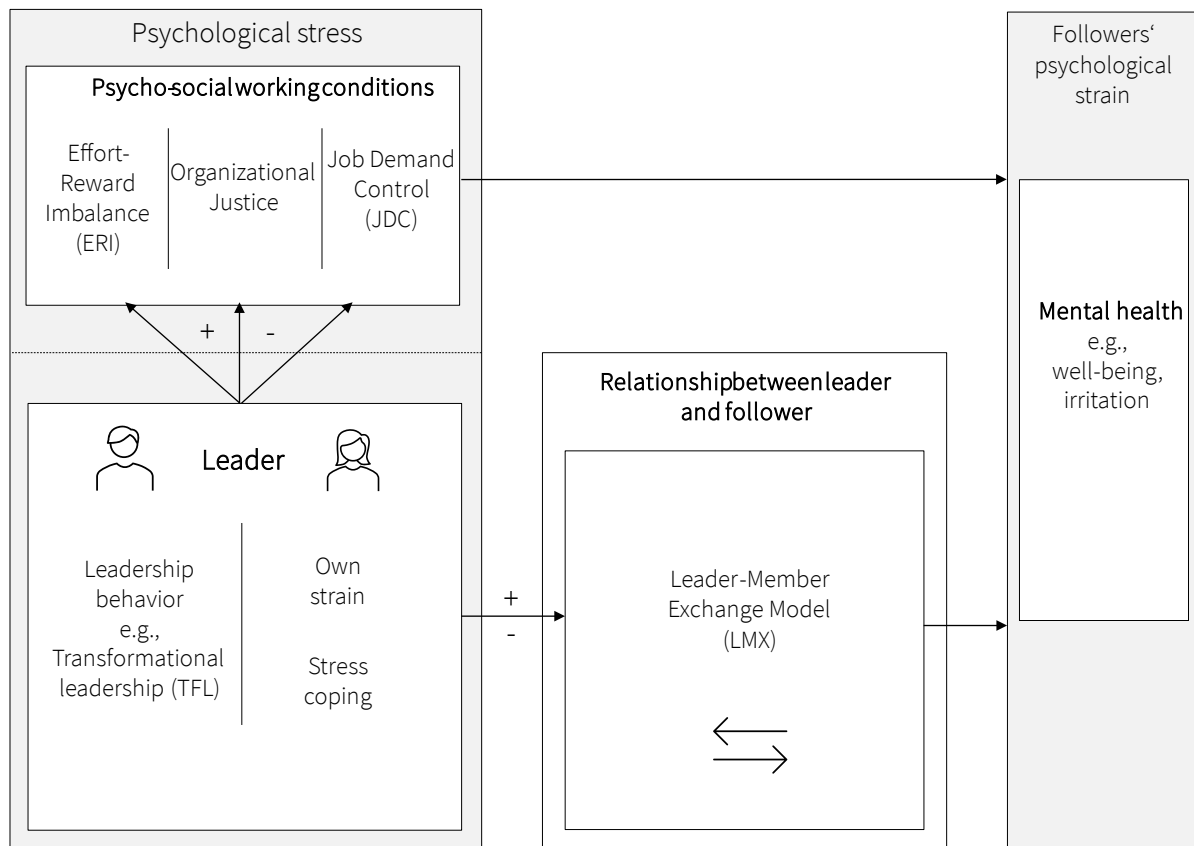
Although leaders' demand of stress-coping interventions is high (Campbell et al., 2007), the number of leader-specific intervention remains very low (Kaluza et al., 2020). Single intervention approaches pointed in a promising direction. For example, leaders that participated in an education program on mental health shared more information about mental health and were more supportive for employees concerning mental health issues (Dimoff & Kelloway, 2018). A mindfulness training reduced strain and increased leadership effectiveness in a pilot approach (Wasylikiw et al., 2015). Additionally, a mindfulness-leadership intervention

showed a reduction in leaders own stress and showed an improvement in leaders TFL two to three months after the intervention (Lange & Rowold, 2019). Moreover, a stress management in leaders of middle management showed an improvement of peer support but also increased perceived demands four months later in their Portuguese fire fighters staff (Ângelo & Chambel, 2013). Regarding the health care sector, stress-preventive leadership approaches seem to be missing (Hartney, 2018) and a systematic overview on existing strain-preventive interventions for leaders is still outstanding.

Taken together the subparts 1.4.1 – 1.4.4, leaders can be seen as key figures in psycho-social stress-management in the workplace. Studies show a high level of evidence that leaders' influence on psycho-social working conditions, their leadership behavior, their way to shape workplace relationships and their own strain contribute to followers' mental health (e.g., Arnold, 2017; Harms et al., 2017; Kaluza et al., 2020; Nielsen, Randall, et al., 2008). This seems to be especially true for leaders of middle management, as they are in close contact with their followers compared to upper management. With view on the health care sector, a systematic overview on stress-preventive leadership interventions is still outstanding. Moreover, there are only a few empirical studies that capture constructive leadership such as TFL and leader-follower relationship quality (e.g., LMX) in the health care sector in general (e.g., Green et al., 2013; Gregersen et al., 2014). As a result, little is known about the status quo of these dimensions in the health care sector, and it remains unclear which core leadership behaviors clinical leaders need to contribute to a high leader-follower relationship quality. Moreover, there is a lack of leadership intervention studies that aim to foster followers' or leaders' mental health and the small number of controlled studies existing showed no effect (Kuehnl et al., 2019). This contrasts with the call for effective leadership intervention approaches in the health-care sector (Stoller, 2014) and the empirical initial situation that illustrated the need of a health care sector specific stress-preventive leadership intervention addressing leaders' key figures position through the four pathways described above.

Figure 5

Summary of the theoretical background



1.5 The field of health services research and the SEEGEN project as frameworks of this dissertation

In the following paragraph, the author gives a brief overview of the research field of health service research with its aim, tasks, and methods as it is the research field where this dissertation project is allocated. Moreover, this paragraph introduces the SEEGEN Project (**SEE**lische **G**esundheit am Arbeitsplatz **K**ranke**N**haus, mental health in the workplace hospital, principal investigators: Prof. Dr. Harald Gündel and Prof. Dr. Peter Angerer) as a health service research project which builds the framework of the dissertation.

Health service research is a rather young research field in Germany. Its beginning is marked by the first congress of German health services research in 2002. It can be defined as *'[...] the scientific study of health care services for individuals and populations with the provision of health-related products and services under everyday conditions.'* (Bundesministerium für Bildung und Forschung, 2016, p. 6). It aims to improve the health care service for all stakeholder (e.g., patients, employees, and the society) with the help of evidence-based approaches. The

tasks of health service research are the description of the current health care service situation, the finding of causal explanations for the current health service situation, the development of new and scientifically based health care service concepts, the evaluation of these new developed scientifically based concepts as well as the examination of the concepts' effectiveness under everyday conditions. Besides quantitative methods also qualitative approaches are needed to assess the changes under everyday conditions after implementation of new health service concepts (Bundesministerium für Bildung und Forschung, 2016).

One health service research project is the SEEGEN Project. It is part of the funding initiative 'Healthy for a lifetime' by the Federal Ministry of Education and Research. The initiative 'Healthy for a lifetime' funds projects that support mental and physical health through different stages of life, as society faces new challenges due to demographic and societal changes which need to be addressed. The SEEGEN project aims to create a multidimensional mental health management approach for the workplace hospital. Besides the development of this new concept, the project comprises an evaluation of its effect on employees' mental health and well-being (Mulfinger et al., 2019). It extends over four years and can be divided into two project phases. The stress-preventive leadership intervention which is part of this dissertation project can be located within the first phase of the project that focused on the development and initial evaluation in piloting approaches of different health centered interventions in the workplace hospital. Thus, this project phase could be allocated in a clinical study approach within phase-IIa. Besides the stress-preventive leadership intervention presented in this dissertation, a top management training, a dilemma competence training for middle management, an intervention on work-family conflicts and a project on healthy aging in professions of the health care sector were developed. The second phase of the SEEGEN Project combines all these new intervention approaches as one complex intervention. The evaluation of the complex interventions as well as its effectiveness is currently being tested in a randomized controlled multi-center study (Mulfinger et al., 2019)

2. Aims of the present work

The overarching research question of this dissertation project is *how stress-preventive leadership can contribute to employees' mental health in hospitals*. To address this research question, the dissertation comprises three studies:

Study 1, a systematic review, addresses the research question *how previous leadership interventions within the health care sector impacted employees' mental health*. It analyses the current state of research on the influence of leadership interventions on employees' mental health in the health care sector as well as intervention type and dose. Study 1 contributes to the overarching research question by revealing effective intervention approaches and theoretical concepts as well as still existing research gaps in a systematic way. Therefore, it lays the groundwork for the future development of a stress-preventive leadership intervention in a hospital.

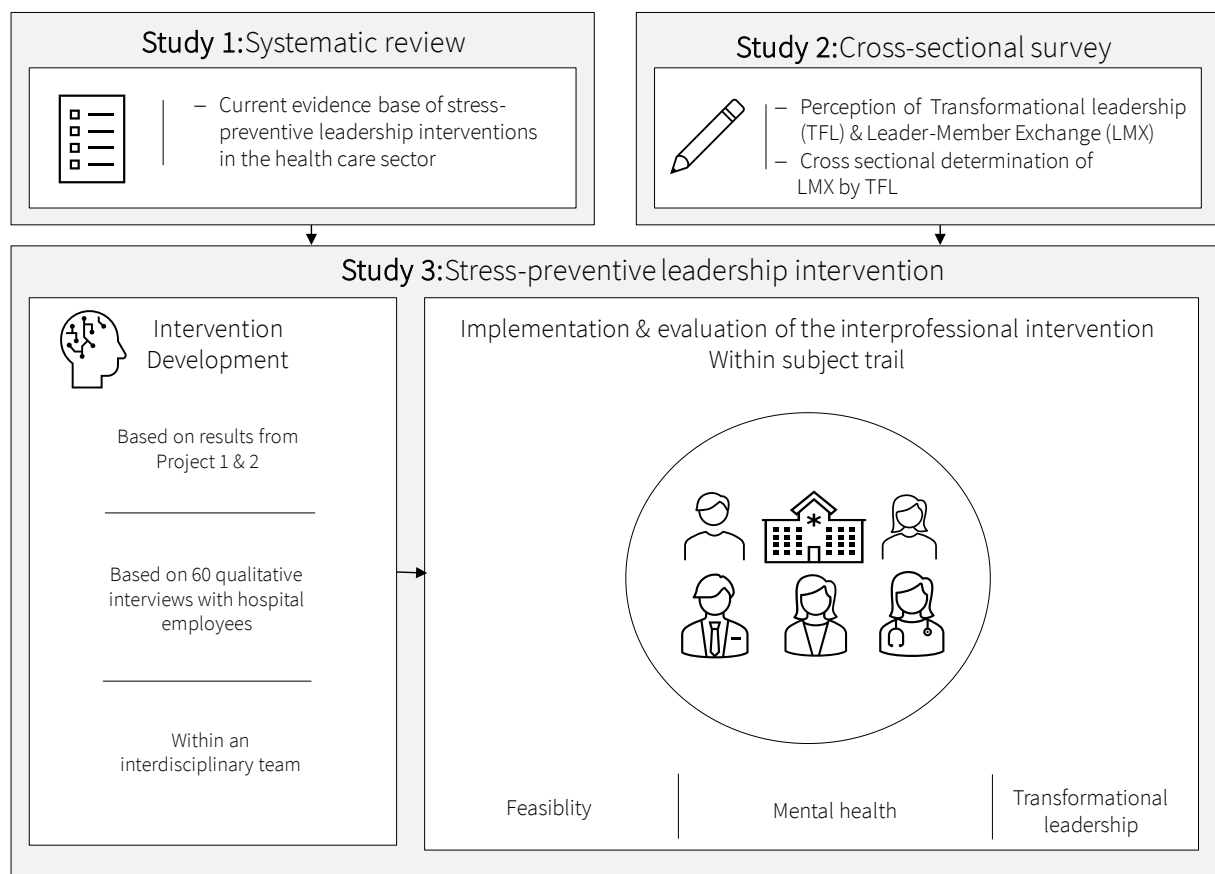
Study 2 investigates the current perception of transformational leadership (TFL) as well as the leader-follower relationship (LMX) as forms of constructive leadership and social well-being in clinical leaders and followers. Therefore, the following research questions were asked: *'How do leaders perceive the quality of their relationship with staff members and vice versa?'*, *'Does the perception of transformational leadership differ between leaders and staff members?'* (Stuber et al., 2019). Additionally, Study 2 contributes to the ongoing research process by examining the association of TFL core-behaviors and leader-follower relationship (LMX) in a tertiary hospital with the following research question: *'In which way are the sub-dimensions of transformational leadership behavior associated with the quality of leader-member relationships from the view of staff members in the workplace hospital?'* (Stuber et al., 2019). With these research questions, Study 2 provides empirical information on the current state of two stress-preventive leadership concepts and their association in the specific context of a German hospital.

Study 3 comprises the development and evaluation of a context specific stress-preventive intervention for hospital leaders. Theoretically, the intervention concept based on the four pathways of leaders' influence on followers' mental health with a focus on leadership behavior specifically on transformational leadership (TFL) and leaders' own mental health. The goal of the evaluations study is to evaluate the feasibility of this new stress-preventive

leadership intervention and to analyze the subjective change of leaders' mental health and TFL (Study 3, see Figure 6). Therefore, the following research questions were asked: 'How do participants evaluate the feasibility and acceptance of the stress-preventive leadership intervention?', 'Do self-rated evaluation of work-related psychological stress, well-being and transformational leadership competency change in participants when measured before the intervention, after the last training session and after the intervention?', 'Has the intervention brought about a change in leaders' everyday work after participating in the intervention?' (Stuber et al., 2022). Study 3 serves as a pilot study in preparation for a randomized controlled trial within the scope of the SEEGEN project and contributes to the research question of this dissertation by presenting a new stress-preventive leadership intervention for hospitals and initial evaluation results on it. Thereby, it opens new perspectives of organizational intervention approaches and stress-preventive leadership in hospitals.

Figure 6

Summary of the aims of the dissertation



3. Results and Discussion

Overall, this dissertation project comprises three studies that investigated stress-preventive leadership in the health care sector especially in hospitals. Table 2 gives an overview on study design, methods, and results on all studies. Additionally, a more detailed description on all studies follows in the next paragraphs. Study 3 included the development of a new stress-preventive leadership intervention as well; the developmental process will be described in the continuous text in paragraph 3.1.3 hereafter. In the discussion section, the results are summarized and placed into the ongoing research process. Moreover, future research implications and practical implications are pointed out. In more detail, methodological aspects as well as potential mechanisms of action and practical implications are discussed.

3.1 Project overview and results

3.1.1 Study 1: Systematic review on stress-preventive leadership interventions in the health care sector (Stuber et al., 2020)

Study 1 is a systematic review summarizing leadership intervention studies conducted in the health care sector aiming to contribute to the mental health of leaders and/or followers. Leadership interventions could be one promising preventive measure as prospective and meta-analytical approaches reported an association between leadership behavior and followers' well-being (e.g., Finne et al., 2014; Lee et al., 2011; Montano et al., 2017), whereas the study of leadership behavior and the association with leaders' own mental health has been largely overlooked (Kaluza et al., 2020).

This project is not the first systematic review on stress-preventive leadership interventions. Kuehnl et al. (2019) conducted a recent meta-analysis on the effects of stress-preventive leadership intervention only on followers' mental health and found no effect. Moreover, Tsutsumi (2011) conducted an unsystematic review of stress-preventive leadership approaches as well on followers' mental health and reported a short effect of stress-preventive leadership interventions. As the perspective on leaders mental health as well as a context specific investigation of stress-preventive leadership interventions in the health care sector is still missing and data situation remains unclear, we conducted a systematic review following the PRISMA guideline (Liberati et al., 2009) to investigate whether stress-preventive leadership

studies targeting leaders' as well as followers' mental health are an effective preventive strategy in the health care sector. The systematic review was registered on the International Prospective Register of Systematic Reviews (PROSPERO, registration number CRD42018088632).

Overall, we found a small amount of seven studies investigating employees' mental health through leadership interventions in the health care sector. The results of the studies differed but pointed into a promising direction. Four out of seven studies showed a hypothesis complying effect on leaders' well-being and occupational strain (Haraway & Haraway, 2005; Luk, 2018) as well as on followers' emotional exhaustion and insomnia (Eastburg et al., 1994; Greenberg, 2006). Two studies reported no effect on employees' mental health (Gabbe et al., 2008; Stansfeld et al., 2015) and one found an associative relationship between mental health and personal work competence (Zimber et al., 2001). Although leadership interventions considerably differed in type (e.g., individual or group setting), dose (amount of intervention hours) and content (e.g., feedback, intervention on organizational justice, or specific leadership styles), we concluded that, interactive group setting with parts of personal reflection and the opportunity to transfer knowledge by practical parts in every day work are potential effective strategies. With respect to methodology, studies showed moderate- to low quality. In terms of future studies, we identified a need of more evaluated stress-preventive leadership interventions in the health care sector to gain a clear picture concerning their effectiveness. Moreover, there is a need of more randomized controlled intervention approaches. Content wise, future interventions should include multiple sources of evidence-based stress-preventive leadership. For example, they should contain strategies for leaders' own strain coping, information on leadership behavior such as transformational leadership, and strategies to shape working conditions according to the stress models Effort-Reward Imbalance (ERI), Job-Demand-Control (JDC) and Organizational Justice.

3.1.2 Study 2: Cross-sectional survey on transformational leadership and leader-member exchange in the workplace hospital (Stuber et al., 2019)

Transformational leadership (TFL) is described as a stress-preventive leadership (e.g., Gregersen et al., 2011; Montano et al., 2017) and could therefore be one way to support employees' mental health in hospitals but little is known about employees' perception of TFL there (e.g., Nielsen et al., 2009).

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Moreover, high dyadic relationship quality between a leader and his or her follower has been associated with followers' mental health in the health care sector (Vincent-Höper et al., 2017) as well. Current approaches define a mature relationship between leader and follower even as social well-being (Stein et al., 2021). Previous research postulated that TFL is associated with a more mature leader-follower relationship (LMX, Bass, 1999) and that leadership behavior like TFL may influence LMX more strongly than followers' variables do (Dulebohn et al., 2011). Although overall TFL was related to a more mature LMX (Howell & Hall-Merenda, 1999; Lee, 2008), it remains almost uninvestigated which of the six TFL core behaviors (fostering innovations, developing a team spirit, having high performance expectations, focusing on followers' individuality, providing a vision and being a role model, Rowold & Poethke, 2017) are related to a mature LMX, and whether these associations may differ between professional groups. Study 2 henceforth investigates the relationship between TFL and LMX in the workplace hospital.

Study 2 is a cross-sectional online survey in a tertiary hospital in Germany. All employees were invited to participate in an online survey. The employed questionnaires asked the 1137 participating employees to assess their relationship with their followers (in case they had leadership responsibilities) or supervisor respectively (in case they had no leadership responsibilities). Furthermore, employees either self-assessed their TFL behavior or assessed the TFL behavior of their direct supervisor respectively. Data were analyzed to depict TFL and leader-follower relationship (LMX) in the workplace hospital as well as to determine how and to what extent LMX is associated with the TFL core behaviors.

First of all, results revealed that hospital leaders and followers differed in their perception of TFL (overall and with respect to all core behaviors separate) as well as in their perception of LMX. In more detail, hospital leaders reported significantly higher scores for both outcomes compared to hospital followers. Compared to a representative German followers' norm sample (Rowold & Poethke, 2017), TFL values of participating followers were significantly lower than values of the norm sample ($t(1148) = 8.97, p < .001$) but could be allocated in the lower average range of t-distribution. This result calls for improvement of TFL in the workplace hospital, as TFL is positively related to followers' mental health (Nielsen, Randall, et al., 2008). Moreover, the rating discrepancy which was observed between participating leaders and followers in their perception of TFL leaves room for improvement since a shorter rating

discrepancy has been associated with better organizational culture (Aarons et al., 2017). Second of all, results on the analysis regarding determination of LMX by the core behaviors of TFL (conducted with the followers' assessments only) showed a strong positive association which is in line with previous research results (e.g., Lee, 2008). Overall, four core behaviors *fostering innovation, individuality focus, providing a vision and being a role model* explained over 70% of LMX variance, whereas the professional groups, which were employed as control variables, could not contribute to the variance explanation. The highest explanatory part was found for the dimensions *individuality focus* and *being a role model*. This is consistent with the results of the only previous study that investigated the association of the TFL core-behaviors and LMX in a military context (Deluga, 1992).

With view to stress-preventive leadership in the health care sector, Study 2 gave an overview on the perception of TFL and LMX in the workplace hospital. The survey revealed that followers perceived TFL in their workplace in the lower average range of t-distribution but significant lower as the norm sample. Moreover, a positive association between four TFL behaviors and relationship quality was found. Knowing which core behaviors are related to high relationship quality, which acts as an important factor of followers' mental health (Gregersen et al., 2014), gives future research a more concrete idea which leadership behaviors need to be fostered in the workplace hospital to contribute to followers' mental health through better LMX. As a transformational leadership style is changeable and trainable (e.g., Kelloway et al., 2000; Saravo et al., 2017), this underpins the need of leadership interventions as an opportunity for leaders to reflect and, if required, to improve their transformational leadership behavior.

3.1.3 Study 3: Development of a new stress-preventive leadership intervention and its evaluation in a pilot study (Stuber et al., 2022)

Hospitals are workplaces with demanding psycho-social working conditions (e.g., Bauer & Groneberg, 2013; Von dem Knesebeck et al., 2010) and with a need for stress-preventive measures. As leaders, especially leaders of middle management, can be seen as key figures concerning stress-prevention in the workplace with different possibilities of action (e.g., leadership behavior, shaping workplace relationships and working condition) multidimensional leadership interventions could be one promising strategy to promote employees' mental health in the workplace hospital. But until now, only a small number of

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stress-preventive leadership interventions were conducted in the health care sector and with mixed results (Stuber et al., 2020). Moreover, from an empirical point of view employees without leadership responsibility perceived transformational leadership (TFL) only as lower average in hospital work environment (Stuber et al., 2019), therefore the training of this stress-preventive leadership style could be a promising approach to support especially leaders of middle management in their key-figure position. Consequently, we decided to develop a multidimension stress-preventive leadership intervention concept for middle management hospital leaders targeting the pathways of leaders' own mental health, leaders' opportunity to shape psycho-social working conditions, leaders' relationship competence and leaders' TFL.

The developmental process of the new stress-preventive leadership intervention was first based on an extensive systematic literature search as presented in Study 1 (Stuber et al., 2020). Second, we conducted 30 telephone interviews with hospital leaders and 30 telephone interviews with hospital followers of all occupational groups (mainly physicians and nurses) to assess the expectations, needs and wishes of both hierarchical levels regarding a new stress-preventive leadership intervention. The interviews were recorded, transcribed, and analyzed qualitatively with the help of the MAXQDA software (VERBI GmbH, 2018) using content analysis (Mayring & Fenzl, 2014). For further description on the qualitative data analysis and the results of the leader interviews see Tsarouha et al. (2021). The results of the qualitative data analysis underpinned the idea of a multidimensional intervention approach. Hospital employees named theoretical knowledge about stress-preventive leadership styles, the practical implementation of supportive leadership skills in leaders' every day work, leaders' own stress coping, strategies to convey stress-coping skills to followers, shaping working conditions with structured guidelines (e.g., concerning duty roster) as well as stress-preventive communication and interaction skills with view to dyadic, team and interprofessional communication as potential intervention contents.

Based on this theoretical and empirical groundwork, we developed an interactive, interprofessional group intervention for hospital leaders. The developmental process was supported by an interdisciplinary team of psychologists, physicians, and an educator. In total, the intervention consisted of one full-day and four half-day modules. The first four modules took place in a bi-weekly rhythm, the last module followed with a 3-month interval. Between the modules the participants were supported via an e-mail reminder and self-chosen practical

tasks. Overall, the new intervention was based on the concept of TFL that was introduced in Module 2 and taken up again in Module 3 and Module 4. Core contents of the intervention were evidence-based stress models (ERI, JDC, and Organizational Justice) and leaders' own stress coping on a theoretical and practical basis (Module 1), leaders' present TFL and their leadership attitude (Module 2), dyadic communication and underlying feedback and listening skills based on needs, stressors and working motives of followers (Module 3) as well as the leadership of teams with a focus on change management (Module 4). Module 5 served as a venue for the exchange between leaders and the reflection of the practical phase between Module 4 and Module 5. For a detailed description and graphic illustration of the module content and the underlying theoretical constructs see Stuber et al. (2022) and Figure 7. Didactically, the intervention was structured with short impulse lectures, individual work for reflection and small group work. Additionally, a workbook accompanied the participants' reflection within the sessions as well as their everyday work between the modules.

The new stress-preventive leadership intervention was investigated in a longitudinal pilot study with a within subject design. In addition to feasibility and acceptance concerning the stress-preventive leadership intervention, participants' irritation, well-being and TFL were assessed over three timepoints (at the beginning of the intervention, T0; directly after Module 4, T1; and after a three month follow up at the beginning of Module 5, T2). Besides this longitudinal measurement, qualitative focus group discussions were conducted to examine leaders' individual intervention success and transfer in their everyday work in Module 5. Overall, 93 hospital leaders of middle management participated in the leadership intervention within 5 consecutive intervention runs. At the end of the intervention, still 62.3% of participants took part and 64.1% participated in the follow-up session. The dropout rates can be explained by clinical duties, illnesses and holydays. Data of 88 participants could be used for inference statistical analysis.

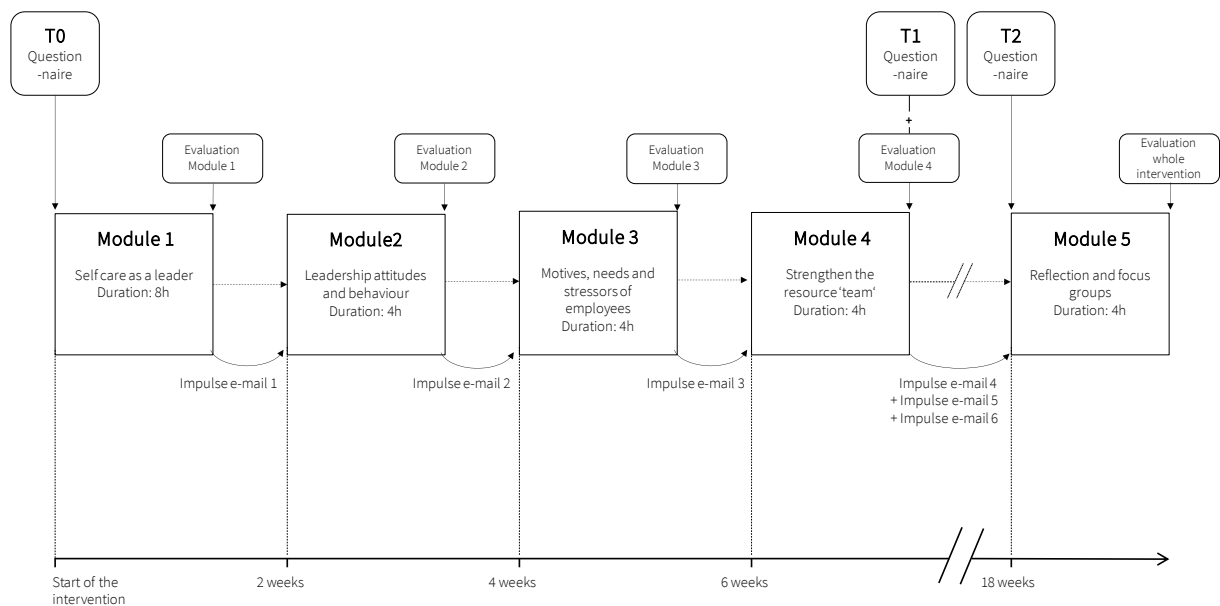
Quantitative results of the evaluation showed that the new stress-preventive leadership intervention was rated as feasible and highly accepted by the participating leaders. Beyond this, participants reported a significantly reduced cognitive irritation, significantly higher well-being and a significantly higher TFL competence over time. Whereas the perception of cognitive irritation and well-being had already changed between T0 and T1, the perceived leadership competence had changed time-delayed to the third measurement point (T2). In focus group

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discussions, participants reported a sensibilization concerning the topic *mental health in the workplace*, they noticed a positive change in their own *strain coping*, they commented on their *improved communication skills* and would have established *social relationships to their followers* in a more profitable way. All named changes were attributed to the stress-preventive leadership interventions by participants themselves.

Figure 7

Intervention procedure



Note. Figure was cited from Stuber et al. (2022, p. 3)

Table 2

Project overview

	Study 1: Systematic review on stress-preventive leadership	Study 2: Cross-sectional survey on transformational leadership (TFL) and Leader-Member-Exchange (LMX)	Study 3: Development of a new stress-preventive leadership intervention and its evaluation in a pilot study
Design	Systematic review according to the PRISMA guidelines (Liberati et al., 2009) to summarize stress-preventive leadership interventions in the health care sector	Cross sectional online survey on the perception of TFL and LMX in the workplace hospital and the determination of LMX by TFL core behaviors	Longitudinal mixed-method pilot study to evaluate the feasibility, leaders' mental health and leadership behavior in a within subject design
Sample	734 employees in the health care sector, $n = 86$ leaders, $n = 648$ followers	1137 hospital employees, $n = 315$ leaders, $n = 822$ followers	93 hospital leaders of middle management
Statistical analysis	-	<ul style="list-style-type: none"> - T-Test - Multiple linear regression analysis 	<ul style="list-style-type: none"> - Linear mixed models
Independent variables	-	<p><i>T-Test</i></p> <ul style="list-style-type: none"> - Hierarchy level (leaders vs. follower) <p><i>Multiple linear regression analysis</i></p> <ul style="list-style-type: none"> - Core behaviors of TFL (from followers' perspective) - Professional group (control variable) 	<ul style="list-style-type: none"> - Time (T0 vs. T1 and T0 vs. T2)
Outcome variables	Leadership interventions that contribute to leaders' and / or followers' mental health (e.g., subjective well-being, distress, absenteeism, insomnia) in the health care sector	<p><i>T-Test</i></p> <ul style="list-style-type: none"> - Perceived TFL (from leaders' and followers' perspective) - Perceived LMX (from leaders' and followers' perspective) <p><i>Multiple linear regression analysis</i></p> <ul style="list-style-type: none"> - Leader-Member-Exchange (from followers' perspective) 	<p><i>Quantitative variables:</i></p> <ul style="list-style-type: none"> - Feasibility and acceptance of the intervention - Participants' well-being - Participants' irritation - Participants' transformational leadership <p><i>Qualitative variables:</i></p> <ul style="list-style-type: none"> - Participants' subjective changes in their everyday leadership behavior

Main results

- Available data are scarce: Seven suitable studies with moderate to low quality out of 11221 initial research hits were identified
- Mixed evidence with view to interventions' outcomes: two studies showed an improvement in leaders' mental health over time and two studies showed an improvement for followers' mental health, three studies showed no difference in mental health outcomes over time
- Effective interventions were divided over several days and reflective and interactive methods within group settings were used
- The health promoting effect on TFL was not investigated
- Leaders and followers differed significantly in their perception of TFL and LMX.
- Leaders perceived their TFL behavior higher as followers did. And leaders perceived their LMX to one exemplary follower higher as follower perceived LMX to their direct leader.
- Followers' perception of TFL tended towards the lower average compared to a German representative sample
- From a followers' perspective, the TFL core behaviors *fostering innovation, individuality focus, providing a vision and being a role model* were significant determinants of their perceived LMX. Factors with the highest contribution were *individuality focus* and *being a role model*. This association was independent from professional group affiliation.

Quantitative variables:

- High feasible intervention with high acceptance from participants' point of view
- Participants' well-being and transformational leadership has been significantly improved over time
- Participants cognitive irritation has been significantly reduced over time

Qualitative variables:

- Participants reported a successful implementation of intervention contents in their everyday work

Interpretation

More research on stress-preventive leadership interventions in the health care sector is needed. Group interventions which foster the interaction and reflection seem to be promising approaches.

This study explored how leaders' TFL behavior could contribute to followers perceived relationship quality as one way to prevent followers' strain in the workplace hospital and pointed out a need for more TFL in German hospitals.

This new stress-preventive leadership intervention was highly accepted and feasible and pointed to first promising changes in hospital leaders concerning their mental health and leadership behavior.

This new intervention approach needs to be evaluated in a randomized-controlled trial as a next step.

3.2 Discussion

3.2.1 Core results

This dissertation investigate how stress-preventive leadership can contribute to employees' mental health in hospitals. Therefore, Study 1 summarized the current research on stress-preventive leadership intervention for the health care sector within a systematic review. It revealed a lack of stress-preventive leadership interventions in the health care sector with very heterogenous study designs and intervention content. Overall, interventions showed mixed effectiveness with view to leaders' and followers' mental health. In more detail, two studies showed an improvement in leaders' mental health over time, two studies showed an improvement for followers' mental health and three studies did not find a longitudinal effect on followers' or leaders' mental health. Moreover, transformational leadership (TFL) as an evidence-based stress-preventive leadership style has not been investigated in an intervention to improve employees' mental health in the health care sector. Study 1 gave an overview on relevant intervention research to date.

In addition to this theoretical approach, in Study 2 we examined transformational leadership (TFL) and leader-member exchange (LMX) as constructive leadership behaviors in the context hospital empirically and thus supplemented the still thin data situation on stress-preventive leadership behavior in this working context. Results showed a discrepancy between leaders' and followers' TFL perception as well as a lower perception of TFL behavior from followers' point of view compared to a representative German norm sample. To get an idea of how leaders contribute to the leader-follower relationship quality as a form of social well-being through their concrete leadership behavior, we analyzed the association between TFL and the quality of leader-member exchange (LMX) from followers' perspective in more detail. Results from a multiple linear regression analysis showed that a focus on *individuality, leaders' role model behavior, showing a vision and encouraging innovations* determinated followers' perceived LMX. This result contributed to the literature by providing an indication of how hospital leaders could foster their relationship to their followers and how they could thereby indirectly contribute to followers' mental health through an improved LMX.

Based on these theoretical and empirical research work, Study 3 contributed to the development of a new multidimensional stress-preventive leadership intervention for hospital leaders of middle management with a focus on transformational leadership (TFL). To examine this new stress-preventive leadership intervention we conducted a pilot study with a mixed method approach. Participants reported an improved mental health as well as an increase of TFL over time. They assessed the new intervention approach as feasible and attributed changes in constructive leadership behavior and strain coping to the participation in the stress-preventive leadership intervention. With the development of this stress-preventive leadership intervention we contributed to a structured health management in German hospitals. The development and evaluation of this new stress-preventive leadership approach was part of the first phase of the SEEGEN project. A project funded by the Federal Ministry of Education and Research to improve the employees' health management in German hospitals. In the second phase of SEEGEN, which is conducted currently, the effectiveness of Study 3 with view to leaders' and followers' health is investigated as part of a multi-center randomized controlled trail.

3.2.2 Interpretation of results

As Study 1 and 2 laid the groundwork of Study 3, the author will mainly focus on Study 3 within the following discussion parts. To interpret the results of Study 3 against the scientific background, the author compared previous studies on stress-preventive leadership from Study 1 and from other working contexts with the pilot study conducted in Study 3 regarding *measurement methods, study design, sample size, intervention variables* and *outcome variables*. After this detailed discussion, the author places the entire dissertation project in the context of health psychology.

Regarding Study 1, the results of our review were partly in line with previous and later reviews as well as meta-analysis on stress-preventive leadership (Dannheim et al., 2021; Kaluza et al., 2020; Kuehnl et al., 2019; Tsutsumi, 2011). All recent approaches found insufficient data to make a clear contribution to the effectiveness on stress-preventive leadership interventions and emphasized the need of more methodologically sophisticated interventions. With view to RCTs, Kuehnl et al. (2019) found in their recent meta-analysis one RCT on stress-preventive leadership interventions targeting employees' mental health and Tsutsumi (2011) reported in their systematic review three RCTs. Both author groups

emphasized the need of more RCTs to evaluate the effectiveness of leadership interventions on employees' mental health. Moreover, Kaluza et al. (2020) underlined the need of RCTs with view on the causal relationship of leaders' own strain and leadership behavior. Due to the effectiveness of stress-preventive leadership interventions, Kuehnl et al. (2019) stated that leadership interventions are not effective concerning followers' mental health. Dannheim et al. (2021) concluded that the effectiveness of leadership-intervention is rather small. With view to the health care sector, our review revealed a mixed picture with view to employees' mental health with half of the studies showing a significant improvement.

Study 2 supplemented the data on transformational leadership (TFL) in German hospitals and showed that TFL needs to be improved from a follower's perspective. Since TFL is postulated to be stress-preventive (Montano et al., 2017) this offers a starting point for organizational preventive health measurements in the German health care sector that need to be examined in further research. With regard to the determination of LMX, we found the same dimensions determining LMX as Deluga (1992), who examined the association of TFL and LMX in the military context. Moreover, Vincent-Höper et al. (2018) found in their study in the German health and social sector that LMX in the most stress-preventive measure compared to other health related organizational measurements. Therefore, this cross-sectional approach gave a hint how hospital leaders could foster the social dimension in their workplace as an important stress-preventive measure. The relationship of TFL and LMX needs to be examined in future intervention study approaches such as Stein et al. (2021) did in their RCT on supportive leadership and LMX in childcare centers. The results showed that the supportive leadership intervention increased the social well-being in form of LMX in followers significantly one month after their leaders participated in the intervention. This was moderated by the quantitative workload of followers at baseline. Intervention was effective in followers with middle and high quantitative workload at baseline but not with low. This approach could be taken as model to examine the longitudinal association of TFL and LMX in consideration of moderating working conditions as well. This would also answer the call for more intervention research to improve LMX and to explore possible causal relationships (Erdogan & Bauer, 2015).

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To interpret the results of Study 3, different aspects such as *measurement methods*, *study design*, *sample size*, *intervention variables* and *outcome variables* will be set into the current research context.

Measurement methods. With view to the *measurement methods* our study was in line with all previous stress-preventive leadership studies in the health care sector (Eastburg et al., 1994; Gabbe et al., 2008; Greenberg, 2006; Haraway & Haraway, 2005; Luk, 2018; Stansfeld et al., 2015; Zimber et al., 2001) by focusing on quantitative valid questionnaires (WHO-5, Irritation Scale, FiF). Moreover, we also added a qualitative approach to assess leaders' intervention evaluation and change process which was in line with previous stress-preventive leadership intervention studies as well (Haraway & Haraway, 2005; Luk, 2018; Stansfeld et al., 2015). With our mixed method approach, we set up our measurement methods broadly to capture both, subjective perceptions, and valid psychological construction.

Study design. Looking at the *study design* our study was in line with previous stress-preventive leadership interventions with focus on leaders as outcome assessors (Haraway & Haraway, 2005; Luk, 2018) and by using an explorative design of a cohort study, whereas Gabbe et al. (2008) were so far the only authors conducting a RCT. RCTs are so far the exception among stress-preventive leadership interventions in the health care sector but also with view to stress-preventive leadership interventions across all sectors (e.g., Dannheim et al., 2021; Kuehnl et al., 2019). Therefore, our new stress-preventive leadership approach is investigated as part of a multi-center RCT within the SEEGEN project. This further research step will allow to investigate whether the here presented broad and multi-layered intervention concept has a positive impact on employees' mental health and thus differs from the results of Kuehnl et al. (2019) who did not find an effect of stress-preventive leadership interventions on followers' mental health. If an effect is found, this will support previous associative approaches that reported a positive association between constructive leadership behavior and employees' mental health (e.g., Kuoppala et al., 2008; Skakon et al., 2010).

Sample size. With view to the *sample size*, our study surpassed the amount of investigated leaders (93 leaders) of all previous stress-preventive leadership interventions in the health care sector so far (Stuber et al., 2020). With this higher sample size, we were able

to assess the feasibility and acceptance in a more representative way, since a higher sample size also increases the probability of more different leader personalities evaluating our intervention. With view to their TFL behavior participating leaders did not appear to differ at the beginning of the intervention (T_0 , $M = 3.87$, $SD = 0.49$) from the survey sample from Study 2 ($M = 3.98$, $SD = 0.48$). Since both projects were conducted at the same hospital, it can at least be assumed that the participants from Study 3 were representative of the leadership group at the hospital under study.

Intervention variables. The length of our intervention (24 h total duration) exceeded the length of previous stress-preventive leadership interventions in the health care sector (Stuber et al., 2020). The longer duration of the new stress-preventive leadership approach was due to our very broad intervention concept. More intervention time was needed for its theoretic teaching and practical application. Whether a longer duration is an advantage with view to the subjective well-being and improved TFL behavior cannot be answered within the scoop of this dissertation but would be a research question for future intervention studies, as an economic intervention design would be in the sense of the participants.

In terms of intervention setting, only two other previous stress-preventive leadership interventions in the health care sector used an interprofessional composition of the participating leaders (Haraway & Haraway, 2005; Stansfeld et al., 2015). Within our focus group discussions, leaders appreciated the interprofessional exchange with other leaders of middle management. During the implementation, the idea of intervision groups occurred to perpetuate the interprofessional contact. This idea would tie in with the peer-tutoring approach of Gabbe et al. (2008) and emphasizes the need of group membership and exchange for well-being, as team-member exchange has been shown as a buffering factor of employees' unfavorable strain (Schermyly & Meyer, 2016). This seems to be an important aspect especially for hospitals as first qualitative approaches detected a poor interprofessional teamwork between physicians and nurses (O'Connor et al., 2016).

Concerning the intervention content, our concept of stress-preventive leadership was broader than most of other stress-preventive leadership concepts in the health care sector (Stuber et al., 2020). Moreover, despite the frequently documented association between transformational leadership (TFL) and employees' well-being (e.g., Montano et al., 2017) no other stress-preventive leadership intervention in the health care sector included

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theoretical or practical components of transformational leadership to improve mental health (although other leadership interventions not aiming to measure mental health already used TFL e.g., Abrell et al. (2011); Saravo et al. (2017)). Moreover, six out of seven studies did not even focus on an evidence-based leadership concept at all. Only Luk (2018) investigated the concept of servant leadership, a constrictive leadership behavior that emphasizes the moral and ethical aspects of leadership (Hoch et al., 2018). The paucity of evidence-based leadership concepts in the context of stress-preventive leadership interventions in the health care sector points to a gap between the high number of theoretical approaches (e.g., Arnold, 2017; Montano et al., 2017) and the small amount of practical investigations on TFL which we contributed to close. With view to other economic sectors, Tsutsumi (2011) and Dannheim et al. (2021) did not find any RCT in their review investigating a TFL intervention and their influence on employees' mental health. Moreover, Kuehnl et al. (2019) could only include one RCT in his systematic review investigating a training drawing on TFL in the banking sector. It showed an improvement of TFL from followers' point of view (Barling et al., 1996).

Taken together, constructive, and evidence-based leadership approaches such as TFL need to be transferred from theory to practical intervention studies. Currently, there is still a need of such leadership interventions in the health care but as well in other economic sectors. With our intervention we contributed to this process and were, together with, for example, Luk (2018) and Saravo et al. (2017), pioneers in the field of health care.

Outcome variables. With view to TFL as an outcome variable in general, leadership interventions in the health care sector and other related sectors showed an improvement of TFL through leadership interventions. For example, Saravo et al. (2017) implemented an intervention in the resident medicine and showed a significant improvement of TFL in physicians of the intervention group with a high effect size. Furthermore, a leadership intervention for nurses comprising different supportive leadership styles, among others TFL, assessed an improvement of measured leadership behaviors compared to a control group (Shirazi et al., 2016). Furthermore, Abrell et al. (2011) found a leadership intervention effect on leaders' TFL in a drug laboratory after, six, nine and twelve months from followers' perspective. The subjective improvements of TFL in participants of Study 3 can be seen in

line with the above-named results and need to be confirmed in a RCT considering followers' TFL assessment of their leader.

Besides TFL, participants' mental health was assessed in Study 3. Taking a closer look at the outcome variables of previous stress-preventive leadership interventions in the health care sector, three out of seven assessed mental health outcomes in health care leaders (Gabbe et al., 2008; Haraway & Haraway, 2005; Luk, 2018). Whereas Gabbe et al. (2008) and Haraway and Haraway (2005) assessed negative forms of mental health in form of burnout and psychological strain, Luk (2018) concentrated on the positive forms of mental health in form of well-being. Our study extended the outcome range compared to previous stress-preventive leadership studies in the health care sector and assessed both, negative forms (irritation) as well as positive forms (well-being) of mental health. With the examination of these outcomes, the range of short-term work-related consequences of psychological strain and long-term more general consequences of psychological strain (Rohmert, 1984) was depicted. Whereby, irritation (Mohr et al., 2005) belonged to the short-term work-related strain consequences and well-being (Topp et al., 2015) was part of long-term more general strain consequences. Parallel to our intervention a positive change of both variables could be observed. This result was in line with the results of Luk (2018) and Haraway and Haraway (2005). Haraway and Haraway (2005) found a reduction of occupational strain in participants, whereas Luk (2018) reported an improvement of participants' well-being over time. With view to other workplace sectors, stress-preventive leadership interventions were also examined. For example, a leadership intervention conducted in a production site was found to reduce psychological exhaustion in participants slightly (Barrech et al., 2018).

In Study 3, participants' perception of cognitive irritation and well-being changed significantly from before to directly after the intervention and remained on an improved level until the three-month follow-up measurement point. As no stress-preventive leadership intervention in the health care sector with leaders as outcome assessors used a follow-up measurement point, it seems useful to look at other kinds of stress-preventive interventions to frame the results of our intervention. Ruotsalainen et al. (2015) conducted a systematic review on stress-preventive measures in health care employees. In their review, cognitive-behavior therapy (CBT) based interventions were shown to be effective one month

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after the end of the interventions. Effectiveness persisted in seven out of fourteen studies between one and six months, in two studies a strain reduction was observed even six months later. No difference between CBT interventions with relaxation components and CBT intervention without relaxation components were found. Pure physical or mental relaxation interventions also showed an effect on employees' strain. As well as the CBT studies, most relaxation studies reported an intervention effect between one and six months after the end of the intervention. Our stress-preventive intervention approach also comprised mental relaxation parts in form of mindfulness practice and CBT parts in form of situation analysis to understand one's own stress reactions and negative reinforcing thoughts. Thus, our results could be taken to parallel those of Ruotsalainen et al. (2015) as participants' subjectively improved mental health persisted until at least the follow-up measurement time of three months. As part of future studies, the hypothesis could also be tested how a stress-preventive leadership intervention could contribute to the mental health of participating leaders or even their followers outside the workplace. First leadership interventions found a positive effect on employees' family relationship (Brady et al., 2021). Brady et al. (2021) conducted a supportive leadership intervention within a RCT and found a positive effect on employees' partnership relationship nine month later. Besides the changes in their partnership relationships, employees with a high strain level also showed improvements in their parental relationships and thus appear to benefit in two ways.

When combining our observations on leaders' TFL behavior and mental health, a time lagged change structure occurred. Whereas cognitive irritation and well-being improved directly after the intervention and remained stable, the subjectively perceived changes in TFL occurred after the three-month follow-up period. The relationship between leaders' own mental health and their leadership behavior has only recently become the focus of research interest. A meta-analysis from Kaluza et al. (2020) reported a positive association between the facet of long-term work-related well-being with constructive leadership behavior and reported a more pronounced association between change-oriented leadership with leaders' well-being compared to relation-oriented leadership styles. With view to our study, TFL can be defined as constructive as well as change oriented. Moreover, irritation (Mohr et al., 2005) mapped work-related well-being and the used well-being questionnaire (Topp et al., 2015) a general, stable construction of well-being. Taken

these parallels into account, in our study the results of leaders' mental health could be interpreted together with the results of leaders' TFL when considering the results of Kaluza et al. (2020). In more detail, the time lagged improvement of TFL could be used to hypothesize that a favorable mental health of leaders is the prerequisite for TFL behavior. From a practical standpoint, this would underscore the need of leaders' own stress-prevention for leaders' but also for followers' benefit. From a research point of view this would underline the need of a follow-up measurement to capture changes in mental health followed by time-lagged changes in leadership behavior to proof this hypothesized causal relationship of leaders' mental health and their leadership behavior. As Kaluza et al. (2020) already mentioned, it is important to proof potential causal relationships between leaders' mental health and constructive leadership behavior as a next research step and, when considering our results, to test a time-lagged improvement (e.g., via latent growth models, Kaluza et al., 2020). Regarding the study of Zwingmann et al. (2016) also the potential long-term negative consequences of TFL for leaders themselves should be considered. Zwingmann et al. (2016) found in their longitudinal regression analysis that leaders' TFL determinates leaders' own emotional exhaustion two years later. The authors assumed that TFL is a resource intensive leadership approach that needs more personal capacity and resources then it refills which would lead to reduction of personal resources and an increase of personal strain long-term.

To place the evaluation (questions on feasibility and qualitative focus groups) in a theoretical evaluation concept, the questions on feasibility and the qualitative focus groups can be allocated to the levels one to three of the four-stage Kirkpatrick Model for training evaluation (Kirkpatrick & Kirkpatrick, 2016). The Kirkpatrick Model is a theoretical framework of Dr. Don Kirkpatrick to create effective intervention evaluations which postulates four different evaluation levels. Level one named 'reaction' comprises the direct reaction of participants on an intervention. In Study 3 the questions on feasibility, in more detail the questions on participants' satisfaction, recommendation and practical transfer can be assigned to level one of the evaluation model. Moreover, the qualitative focus groups can be allocated on level two 'learning' and level three 'behavior'. The qualitative focus groups at the follow-up measurement time point, three months after the end of the intervention, were conducted to map participants' individual change processes concerning their stress-

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preventive leadership behavior in everyday work as hospital leaders. Participants reported an improvement of their own stress-preventive behavior, a positive change in their workplace relationships to followers and a higher awareness for the topic mental health in general in the areas of knowledge, attitude, and behavior. To allocate these results in the Kirkpatrick Model, level two comprises the aspects of knowledge, attitude, and behavior that participants should learn by participating in an intervention. And level three depicts the practical transfer of learned content in participants' everyday work. Consequently, information to the levels two and three were given in the qualitative focus groups and analyzed in parallel to these criteria. Regarding comparable empirical studies, the other studies on stress-preventive leadership interventions in the health care sector Stansfeld et al. (2015), Haraway and Haraway (2005) and Luk (2018) conducted qualitative analyses as well. Whereas Luk (2018) was in line with our approach and assessed the intervention's effect on participants, Stansfeld et al. (2015) as well as Haraway and Haraway (2005) conducted interviews to analyze participants' acceptance as well as to assess the working context of participants.

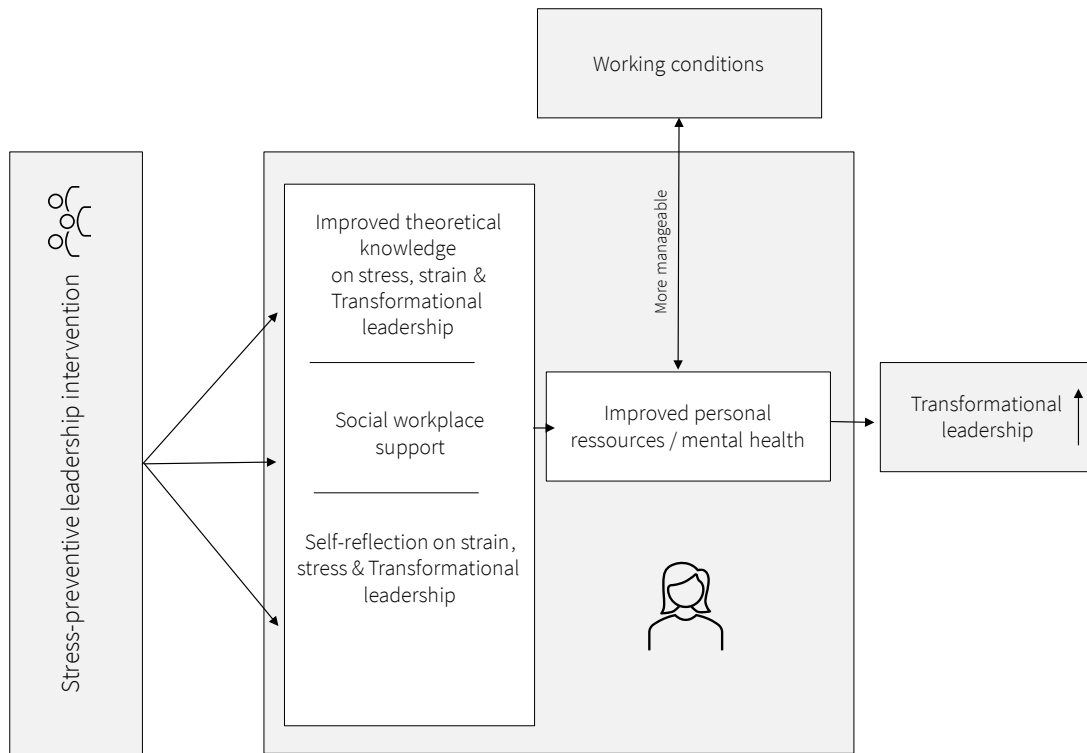
In general, the use of qualitative approaches can contribute to an understanding of the subjective intervention's mechanisms of action. Their frequent use in current stress-preventive leadership research highlights how little is known about mechanisms of action of stress-preventive leadership interventions as it is still unclear what intraindividual changes occur after participation in the intervention until the improvement in mental health and leadership behaviors is measurable (Kaluza et al., 2020).

With view to the here newly developed and piloted stress-preventive leadership intervention, the mechanisms of action could be highly complex. The following paragraph attempts to identify possible theoretical relationships that could explain the subjectively improved TFL. These associations could be explored in further studies. Due to its didactic and thematic diversity, the stress-preventive leadership intervention could impact the individual variables of *theoretical knowledge*, *perceived workplace support* and *leaders' self-reflection*. In more detail, impulse lectures on the current state of research could improve participants' knowledge on stress, strain, and TFL on a theoretical level. This could be assessed by knowledge test as already used in educational research (e.g., Tschannen et al., 2018). In addition, the group setting, and the small group work within the evaluated

intervention approach could amount to a relational level and thereby could increase the perception of workplace support. This would be in line with previous research that showed in a regression analysis that social support determinates informal learning processes in health care leaders positively (Ouweneel et al., 2009). Moreover, the reflective parts of the intervention could contribute to an individual process of self-reflection on stress and strain as well as on TFL on the levels of knowledge, attitude, and behavior as postulated on the second level of the Kirkpatrick Model of training evaluation (Kirkpatrick & Kirkpatrick, 2016). This would be in line with the theoretical framework of Nesbit (2012) that postulates that self-reflection is a meta-skill that is important for leaders' self-change and thereby contributes to the improvement of leadership behavior. The improvements in theoretical knowledge, social support and self-reflection could lead to improved personal resources as an important part of mental health (GDA-Arbeitsprogramms Psyche, 2017). Consequently, working conditions could be evaluated, as postulated by Lazarus and Folkman (1984), due to improved resources / mental health as better manageable, which in turn could lead to improved mental health. Less strain could result in more free cognitive resources which could lead to more TFL behavior (e.g., Harms et al., 2017, see Figure 8)

Figure 8

Potential mechanism of action



Note. The arrow pointing upwards shows an increase of transformational leadership

With view to the wider context of health psychology, this dissertation project contributes to the understanding of the *social dimension* in the occupational context of the health sector. As stress models such as Effort-Reward Imbalance (ERI), Job-Demand-Control (JDC) and Organizational Justice (see paragraph 1.3) gave concrete approaches to improve working conditions in a stress-preventive way, a dimension that connects these established stress models and sets a unifying framework is still missing (Junne & Zipfel, 2019). Stress-preventive leadership could depict such a dimension. Furthermore, this dissertation project may represent an empirical contribution to the theoretical model of salutogenesis. The integrative approach of salutogenesis (Antonovsky, 1997; Faltermaier, 2017) maps the individual development of health. It postulates that external conditions such as workplace stressors influence a person's health. In this model, health is understood as a continuum from health to illness. How the workplace stressors influence this continuum (e.g., in a positive or negative way) depends mainly on a person's sense of coherence (SOC), the core concept of salutogenesis (Blättner, 2007; Faltermaier, 2017). In the work context, SOC means

that work is perceived as plannable and predictable (comprehensibility), that the demands placed on a person appear feasible (manageability) and meaningful (meaningfulness, Felfe et al., 2018). The concept of SOC was strongly associated with mental health (e.g., Eriksson & Lindström, 2006) and therefore plays an important role for mental health preventive approaches in the work context. Stress preventive leadership, in more detail transformational leadership (TFL), has been named as a leadership that fosters the meaningfulness of work in terms of the SOC in followers (Felfe et al., 2018). This dissertation project addresses how leaders can instill a sense of coherence (SOC) in their hospital followers by developing and evaluating a transformational leadership-based intervention. Moreover, it tries to foster the SOC of leaders themselves by informing and practicing stress-preventive leadership to make this concept more comprehensible, manageable, and meaningful in the specific work context of hospitals. The influence of the here presented leadership intervention on the SOC of leaders and followers could maybe be investigated in future research. More implication for future research will be lined out within the next paragraph.

3.2.3 Implications for future research on leadership interventions focusing on stress-prevention

To line out future research implications regarding stress-preventive leadership interventions, the author discusses in the following paragraph methodological aspects of outcome assessment, contexts dependency / independency and fitting target groups (see Figure 9).

As a next step, the effectiveness of the here presented stress-preventive leadership intervention on leaders' and followers' mental health needs to be tested. This will be done within the SEEGEN project as lined out before. With view to stress-preventive leadership interventions in general, mainly methodological improvements are needed as methodological standards remained low previously (Dannheim et al., 2021; Kuehnl et al., 2019; Stuber et al., 2020). Intervention approaches need to be tested within a RCT against a treatment as usual condition or against another intervention approach to assess whether a stress-preventive leadership intervention influences leaders and/or their followers. This would be important as first meta-analytical approaches did not find an effect of leadership interventions on followers' mental health (Kuehnl et al., 2019) and thereby contradict

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established cross-sectional approaches (e.g., Montano et al., 2017). Moreover, with view on leaders' own mental health and their leadership behavior, meta-analytical approaches point towards a promising direction but longitudinal data basis remains unclear (Kaluza et al., 2020).

As the evaluation of leadership interventions can only be conducted as field experiments, contextual factors can play a crucial role. For example, regarding the workplace hospital the recent COVID-19 pandemic has changed the working environment of hospital employees' significantly and influenced employees' mental health in an unfavorable way (e.g., Salari et al., 2020). Thus, like Kuehnl et al. (2019) mentioned, a careful documentation of the contextual factor is needed to soundly evaluate the effectiveness of a leadership intervention.

Another methodological point is the assessment of outcomes. Due to the pilot study design and our intervention's focus on leaders' intraindividual perceived mental health, we used subjective questionnaires which was in line with previous approaches (Haraway & Haraway, 2005; Luk, 2018). Nevertheless, 360° feedback could be established for behavioral outcomes such as TFL behavior. Using this approach, changes in participants' TFL behavior would be assessed by themselves as well as by their own supervisors and their direct followers. Followers and supervisors should be blinded to avoid a contamination through their own expectations on intervention success or failure (Note that blinding of participants is never possible in such intervention studies). With view on the health care sector, Saravo et al. (2017) used already a similar approach by using the assessment of external blinded raters and followers to estimate TFL behavior of participants.

Furthermore, momentary assessment approaches (e.g., Gromatsky et al., 2020) could be used to investigate individual perceived change in a more valid way. Thus, irritation (Mohr et al., 2005) and well-being (Topp et al., 2015) could be assessed every day via app on work cell phones to investigate change processes of these variables over a longer time interval or to assess day-to-day changes. For example, Diebig, Bormann, et al. (2017) measured day-to-day change of followers' perception of their leaders TFL and followers' strain by short questionnaires at the end of five consecutive days. Results showed that followers' daily perceived TFL was associated with followers' current strain. Moreover, by using momentary assessment several times a day, changes in mental health and TFL could be assessed within

one working day. This could give an indication of when particularly challenging leadership tasks would be best handled. Modern technology could also be used to investigate individual change processes based on leaders' participation in a stress-preventive leadership intervention more extensively. For instance, qualitative questions to reflect changes could be sent via cell phone and answers could be assessed via voice messages during the working day.

Besides these subjective assessment methods, as well biological or organizational outcomes could be used to investigate our newly developed stress-preventive leadership intervention. For example, salivary cortisol or α -amylase could be used as biological strain markers of hypothalamic-pituitary-adrenal axis activity and the activity of the sympathetic nervous system, as Limm et al. (2011) did in the evaluation of their stress management intervention in the industrial sector. Limm et al. (2011) conducted a RCT study on a stress reducing workplace intervention based on the ERI Model and assessed, besides other subjective measurement methods, the biological markers of salivary cortisol or α -amylase. They found a reduction in α -amylase in participants of the intervention compared to the control group after one year.

Regarding organizational outcomes, outcome variables such as leaders' or followers' intention to leave the current workplace as well as their rate of sickness absence before and after the intervention could be assessed in line with the leadership intervention approaches of Stansfeld et al. (2015) or Milligan-Saville et al. (2017). Based on these indicators it would also be possible to estimate the costs as well as the money saved by the intervention, for example, through reduced sickness absence. For instance, Milligan-Saville et al. (2017) reported that their intervention saved about 10 pounds per invested pound. The latter outcomes are particularly important in assessing the overall benefits of a stress-preventive leadership intervention on a hospital's overall organizational culture. Organizational outcomes could also serve as instruments to convince top management of a stress-preventive leadership intervention's benefits.

Besides the methodological considerations, one can discuss the question of an adequate context and the target group of a stress-preventive leadership intervention. Recent reviews and meta-analyses describe research on leadership intervention within different economic sectors (Dannheim et al., 2021; Kaluza et al., 2020; Kuehnl et al., 2019;

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Tsutsumi, 2011). It could be investigated whether stress-preventive leadership is a context independent concept and thus could have the same impact pathways and effectiveness in different working contexts with view to leaders' and followers' mental health as well as with view to leader-member-exchange (LMX). One finding that points into this direction is the determination of LMX in Study 2. We found the same TFL behaviors determining LMX as Deluga (1992) did in the military context. Moreover, a positive association between employees' mental health and transformational leadership has been shown context independent as well (e.g., Skakon et al., 2010). Two recent projects, also funded by the German Federal Ministry of Education and Research, could help to provide first indications of context independence or dependence. Whereas the research project IMPROVEjob (Weltermann et al., 2020) investigates the improvement of job satisfaction among the team members of general practices (focusing on working conditions, job safety and structured stress prevention), the research project KMU-GO! (Lehmann et al., 2021) investigates a stress-management training for leaders with a partial aspect of stress-preventive leadership within small and medium enterprises. Since they also focus on stress-preventive leadership as a stress-preventive measure, it will be interesting to compare their results with the results from the SEEGEN Study and generate initial findings on the effect of stress-preventive leadership in different work contexts.

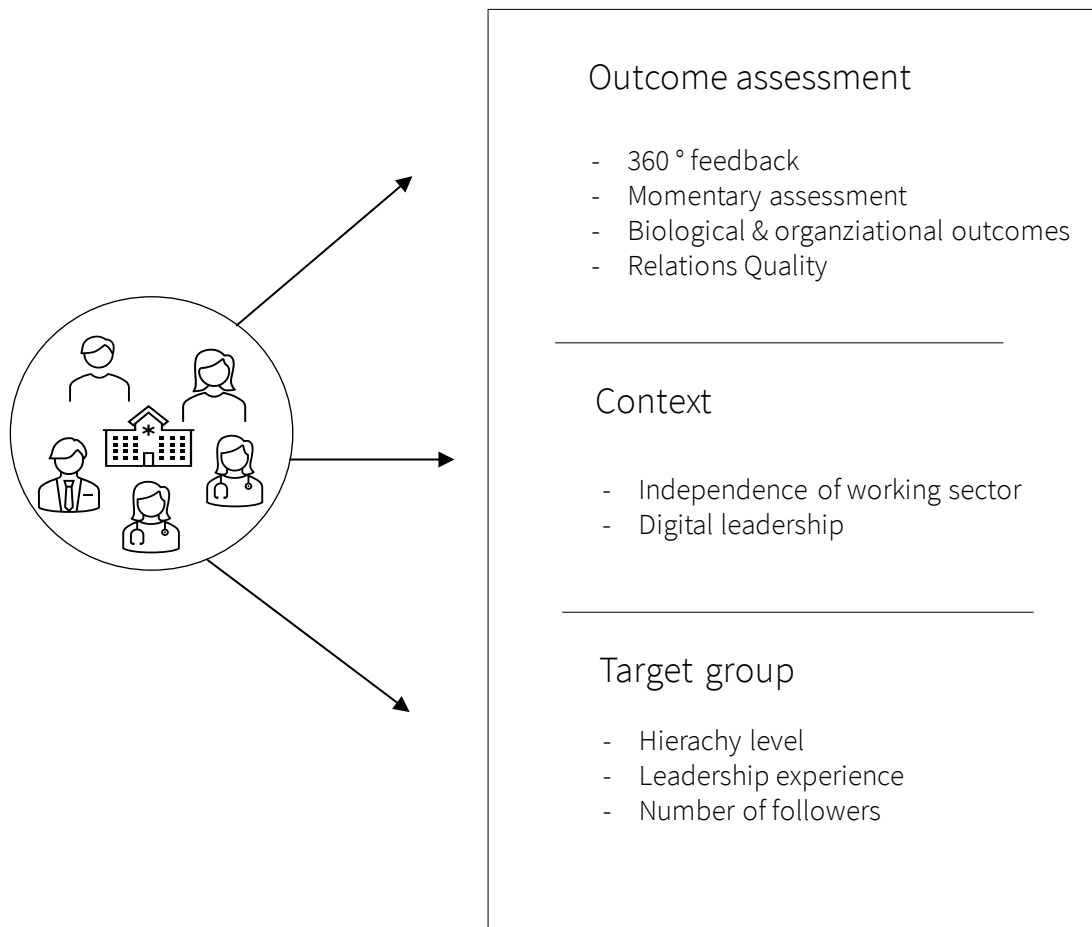
Due to the current COVID-19 pandemic and the distances involved, leadership via digital media (e.g., in team meetings) is also gaining importance in healthcare. Future research could investigate our new stress-preventive leadership and its effectiveness in the context of digital leadership. Moreover, the intervention could be transferred in a blended learning format, with digital and face-to-face parts. This would follow the recommendations of Stansfeld et al. (2015), who found no effect for their digital-only stress-preventive leadership intervention.

Furthermore, the question arises which leadership subgroup could benefit the most from the newly developed stress-preventive intervention. The preliminary results of Study 3 are focused on leaders of middle management. In further studies, it would be interesting to investigate whether top management would also benefit from the approach presented here. Presumably, however, due to the power of this level of management, the content of stress-preventive working conditions (e.g., job demands and control, effort-reward imbalance)

could be expanded to focus on a more organizational level (Montano et al., 2014) but should also contain the stress-preventive basics. Expanding the intervention to include top management was also a topic of discussion in Study 3's focus groups and would address participants' wishes to involve top management, according to one participant: *'So often I had to ask myself, what are our superiors doing? They really don't do a lot of the things that we've been taught here now [...]'* (6538617-PO-01_20190521_134556). Moreover, it might be helpful to know which leadership subgroup would benefit most from a stress-preventive leadership intervention, e.g., leaders with little or a lot of previous leadership experience, younger or older leaders, leaders with large or small teams. This knowledge would contribute to build an effective modular target group-specific health management system in the workplace hospital.

Figure 9

Future research implications



3.2.4 Practical implications

Regarding the practical implementation of stress-preventive leadership interventions, this dissertation leads to various considerations that are discussed in the following paragraphs.

First, the here described stress-preventive leadership approach focused on leaders' own strain and stress-coping. Thereby, its implementation might contribute to the de-tabooing of the themes stress and strain among leaders and instead bring them into a collegial dialogue as an instrument of hospitals top management to acknowledge the burden of their leaders (Byrne et al., 2014).

Second, with view to the highly positive evaluation of the communication focused module in our stress-preventive leadership intervention (Stuber et al., 2022), the importance of the interactive parts of a leadership intervention became clear. With its focus on the social dimension, our intervention could provide the right communication tools to meet the

current challenges of psycho-social stressors in the workplace hospital. In future, stress-preventive leadership interventions could take into account the considerations of Gabbe et al. (2008) and integrate peer coaching or mentoring with leaders at the same hospital to create exercise space for communication skills and strengthen the social dimension. This would increase the concomitant nature of the leadership intervention and, through a clear intervention agenda, could be comparable with booster sessions to repeat intervention content, which have been shown to increase the effectiveness of burnout preventive interventions (Awa et al., 2010).

Third, a structured comprehensive health management program for employees in German hospitals is largely missing (Mulfinger et al., 2019). With the help of this new intervention concept, we contribute to an evidence-based conceptualization of a structured leadership health management for middle management which is one puzzle piece needed to strengthen employees at a highly demanding workplace (Badura et al., 2020; Warth et al., 2016). How a structured and multiple level leadership program could be constructed can be seen in the Anglo-American region. The Cleveland clinic, for example, offers a modular program, which expands from workplace companion interventions to a MBA-study program in health care leadership (Christensen & Stoller, 2016). However, to prepare employees well for their work as clinical leaders, one could go one step further and lay the foundation for stress-preventive leadership starting in university or professional training through increased team-based learning strategies and courses in communication and leadership, such as for example the Royal College of Physician and Surgeons of Canada (<https://www.royalcollege.ca>, Stoller, 2014). These two named approaches could be combined to a structured and accompanying stress-preventive leadership approach from the beginning until the end of the professional path.

3.2.5 Strengths and limitations of the thesis

With the development of a new stress-preventive leadership intervention for hospital leaders of middle management, we followed a call for action to develop clinical leaders (Stoller, 2014) and contributed thereby to close a theoretical and practical gap.

As a first step, the author presented the health care-specific state of research literature on stress-preventive leadership interventions in a systematic way. This led to an

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extensive overview on the named topic in an important and particularly psychologically challenging economic sector and revealed existing research gaps (Study 1).

As a second step, the scarce empirical data on transformational leadership (TFL) and leader-follower relationship was supplemented to further classify the workplace hospital regarding these psycho-social stressors by a cross-sectional approach (Study 2). It was extended by a theoretical contribution to the relationship between TFL and leader-follower relationships in the workplace hospital that provided information which core TFL behavior hospital followers experience as relationship-strengthening and thus as stress-preventive. Thereby, it supplied the groundwork for a longitudinal examination of this association.

As a third step, the author developed a new stress-preventive leadership approach for middle management leaders of the workplace hospital with the expertise of a multi-professional team and an empirical needs analysis (Study 3). The new intervention was evaluated as highly feasible and could point towards an improvement in participants' mental health and leadership behavior. Its development and first implementation are highly practically relevant for the health management in the workplace hospital. Based on these promising results the interventions effectiveness is tested in a randomized controlled trial (RCT) and will thereby add important information to the leadership intervention research.

This dissertation project has also limitations which mainly relate to the methodology of the project's studies. The research approach of Study 1 is only descriptive and could not provide a quantitative estimation of interventions' effectivity via metanalysis. Moreover, the systematic review focused only on a small sample of leadership interventions due to the narrow outcome concept of mental health outcomes, which could be extended in future approaches by leadership behavior as an outcome.

Study 2 provided data only out of one data source which is a selection bias and impairs the transfer of the results to other work contexts inside or outside the health care sector. Participation was voluntary and consequently participants were not necessarily representative for all employees. Therefore, results could be distorted by over- or underestimate the expression of transformational leadership (TFL) and leader-member exchange (LMX) at the workplace hospital. Furthermore, the conducted regression analysis could only reveal associative relationships which cannot state to causal relationships between transformational leadership behavior and leader-follower relationship. Moreover,

the core leadership dimensions of TFL were highly intercorrelated, which was due to the scientific concept of TFL.

With view to Study 3, due to its piloting nature and due to the regulations of the hospital's works council the pilot study was conducted without a control group, so no statement can be made concerning the effectiveness of the stress-preventive leadership intervention yet, but as mentioned before this will be addressed in the RCT of the SEEGEN project. Moreover, a response bias due to social desirability or distorted self-perception due to increased attention to the variables mental health and TFL because of intervention participation cannot be ruled out and could be reduced in future studies by 360° feedback methods to assess participants' follower and participants' leader perspective. Additionally, we had to accept relatively high dropout rates (approx. 35%) that can be explained by our large hourly scope of the intervention and the target group-specific workplace proximity, which, however, repeatedly led to work assignments of hospital leaders and is in line with other leadership intervention approaches from the social sector. For example, Stein et al. (2021) reported an dropout rate approx. 50%. Consequently, we revised our intervention concept for the RCT of the SEEGEN project and reduced the hourly scope. The above-named limitations need to be viewed in the context of health service research and mirrors the intrinsic field of tension between experimental scientific concepts and their practicable transfer und implementation in everyday work which often is accompanied by a loss of methodological quality and need to be addressed in further studies as lined out in the paragraph 3.2.3.

3.2.6 Conclusion and further direction

The author contributed to the ongoing research process on stress-preventive leadership in the workplace hospital with three different studies. Study 1 systematically analyzed the previous intervention approaches on stress-preventive leadership in the health care sector and synthesized potential factors of success as well as factors for improvement in future intervention approaches. The results showed that stress-preventive leadership interventions are rare, point in a promising direction, but cannot clearly contribute to the mental health of healthcare employees. Moreover, results indicate the need of future multimodal leadership interventions to do justice for the complex mechanism of action of stress-preventive leadership. In addition, Study 2 contributed to the current thin

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empirical state of transformational leadership (TFL) and leader-follower relationship (LMX) as important factors of work-related stress-prevention in the German hospital sector. Followers' perception of transformational leadership and relationship quality indicated improvement potential in the workplace hospital. By developing a new multimodal stress-preventive leadership approach for the psychologically demanding workplace hospital (Badura et al., 2020), Study 3 built on Study 1 and 2 and contributed to close a research and practical gap. The conducted pilot study revealed high feasibility and acceptance of the intervention as well as subjective perceived changes in mental health and TFL of participants after the intervention. Thus, the intervention concept pointed into a promising direction with view to leaders' mental health and their stress-preventive leadership behavior.

As a next step, the stress-preventive leadership concept is proofed on its effectiveness. Therefore, the concept of stress-preventive leadership was revised according to the qualitative results and feasibility evaluation of the pilot study. It is now investigated in a randomized controlled trail (RCT) within the SEEGEN Study to assess leaders' and followers' mental health and transformational leadership perception as well as economic measures such as intention to leave or sickness absence on hospital department level.

The intervention developed and evaluated here forms an important basis for further evaluation and represents a promising starting point for an effective health management in the workplace hospital.

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5. Manuscripts



The effectiveness of health-oriented leadership interventions for the improvement of mental health of employees in the health care sector: a systematic review

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Abstract

Purpose An increasing prevalence of work-related stress and employees' mental health impairments in the health care sector calls for preventive actions. A significant factor in the workplace that is thought to influence employees' mental health is leadership behavior. Hence, effective leadership interventions to foster employees' (leaders' and staff members') mental health might be an important measure to address this pressing issue.

Methods We conducted a systematic review according to the PRISMA statement (Liberati et al. 2009) and systematically searched the following databases: PubMed (PMC), Web of Science, PsycINFO (EBSCOhost), EconLit (EBSCOhost), and Business Source Premier (EBSCOhost). In addition, we performed a hand search of the reference lists of relevant articles. We included studies investigating leadership interventions in the health care sector that aimed to maintain/foster employees' mental health.

Results The systematic search produced 11,221 initial search hits in relevant databases. After the screening process and additional literature search, seven studies were deemed eligible according to the inclusion criteria. All studies showed at least a moderate global validity and four of the included studies showed statistically significant improvements of mental health as a result of the leadership interventions.

Conclusions Based on the findings, leadership interventions with reflective and interactive parts in group settings at several seminar days seem to be the most promising strategy to address mental health in health care employees. As the available evidence is limited, efforts to design and scientifically evaluate such interventions should be extended.

Keywords Leadership · Intervention · Mental health · Health care sector · Employees · Prevention

Introduction

On one hand, mental health can be seen as a basic human need that influences the individual quality of life in general. On the other hand, mental illnesses cause a large economic loss worldwide. For example, Patel et al. (2018) estimated the global economic loss due to mental illnesses between 2010 and 2030 at US\$ 16 trillion worldwide. Thus, mental health may be considered an important variable concerning ethical and economic aspects in the modern working world.

In this review, the term mental health is defined according to the conceptualization of the World Health Organization (World Health Organization 2001), which describes *mental health* as a continuous variable ranging from a negative, symptom-based pole to a positive pole concentrating on psychological functioning. In detail, the term mental

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health can be conceptualized as being based on negative symptoms such as psychological harm and pathologies like depression, burnout, and their related physical symptoms (e.g., sleeping disorders). It can also be conceptualized as positive mental health in the form of emotional, psychological, and social well-being (Montano et al. 2017; Westerhof and Keyes 2010).

Considering both sides of mental health, its maintenance in working contexts is no longer seen only as an employee's individual task. Rather, political stakeholders as well as scientists increasingly discuss the issue of prevention in mental health as an organizational task; that is, the organization and its representatives, especially leaders, are seen to have the responsibility for upholding their employees' mental health (e.g., Thomas et al. 2018; WHO Regional Committee for Europe 2013). This is in concordance with occupational health and safety regulations emphasizing the enterprise's responsibility to avoid or minimize all kinds of work-related risk factors (Council of the European Communities 1998).

This extension from individual to common organizational responsibility can be seen of especially high importance in psychologically and physiologically demanding working contexts such as the health care sector. For example, Zhou et al. (2017) found the highest rate of "work-related mental ill health" (p. 310) for nurses, followed by ambulance staff and physicians compared to social workers and teachers working within the social sector in the UK.

The higher prevalence of mental illnesses in health care employees (for an overview, see Harvey et al. 2017) might be partly explained by the difficult working conditions that characterize the work in the health care sector (Harvey et al. 2017). Besides an increased workload and staff shortage (Royal College of Physicians 2016), studies showed an effort-reward imbalance (Schulz et al. 2009; Weyers et al. 2006); that is, employees perceived an imbalance between the effort they put into their work and the reward they obtained for it (e.g., salary, appreciation). Furthermore, physicians have reported that their workplace is characterized by high job demands but low job control (Bauer and Groneberg 2015). And Kivimäki et al. (2003) found that amongst hospital employees, low procedural justice, for example when processes are perceived as intransparent and non-participative, was linked to a higher risk of sickness absence in relation to high procedural justice. Finally, health care workers state to have high psychological burdens in their daily work (Bernburg et al. 2016) and can be confronted with acute crises which cause incredible psychological stress such as serious accidents with lots of heavily injured patients or pandemics like COVID-19 (Zhu et al. 2020).

Taken together, health care workers can be seen as a group with special working conditions which may lead to a large amount of work stress and can in turn promote the development of certain mental disorders. Furthermore, the

growing strain in health care professions (e.g., physician burnout affects over 50% of physicians in the USA) can also be seen as a danger for patient safety (The Lancet 2019).

An important factor that can buffer at least some negative aspects of the mentioned working conditions on staff members' mental health is leadership behavior. In more detail, leadership behavior is an important working condition in day-to-day work that has been associated with staff members' mental health in both positive and negative ways. Destructive leadership behavior is negatively associated with well-being (Schyns and Schilling 2013), and a lack of supportive leadership decreased self-rated health in men even ten years later (Schmidt et al. 2018). From a positive perspective, Finne et al. (2014) reported in their prospective panel study that fair leadership behavior and the support of direct supervisors are the most protective factors for staff members' mental health.

Based on the health-oriented leadership concept (HoL) of Franke et al. (2014) health-oriented leadership can be defined as a general term to describe a behavioral and organizational health-preventive approach consisting of 'leader-centered' and 'staff-centered' aspects. Leader-centered aspects include the mindsets, attitudes/beliefs and behaviors of leaders, which influence the leaders' own health behavior and stress experience. Whether the leader her/himself is under stress is one important factor for staff members' health, as it can spill over indirectly because of the leaders' role model function, or directly through leadership behavior communication or interaction, to staff members' mindsets, attitudes/beliefs and behaviors (Elprana et al. 2016; Franke and Felfe 2011). As a consequence, leaders' own health is an important factor in health-oriented leadership. Staff-centered aspects of health-oriented leadership comprise the creation of a mental health-promoting work conditions (e.g., Nielsen et al. 2008) as well as direct attentive communication and interaction with staff members (e.g., proactively addressing stressed staff members to find solutions or help with prioritizing work tasks) in a participative process (Elprana et al. 2016; Franke and Felfe 2011). To sum up, a health-oriented leader pays attention to her or his own physical and psychological health (behavior prevention) and addresses the health of staff members through her or his communication, leadership behavior, and as a role model (organizational prevention, Skakon et al. 2010, see Fig. 1). When we refer to health-oriented leadership in this manuscript, we not necessarily mean the HoL concept in the strict sense as it was drawn up by Franke et al. (2014) but rather in a broader sense encompassing all leadership behavior that has the health of employees as a longterm goal.

Montano et al. (2017) emphasizes the future need for leadership interventions from an occupational health point of view. This is especially true for psychologically and socially demanding workplaces such as those in the health

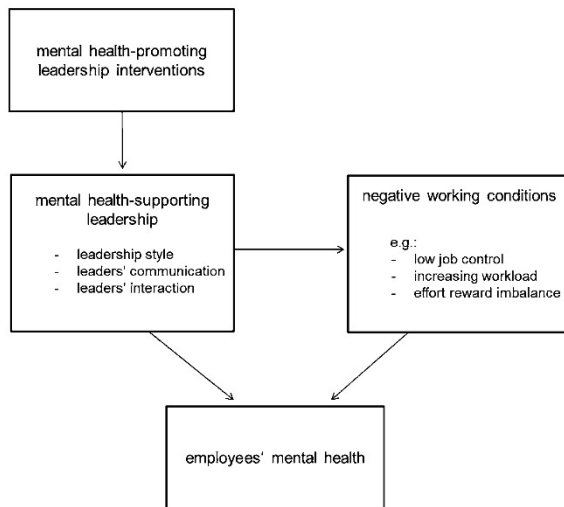


Fig. 1 Relationship between leadership training and staff members' mental health

care sector. Leadership plays an important role in emergency situations, in the establishment of team play, high-quality inter-professional cooperation and daily work with serious ill patients and can help to prevent psychological illnesses of health care workers not least to secure the medical care of patients. With regard to the health care sector, staff-centered leadership behaviors, which is as well helpful in other work sectors, such as the leader-member-exchange model (LMX; for an overview see Graen and Uhl-Bien 1995), transformational leadership behavior (Bass 1999; Podsakoff et al. 1996) or servant leadership (Blanchard 2018) have been shown to be associated with improved mental health (Eva et al. 2019; Gregersen et al. 2014). Some cross-sectional studies point to the positive correlations of health-oriented leadership for staff members. For example, transformational leadership goes along with increased job satisfaction and less workplace absenteeism in nurses (Boamah et al. 2018; Lee et al. 2011).

When contrasting the potential psychological strain of the workplace *health care sector* and the potential health-maintaining and promoting aspects of leadership behavior, international experts have recently begun to support clinical leadership interventions with a focus on leaders' communication (e.g., giving feedback to staff members), interaction (e.g., nonverbal communication or fostering team work) and leadership style (e.g., transformational leadership) to promote a healthier workforce (Saravo et al. 2017). Leadership interventions are, therefore, an important instrument to be aware of, learn and practice health-oriented leadership. To emphasize the importance of health-oriented interventions Wijnen et al. (2020) showed that stress reducing interventions among health care workers improved staffs'

productivity on a monetary level and showed a 60-fold payout. However, too persuade top management in the health care sector to implement health oriented leadership interventions, such systematic evidence of effectiveness is needed. Yet, a systematic approach is missing and the scattered knowledge does currently not provide a clear picture regarding the advantages of health-oriented leadership interventions. To target this gap, the first step should be an overview of leadership interventions' (psychologically and economically) effectiveness, in particular an overview of the effectiveness of longitudinal studies (at least with a measurement point before and after the intervention), as they show the possible change potential regarding employees' mental health and thereby contribute to the improvement of health care quality.

Hence, our aim was to record the existing longitudinal studies regarding the effectiveness of leadership interventions towards mental health in the health care sector. Since health-oriented leadership is a concept with many facets, we focused on leadership interventions that target communication as a leadership tool, interaction as a relationship-oriented factor, or leadership style as specific leadership concepts. With this limitation, we were able to focus on leadership as an occupational health factor.

The research question of this review was therefore formulated as follows:

How do interventions that target leadership in the health care sector with a focus on communication, interaction or leadership style influence the mental health of leaders and/or of their staff members working in the health care sector?

By doing so, we provide accumulated knowledge about leadership interventions including their dose, content and target group in the health care sector as one contribution to inform other researchers in the field how to design future studies which ultimately may strengthen the evidence on the effectiveness of such interventions.

Methods

The systematic review was conducted according to the PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses; Liberati et al. 2009; Moher et al. 2009). The reporting of methods in the following is structured according to the PRISMA checklist (Liberati et al. 2009, p.3).

Registration

After developing a research protocol, the systematic review was registered at the International Prospective Register of Systematic Reviews (PROSPERO) of the National Institute for Health Research (NHS). The registration is available

under no. CRD42018088632 at www.crd.york.ac.uk/prosp/ero/display_record.php?RecordID=88632. The registration took place after the search strategy and the databases were decided on and before the screening process was initiated.

Eligibility criteria

We applied the PICOS criteria (Participants, Intervention, Comparator, Outcome, Study Design; Liberati et al. 2009; Moher et al. 2009) described in Table 1 to select studies in a standardized manner to answer our research question. In detail, PICOS criteria were utilized to develop our search strategy as well as to select studies in the screening process, and they guided the structured full-text analyses of included studies.

Search

We searched psychological, medical and economic electronic databases, namely PubMed (PMC), Web of Science, PsychINFO (EBSCOhost), EconLit (EBSCOhost), and Business Source Premier (EBSCOhost), from inception to 16 May, 2018 and updated our search until 27 May, 2019. The search strategy was developed in a discursive group process by means of the PICOS criteria and followed this general scheme: content AND intervention AND outcome AND setting AND outcome assessor for each of the core concepts included a variety of keywords. As an example, the search strategy for the PubMed database was: (leadership

OR communication OR interaction) AND (intervention OR training OR education OR skills OR prevention OR program OR curriculum OR "skill enhancement" OR "vocational training" OR "vocational trainings" OR "on-the-job-training" OR "on-the-job-trainings" OR "leadership training" OR "leadership trainings") AND ("mental health" OR "psychological health" OR "psychological strain" OR "mental strain" OR "stress" OR "well-being" OR "stress reduction" OR "stress prevention") AND (hospital OR clinic OR "general practice" OR "general practices" OR "private practice" OR "private practices" OR "medical practice" OR "medical practices" OR "inpatient service" OR "inpatient services" OR "outpatient service" OR "outpatient services") AND (doctor OR physician OR "practitioner" OR "practitioners" OR nurse OR "doctor's assistant" OR "doctor's assistants" OR "medical assistant" OR "medical assistants" OR employee OR worker OR workforce OR follower OR "group member" OR "group members" OR staff OR subordinate OR manager OR leader). The search strategies for the other databases were similar with a few changes to accommodate database-specific requirements. For the searches in PsychINFO, EconLit and Business Source Premier, we applied the advanced search filters "apply related words" and "apply equivalent subjects" and "Academic Journals". We decided to include published original articles in English and German.

Title and abstract of the electronically selected studies were screened by two independent raters according to the inclusion criteria to avoid the rejection of relevant studies. After the screening process, we further examined all studies

Table 1 Applied PICOS criteria

PICOS criteria	Inclusion	Exclusion
Participants	Leaders and/or staff members working in the health care sector	Leaders or staff members working outside the health care sector
Intervention	A leadership intervention to improve or maintain leaders' or staff members' mental health, by building or shaping leadership style, communication or interaction skills Intervention typ: face-to-face interventions, online interventions, handouts, supervision, intervision, coaching, case conferences, or academic training programs	Interventions only for staff members (employees without leadership responsibility)
Comparator	Possible but not required	
Outcome	Indicator of mental health in leaders and/or staff members (e.g., stress, well-being, burnout, affective symptoms, physical health problems corresponding to mental health e.g., chronic pain) Measured by subjective measurements (e.g., questionnaires, qualitative data like video and audio, participating or non-participating observation) or objective measurements (e.g., number of sick days, number of department changes inside one organization, number of resignations, physiological measurements of mental health like heart rate or cortisol level)	No indicators/outcomes of mental health in leaders or staff members Studies that do not measure any mental health outcome
Study design	Measurement of a mental health indicator at least twice, with one time point before and one time point after the administration of the intervention with and without control group	Studies that only measure one time point Case studies

that had been include by at least one rater for eligibility via full-text analyses and supplemented the identified studies by a hand search of the reference lists of the included studies.

Data preparation

The content of the included articles was extracted in a standardized procedure based on the PICOS criteria. The small number of eligible studies, together with a high level of heterogeneity, hindered meta-analytic processing of the available evidence. Instead, we employed a narrative approach. The following dimensions were extracted: countries, where the intervention took place, setting of the intervention (organization), intervention group (e.g., hierarchy level, number of participants), control group (if applicable), intervention type (e.g., coaching, workshop, or supervision), dose/duration of intervention (i.e., how often and how long the intervention was administered), content/reference frame of the intervention (i.e., concepts or leadership styles taught in the intervention), time points of measurement (e.g., before and after the intervention, and/or follow-up measurement), type of measurements (i.e., qualitative, quantitative or mixed method), outcomes (i.e., utilized questionnaires), target group (i.e., group from whom outcome measurements were collected), and evidence for effectiveness of leadership intervention. Any uncertainties during data extraction and preparation were resolved through discussion between the authors.

Besides the content-related analyses, we assessed the validity of the eligible studies by the Quality Assessment Tool for Quantitative Studies, developed by the Effective Public Health Project (Effective Public Health Practice Project 2007; Thomas et al. 2004) as recommended in the Cochrane Handbook for Systematic Reviews of Interventions (Armstrong et al. 2008). The six quality categories (selection bias, study design, confounders, blinding, data collection method) as well as withdrawals and drop-outs, can be judged as 'weak', 'moderate' or 'strong' by this tool. Two raters assessed the risk of bias of the seven studies independently. Any rating discrepancy was resolved through discussion in the study group.

Results

Study selection

We identified 11,221 hits in the relevant electronic databases from inception until the last update of the search (27th May, 2019). After removing duplicates, items with unfitting study format for this purpose (e.g., reviews, meta-analyses, book chapters, case studies) and hits with unknown authorships, the titles and abstracts of the remaining 7294 original articles were screened by two independent raters based on the

PICOS criteria. Overall, 142 articles were included for full-text analysis by at least 1 rater. Three articles that were not available online and not accessible by either contacting the corresponding article authors or different article delivery services were deemed unattainable. Based on the remaining 139 articles, we conducted a full-text screening as well by means of the PICOS criteria. After the full-text screening, any uncertainties in the evaluation were discussed within the interdisciplinary author team. Thereafter, 6 articles were left from the database search, whereas 133 articles were excluded because of not meeting the inclusion criteria in terms of nature of the population, means of the intervention content, and less than 2 measurement time points, regarding the outcome or 2 or more of these issues. For a detailed description of the selection analysis, see Fig. 2.

Beyond the electronic database search, we conducted a reference list hand search consisting of the five eligible articles, relevant literature on leadership as well as thematically linked reviews and meta-analysis (including those that were hits in our electronic search). Eventually, one additional article was selected, so in the end, seven articles fully met the inclusion criteria and were subjected to the full-text analyses and quality assessment procedures (for the PRISMA flowchart, see Fig. 2).

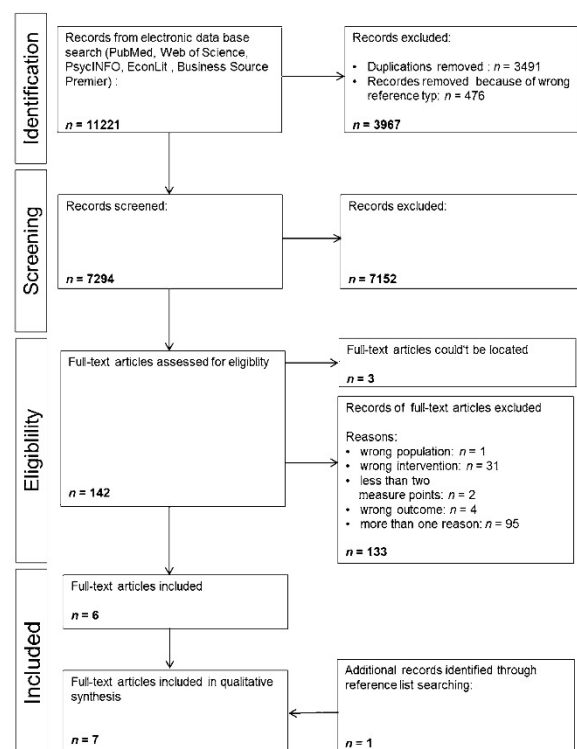


Fig. 2 Flowchart of study selection

Study quality of quantitative study parts

Quantitative studies in psychological health care research or assessing the effects of psychological preventive measures often endeavor to develop or display (new) forms of health care or psychological offers that improve subjective psychological variables and can be transferred directly into practical work. That is, some quality assessment criteria, such as *blinding* or *confounders*, cannot be applied without caution. For example, in this systematic review, six of the seven eligible studies were based on self-evaluation through psychological questionnaires, which made blinding impossible. This is also true for the avoidance of potential confounders (e.g., gender imbalance) which cannot be influenced because they are immanent factors of the health care sector (World Health Organization 2008) and cannot be controlled in field studies. Keeping that in mind, all included studies showed a high risk of potential bias, but the results of the validity assessment showed that almost every included study described the quality components confounders and blinding insufficiently. When disregarding these two components, all studies showed at least a moderate global validity rating. For more details, see Table 2.

Study characteristics

The majority of the included studies were presented in English language and conducted at hospitals/health care institutions (Eastburg et al. 1994; Greenberg 2006; Haraway and Haraway 2005; Luk 2018; Stansfeld et al. 2015). One study was implemented at a medical university (Gabbe et al. 2008) and one in a retirement home in Germany (Zimber et al. 2001). Five interventions were designed for only one specific occupational group: four studies addressed nursing staff (Eastburg et al. 1994; Greenberg 2006; Luk 2018; Zimber et al. 2001), and one addressed new chairs of the department of obstetrics and gynecology (Gabbe et al. 2008), whereas

two interventions were interprofessional (Haraway and Haraway 2005; Stansfeld et al. 2015), that is, all occupational groups of the organization could participate. Overall, a total of 191 leaders took part in an intervention on leadership, communication or interaction topics. However, in one study, the exact number of participating leaders was not mentioned (Eastburg et al. 1994). All studies but two (Haraway and Haraway 2005; Luk 2018) chose a controlled design in the form of a controlled clinical trial (Eastburg et al. 1994; Stansfeld et al. 2015; Zimber et al. 2001), a cohort analytic design (Greenberg 2006) and a randomized controlled trial (Gabbe et al. 2008). Mental health was measured in a total of $n = 648$ staff members and $n = 86$ leaders. The outcome measures differed across the studies: three studies assessed changes in mental health in staff members only (Eastburg et al. 1994; Greenberg 2006; Stansfeld et al. 2015), three studies in leaders only (Gabbe et al. 2008; Haraway and Haraway 2005; Luk 2018), and one study measured changes in both hierarchy levels (Zimber et al. 2001). For more details, see Table 2.

Longitudinal measurements: time points and outcomes

Mental health was measured quantitatively before leadership interventions and at one to three time points after the interventions in all included studies. The measurement point after the intervention differed from directly after the intervention (Zimber et al. 2001) to up to one year after the start of the intervention (Haraway and Haraway 2005). Additionally, Haraway and Haraway (2005), Luk (2018), and Stansfeld et al. (2015) supplemented the quantitative measurement with a qualitative approach mainly not only to assess acceptance, feasibility and potential improvements of the intervention, but also to reflect on the intervention content with regard to leaders'/staff members' health. Since these qualitative measurements only support the use of the

Table 2 Study quality of the quantitative parts of the eligible studies

Author	Selection bias	Study design	Confounders	Blinding	Data collection method	Withdrawals and dropouts
Eastburg et al. (1994)	0	+	-	-	+	+
Gabbe et al. (2008)	0	+	-	-	+	+
Greenberg (2006)	0	0	-	-	+	-
Haraway & Haraway (2005)	0	0	-	-	+	0
Luk (2018)	-	0	-	-	+	0
Stansfeld et al. (2015)	0	+	-	0	+	-
Zimber et al. (2001)	0	+	-	-	+	-

+ = strong 0 = moderate - = weak

quantitative measures in all of the three studies, we focus on the quantitative data when answering the current research question.

All outcome assessors evaluated their own subjective mental health by standardized subjective measurements in the form of questionnaires. Stansfeld et al. (2015) additionally measured sickness leave on an organizational level as an objective variable. As far as the measured constructs are concerned, mental health was either operationalized by one single outcome (e.g., insomnia by Greenberg 2006) or rather broadly by a variety of outcomes (e.g., well-being, psychological distress, self-reported sickness absence by Stansfeld et al. 2015). Six studies conceptualized mental health as the absence of psychological strain. As variables of psychological strain, e.g., burnout, stress, insomnia or sickness leave were measured, whereas in two studies, mental health was evaluated as the presence of well-being. For more details, see Table 2.

Intervention: content and effects

The seven included studies were considerably heterogeneous concerning type, dose and content of the administered leadership intervention. Four of the included studies were structured as group interventions (workshops) with a total duration between 4 and 21 h. In the other three studies, the intervention was delivered on an individual basis with a total duration between 1 h and a flexible time (Eastburg et al. 1994; Gabbe et al. 2008; Stansfeld et al. 2015). As far as the content of the interventions is concerned, studies addressed staff-centered outcomes: leadership skills, which may improve the collaboration with staff members, as well as leader-centered outcomes: skills that may support leaders in their own mental health behavior and stress prevention. Three studies focused on staff-centered outcomes (e.g., giving positive feedback; Eastburg et al. 1994; Greenberg 2006; Haraway and Haraway 2005). Three studies were multimodal with staff-centered as well as leader-centered contents (Luk 2018; Stansfeld et al. 2015; Zimmer et al. 2001) and lastly, the peer-mentor program delivered by Gabbe et al. (2008) was completely individual, and the content was not transparent.

Out of the three staff-centered interventions, Eastburg et al. (1994) conducted a one-hour, one-to-one, psychoeducational intervention on positive feedback, with the main focus on the reflection of leaders' feedback skills and the transmission of positive feedback in the daily routine. A standardization of the intervention was not described. With reference to the results, an intervention effect could be shown for one sub-dimension of burnout (Maslach and Jackson 1981). In particular, the nursing staff of trained leaders showed a decrease in *emotional exhaustion* compared to the control group ($F(1,2.99), p < 0.05$, pre/postchange score

intervention group: -1.29 , pre/postchange score control group: 1.90). The intervention and control group did not differ in their burnout ratings. Thus, mean and standard deviation were only presented for intervention and control group together (emotional exhaustion: $M = 19.1, SD = 11.1$; depersonalization: $M = 6.8, SD = 5.7$; personal accomplishment: $M = 36.8, SD = 8.2$).

The second staff-centered study by Greenberg (2006) took place in four hospitals of one large health care organization. In half of the hospitals, the pay system for nurses changed in the study period so the nurses at these two hospitals got less salary than before. The salary changes were a quasi-experimental manipulation without any researcher involvement. The researcher only knew about the payment change earlier than the employees. For the intervention, one hospital with salary change ($IG_{\text{underpaid}}$) and one hospital without the salary change ($IG_{\text{no payment change}}$) participated in the intervention group. The control group composed as well of a hospital with salary change ($CG_{\text{underpaid}}$) and a hospital without salary change ($CG_{\text{no payment change}}$). The intervention was conducted after the salary change and consisted of a standardized leadership training on organizational justice with a main focus on interactional justice (Skarlicki and Latham 2005) with theoretical and practical parts as well as discussion groups. Leaders learned how to provide information and give emotional support to their staff members. The self-reported insomnia was recorded at four time points (before salary change (T1), after salary change and before leadership training (T2), direct after the leadership intervention (T3) and 6 months after the leadership intervention (T4)). The self-rated insomnia showed an intervention \times payment \times time interaction $F(3,1386) = 9.99, p < 0.01, \eta^2 = 0.02$. At T2, T3 and T4, nurses with no payment change differed from nurses with payment change statistically significant in their reported insomnia (T2: $M_{\text{no payment change}} = 2.58, SD = 1.10; M_{\text{underpaid}} = 5.85, SD = 0.90; F(1,465) = 1,184.04, p < 0.01, \eta^2 = 0.72$, T3: $M_{\text{no payment change}} = 2.76, SD = 1.13; M_{\text{underpaid}} = 5.07, SD = 1.19; F(1, 465) = 460.29, p < 0.01, \eta^2 = 0.50$, T4: $M_{\text{no payment change}} = 2.77, SD = 1.07; M_{\text{underpaid}} = 4.29, SD = 1.40; F(1, 465) = 176.65, p < 0.01, \eta^2 = 0.28$). The intervention showed an effect on the self-reported insomnia of the underpaid nurses. At T3 and T4, all four groups differed statistically significant (T3: $F(3, 463) = 206.84, p < 0.01, \eta^2 = 0.57$, T4: $F(3,463) = 92.84, p < 0.01, \eta^2 = 0.38$). The underpaid nurses with trained leaders reported less insomnia than the underpaid nurses with untrained leaders directly after the organizational justice training as well as 6 months later.

Lastly, Haraway and Haraway (2005) set their staff-centered focus on conflict management (e.g., development, reaction and resolution of conflicts) as well as on communication skills and a standardized training on leading difficult subordinates; developed by Bissell (1993).

However, they assessed only the leaders' self-reports of work-related stress. Specifically, participating leaders stated significantly lower occupational stress in the four sub-areas role overload ($M_{\text{pretest}} = 56.39$, $SD_{\text{pretest}} = 8.90$; $M_{\text{posttest}} = 52.61$, $SD_{\text{posttest}} = 10.43$; $t = 2.33$, $p = 0.03$), interpersonal strain ($M_{\text{pretest}} = 50.43$, $SD_{\text{pretest}} = 8.16$; $M_{\text{posttest}} = 46.52$, $SD_{\text{posttest}} = 8.14$; $t = 2.65$, $p = 0.02$), role boundary ($M_{\text{pretest}} = 55.13$, $SD_{\text{pretest}} = 10.39$; $M_{\text{posttest}} = 51.39$, $SD_{\text{posttest}} = 11.81$; $t = 2.57$, $p = 0.02$), and psychological strain ($M_{\text{pretest}} = 52.09$, $SD_{\text{pretest}} = 9.97$; $M_{\text{posttest}} = 48.61$, $SD_{\text{posttest}} = 8.18$; $t = 2.51$, $p = 0.02$).

Luk (2018), Stansfeld et al. (2015) and Zimber et al. (2001) took a multimodal leadership approach. Luk (2018) conducted an intervention to foster the reflection and development of personal and professional attitudes, values and skills in the sense of servant leadership as well as a part of stress reduction skills for the leaders. Therefore, the participating nursing leaders learned about leader-centered aspects such as self-care and resilience in nursing and 'staff-centered' aspects such as sharing leader experience or managing difficult staff members. The leadership intervention was divided into three different parts: a seminar part, a group sharing part and a 1-day retreat. In a pre-post comparison, participants showed statistically significant improvements in servant leadership and workplace well-being. In more detail, the overall score of servant leadership ($M_{\text{pretest}} = 3.61$, $SD_{\text{pretest}} = 0.30$; $M_{\text{posttest}} = 3.85$, $SD_{\text{posttest}} = 0.38$; $t(25) = 4.03$, $p < 0.001$) as well as the subscales of servant leadership: empowering staff members ($M_{\text{pretest}} = 3.63$, $SD_{\text{pretest}} = 0.50$; $M_{\text{posttest}} = 3.87$, $SD_{\text{posttest}} = 0.58$; $t(25) = -2.07$, $p = 0.049$), behaving ethically ($M_{\text{pretest}} = 3.96$, $SD_{\text{pretest}} = 0.42$; $M_{\text{posttest}} = 4.15$, $SD_{\text{posttest}} = 0.39$; $t(25) = -2.30$, $p = 0.03$), having conceptual skills ($M_{\text{pretest}} = 3.81$, $SD_{\text{pretest}} = 0.43$; $M_{\text{posttest}} = 4.06$, $SD_{\text{posttest}} = 0.36$; $t(25) = -2.39$, $p = 0.025$), creating values for those outside of organization ($M_{\text{pretest}} = 2.92$, $SD_{\text{pretest}} = 0.91$; $M_{\text{posttest}} = 3.52$, $SD_{\text{posttest}} = 0.77$; $t(25) = -3.92$, $p = 0.001$) showed significant improvements. It also applies for the overall workplace well-being ($M_{\text{pretest}} = 2.48$, $SD_{\text{pretest}} = 0.37$; $M_{\text{posttest}} = 2.70$, $SD_{\text{posttest}} = 0.29$; $t(25) = -3.76$, $p = 0.001$) and its' subscales: work satisfaction ($M_{\text{pretest}} = 2.72$, $SD_{\text{pretest}} = 0.42$; $M_{\text{posttest}} = 3.02$, $SD_{\text{posttest}} = 0.39$; $t(25) = -3.39$, $p = 0.002$), organizational respect for the employee ($M_{\text{pretest}} = 2.46$, $SD_{\text{pretest}} = 0.45$; $M_{\text{posttest}} = 2.77$, $SD_{\text{posttest}} = 0.37$; $t(25) = -3.28$, $p = 0.003$) and employer care ($M_{\text{pretest}} = 2.43$, $SD_{\text{pretest}} = 0.61$; $M_{\text{posttest}} = 2.77$, $SD_{\text{posttest}} = 0.47$; $t(25) = -3.06$, $p = 0.005$).

Stansfeld et al. (2015) addressed topics that were rather leader-centered e.g., stress management such as dealing with stress sources, understanding the link between mental and physical health, leaders' legal duty of care and their leadership style as well as rather staff-centered topics such as supporting staff members and teams in problem-solving,

find individual staff-centered solutions, on staff member and team level. To this end, they utilized a standardized e-learning program for leaders (Anderson Peak Performance package, <https://www.andersonpeakperformance.co.uk>) in a mainly online-based approach. However, the e-learning leadership intervention showed no significant effect. Staff members reported no significant changes in any investigated indicator of mental health.

In the third multimodal approach, Zimber et al. (2001) concentrated their group intervention for leaders and staff members on the following topics without referring to a standardized manual: coping with 'difficult' residents, coping with personal stress, communication with staff members, and leadership style. Leaders and staff members participated together in two-thirds of the intervention, whereas one-third of the intervention was delivered separately. However, the study results were presented together for leaders and staff members, and therefore, leadership-specific changes in either leaders themselves or staff members could not be assessed. Significant improvements in the intervention group compared to the control group from the first to the second measurement time point were only found in relationship to residents but not in mental health-related outcomes. Nevertheless, changes in personal competences from before until 3–4 months after the intervention could predict a significant amount of variance in working strain ($R^2 = 0.33$, $F = 6.4$, $p < 0.001$) and psychological impairment ($R^2 = 0.32$, $F = 6.2$, $p < 0.001$).

Gabbe et al. (2008) implemented an individual, 1-year peer-mentoring program between new chairs of obstetrics and gynecology departments and experienced chairs. The authors had no concrete requirements for the participating chairs concerning what content should be mentioned in their peer-mentoring contacts except that the intervention should support the new leaders by developing the necessary skills to be successful as a chair. The authors observed no differences in perceived burnout symptoms between participating chairs and control group before and after the peer-mentoring program. For more details, see Table 3.

Overall, none of the included studies revealed any adverse effects of a leadership intervention on leaders' and/or staff members' mental health. Three studies reported a decrease of negative mental health outcomes (Eastburg et al. 1994; Greenberg 2006; Haraway and Haraway 2005), whereas Luk (2018) showed an increase of well-being in the workplace. In two studies, outcome assessors perceived no significant change in any indicator of mental health (Gabbe et al. 2008; Stansfeld et al. 2015). Zimber et al. (2001) reported a change in a cross-sectional regression analysis but failed to show a trend difference in mental health outcomes.

Table 3 Characteristics of included studies

Author	Setting	Study design	Sample (IG/CG;n)	Outcome assessors (IG/CG;n)	Intervention type; dose	Content of the intervention	Measure points	Type of measurement	Results
Eastburg et al. (1994)	USA, 1 private medical hospital	Controlled clinical trial	Nursing leaders (IG; number not mentioned), (CG; number not mentioned)	Nursing staff members (IG; 34), (CG; 28)	One-to-one meeting with a researcher; 1 x 1 h	Positive feedback and its relation to staff members' mental health, transfer of positive feedback into daily routine	t0: before the intervention; t1: 30 days after the intervention	Quantitative; Self-rated burnout (Maslach Burnout Inventory, MBI; t0-t1: personal Maslach and Jackson 1981)	t0-t1: emotional exhaustion, ↓ in IG (IG vs. CG, $p < .05$) t0-t1: depersonalization, no effect t0-t1: personal accomplishment, no effect
Gabbe et al. (2008)	USA, departments of obstetrics and gynecology	Randomized control trial	New chairs (IG;14), (CG;13)	Same as sample	Peer-mentoring-program; individual	Individual	t0: before the intervention; t1: 1 year after the intervention started	Quantitative; Self-rated burnout (Maslach Burnout Inventory, MBI; Maslach and Jackson 1981)	t0-t1: burnout, no effect
Greenberg (2006)	USA, 4 private hospitals	Cohort analytic study; Quasi-experimental manipulation of payment; mixed design with: 2 x 2 (between) X 4 (within) factors, between factors: salary (no change vs. change), intervention (intervention vs. no intervention)	Nursing leaders (IG _{total} : 40, IG _{underpaid} : 19, IG _{no payment change} : 21), (CG; number not mentioned)	Nursing staff members (IG _{total} : 241, IG _{underpaid} : 105, IG _{no payment change} : 136), (CG _{total} : 226, CG _{underpaid} : 96, CG _{no payment change} : 130)	Group intervention; 2 x 4 h on two consecutive workdays	Organizational justice training (Skarlicki and Latham 2005) with focus on interaction and informational justice	t0: before salary change was announced; t1: after salary change was implemented; t2: 1 week after the intervention; t3: 6 months after the intervention	Quantitative; Self-rated insomnia (adapted version of Jenkins et al. 1996, 1988)	t2: insomnia ↓ in IG _{underpaid} (IG _{underpaid} vs. CG _{underpaid}) t3: insomnia ↓ in IG _{underpaid} (IG _{underpaid} vs. CG _{underpaid})

Table 3 (continued)

Author	Setting	Study design	Sample (IG/CG;n)	Outcome assessors (IG/CG;n)	Intervention type; dose	Content of the intervention	Measure points	Type of measurement	Results
Haraway and Haraway (2005)	USA, 1 health care organization	Cohort study	Leaders from different professions (IG; 22)	Same as sample CG;n	Group intervention; 6 h divided on 2 days 1 week apart	1st day: reasons for conflicts, danger of different reactions to conflicts, conflict management, transfer into daily routine 2nd day: reviewing the practical phase, managing difficult people (Bissell 1993), communication skills	t0: before the intervention; t1: 1 month after the intervention	Mixed methods; Self-rated occupational stress (Revised Occupational Stress Inventory OSI-R, three scales with 16 subscales; Osipow 1998) Qualitative analyses to initial situation, expectations for and evaluation of the intervention	t0-t1: subscale role overload ↓ ($p < .05$) t0-t1: subscale interpersonal strain ↓ ($p < .05$) t0-t1: subscale role boundary ↓ ($p < .05$) t0-t1: subscale psychological strain ↓ ($p < .05$)

Table 3 (continued)

Author	Setting	Study design	Sample (IG/CG;n)	Outcome assessors (IG/CG;n)	Intervention type; dose	Content of the intervention	Measure points	Type of measurement	Results
Luk (2018)	Hong Kong, 1 acute general hospital	Cohort study	Senior nursing managers (IG; 42)	Same as sample CG;n	Group intervention; 5 × 1.5 h seminar, 5 × 1.5 h small group sharing, 6 h retreat	personal and professional enhancement as a leader through program focusing on servant leadership style	t0: before the intervention t1: after the intervention	Mixed methods; General measure of servant leadership (Ehrhart 2004) Workplace Well-being Questionnaire (WWQ Hyett and Parker 2015). Content-analysis of self-reflective essays	t0-t1: overall servant leadership ↑ t0-t1: subscales servant leadership: Empowering staff members ↑ Well-being ↑ Behaving ethically ↑ Having conceptual skills ↑ Creating values for those outside of organization ↑ (all $p < .05$) t0-t1: overall workplace well-being ↑ t0-t1: work well-being subscales: Work satisfaction ↑ Organizational respect for the employee ↑ Employer care ↑ (all $p < .05$)

Table 3 (continued)

Author	Setting	Study design	Sample (IG/CG;n)	Outcome assessors (IG/CG;n)	Intervention type; dose	Content of the intervention	Measure points	Type of measurement	Results
Stansfeld et al. (2015)	UK, 4 mental health services (NHS Mental Health Trust)	Controlled clinical trial	Leaders from different professions (IG; 49), (CG; 11)	Staff members (IG; 341), (CG; 83)	Mainly online-based intervention; weekly or two weekly over 3 months	e-learning health-promoting program, topics: stress management understanding the link between mental and physical health, leaders' legal duty of care supporting staff members in problem-solving, find individual staff-centered solutions (Anderson Peak Performance package)	t0: before the intervention; t1: 3 months after the intervention	Mixed methods; Self-rated well-being (Warwick Edinburgh Mental Well-being Scale, WEMWBS Tennant et al. 2007)	t0-t1: no significant effects on mental health
								Sickness absence (with reporting system of NHS mental Health Trust and local Social Service)	
								Self-reported sickness	
								Self-rated psychological distress	
								(General Health Questionnaire, GHQ12 Goldberg and Williams 1988)	
								Interviews with key informants, participating leaders and staff members	

Table 3 (continued)

Author	Setting	Study design	Sample (IG/CG;n)	Outcome assessors (IG/CG;n)	Intervention type; dose	Content of the intervention	Measure points	Type of measurement	Results
Zimber et al. (2001)	Germany, 11 retirement homes	Controlled clinical trial	Nursing leaders (IG; 24), (CG; 18)	Nursing staff members (IG; 32), (CG; 38)	Group intervention; 12 × 1.5 h weekly	Leaders and staff members: coping with 'difficult' residents, professional self-image, coping with stress and personal problems Only leaders: leadership skills and communication with staff members	t0: before the intervention; t1: after the intervention; t2: 3–4 months after the intervention (IG)	Quantitative, Self-rated psychological distress (General Health Questionnaire, GHQ Goldberg and Hillier 1979) Self-rated work atmosphere (Kempe and Closs 1985) Self-rated competence and controlling conviction (Fragebogen zu Kompetenz und Kontrollüberzeugung, FKK Krampen 1991) Self-rated workload in hospitals (Tätigkeits- und Analyseverfahren, TAA-KH Büssing and Glaser 1999) Self-rated professional competence (Zimber and Teufel 1999)	Results for leaders and staff members IG vs. CG: t0–t1: no significant trend differences in mental health outcomes, IG perceived better work atmosphere in relation to residents ↑($p = .01$) t0–t2: changes in personal competences could predict a significant amount of variance (32%) of working strain and psychological impairment (32%) in regression analysis

IG intervention group, CG control group

Discussion

To our knowledge, this is the first systematic review to evaluate leadership interventions designed to improve the mental health of leaders and/or their staff members in the health care sector. With regard to the research question, this systematic review has three key findings.

First, the seven included studies showed mixed evidence for leadership interventions on mental health (of leaders and/or staff). None of the eligible studies showed an adverse effect on mental health, two studies showed no effect (Gabbe et al. 2008; Stansfeld et al. 2015), one study could not identify a trend difference but found an association between the personal competence and work strain/psychological impairment via regression analysis (Zimber et al. 2001), and the data of four studies suggested a significant positive trend for leaders' (Haraway and Haraway 2005; Luk 2018) or staff members' mental health (Eastburg et al. 1994; Greenberg 2006) initiated by a leadership intervention. Second, seven studies could fulfill the search criteria with noticeable diverse research of moderate-to-low quality. Third, no study took place in an ambulatory care setting.

The statistically significant results can be interpreted as clinically relevant, because they all target important interpersonal dimensions for a good relationship between leaders and their staff members in the health care sector which is finally an important factor for a successful patient care (e.g., Boamah et al. 2018), whereas a standardized effect size was only reported by Greenberg (2006) who states a high effect size of the organizational justice intervention.

The diversity of eligible studies was also visible in study sample, intervention type, dose, content, and measurement type. The largest portion (four studies) investigated nursing employees, which is comparable to other research (e.g., Vance and Larson 2002). Leadership interventions differed as well in their direction of action. Three of the studies targeted leaders' individual mental health as a preventive behavior intervention, whereas two-thirds aimed to improve staff members' mental health and thus tried to foster mental health through an organizational prevention.

The studies also showed a broad spectrum of intervention types (from basic communication skills to specific models of psychological strain at the workplace), duration and content aspects. The same applies for the measurement instruments, which recorded the full range of mental health (positive as well as negative) from the subjective symptom (insomnia) over subjectively perceived psychological variables (e.g., emotional exhaustion) to objective variables (e.g., sickness absence).

Although studies were diverse, we found some overlapping aspects in effective leadership interventions. Most

interventions included educational parts, reflective parts and practical phases where leader could implement their new knowledge in their day-to-day work. Three of four effective interventions used a group setting with the idea of collegial intervention. Contently some effective interventions comprised the communicative handling of difficult situations with staff members (e.g., conflicts or injustice). Following these aspects, an improvement on a behavioral and organizational level could be achieved.

Based on the limitations of these seven studies, we recommend future studies to improve their study design using randomized controlled trials, controlling for confounders by at least conducting studies over more than one setting (including ambulatory care), using a blinding mechanism to reduce socially desirable response patterns of participants and their staff members, employing longer follow-up periods and extend their study population to increase the power of studies (for an overview, see Skivington et al. 2018).

To examine the effect of different study formats (e.g., individual-based interventions vs. group interventions), intervention contents or dose, a comparison of different intervention arms and control groups such as in psychotherapy research (e.g., Zipfel et al. 2014) could be one way to focus on the effectiveness of leadership interventions. Using these study designs could reveal possibly more evidence-based causal relationships between leadership behavior and the mental health of leaders and their staff members. Consequently, we encourage researchers and stakeholders in the health care sector to investigate existing and new implemented leadership interventions in a controlled design to apply more evidence-based health preventive leadership interventions as these interventions seem to have a promising effect on mental health.

Studies that attempted to improve supportive leadership behavior, even though not focusing specifically on mental health in the health care sector, can support this development. Saravo et al. (2017) investigated an intervention designed to improve transformational and transactional leadership behavior in resident physicians. Compared to the control group, external and self-assessment both showed a significant improvement of supportive leadership skills in the intervention group with a large effect size. Awad et al. (2004) also implemented a leadership program for residents, which improved communication skills in the pre-post comparison. Although the improvement in leadership behavior can be seen as one step, future research must go further and acquire staff members' and leaders' mental well-being and mental health to clarify the causal association of leadership behavior and staff members' mental health longitudinally with subjective outcomes (e.g., questionnaires) and objective outcomes (e.g., sickness absence).

Research in other sectors has taken these attempts one step further. Milligan-Saville et al. (2017) conducted a

leadership intervention on mental health knowledge and communication for firefighters in a randomized controlled trial. In the 6-month follow-up period, the work-related sickness absence of the staff members in the intervention group decreased significantly (Milligan-Saville et al. 2017). Although the role of firefighters as first aiders can be seen as parallel to ambulance services, the working context of the health care sector is much broader, and thus results can be a hint but are not generally transferable without caution.

Besides these exemplary studies, a review on leadership intervention promoting mental health without any sector specification could identify five studies that targeted staff members' mental health directly (Tsutsumi 2011). Tsutsumi (2011) summarized that leadership interventions had a positive effect on staff members' mental health at least in a 1-year intervention period, whereas long-term effects were not investigated by the reviewed studies. Compared to our systematical review, Tsutsumi (2011) only included studies with a focus on staff members' mental health and did not include leaders' mental health, limited the search period to 9 years (2000–2009), and did not follow the PRISMA statement (Liberati et al. 2009).

Moreover, a recent review (Kuehnl et al. 2019) on the association of human resource management training in general and staff members' mental health only comprises 25 studies with a rather low quality of study design. As a result, the authors suggest a rather low impact of leadership interventions on staff members' mental health. This can be seen as discrepant to our systematic review, but parallel to our estimate, the authors emphasized the need for well-designed further studies (Kuehnl et al. 2019).

These two reviews show that research and study design of mental health preventive leadership interventions need to improve not only in the health care sector but also independent of the specific working context. Consequently, occupational health research on leaders needs to professionalize and catch up with other branches of research (e.g., psychotherapy research).

To get the results of this systematic review in line with the current occupational prevention research in the health care sector, it is important to analyse other existing organizational and behavior preventive interventions for maintaining/fostering mental health. Although we only identified a small number of scientifically pre–post-evaluated leadership interventions targeting mental health, there are other organizational preventive and behavior preventive approaches, which aim to improve mental health in the health care sector workforce.

Ruotsalainen et al. (2015) investigated in their meta-analysis controlled trials on work-related stress prevention in the health care sector and analysed their evidence along the categories organizational and behavioral-level interventions. The only examined organizational interventions that revealed an effect on employees' stress in their review were

changes in working schedules, which had a low evidence level. Regarding relaxation interventions or cognitive behavioral therapy, these behavior-based interventions led to a decrease of stress in comparison to no intervention. However, these results were classified as low-quality evidence as well (Ruotsalainen et al. 2015).

Leadership interventions have the advantage of providing the opportunity to combine organizational and behavioral preventive contents in one training format. Accordingly, they have the potential to be effective in both preventive ways (behavioral and organizational) at the same time and are consequently an opportunity to foster and maintain employees' mental health in the health care sector. Yet, essential prerequisites for effective organizational prevention through leadership intervention are an unconditional support e.g., of the hospital management and favorable general conditions with regard to the financing of health care institutions. Leadership interventions can be seen as one puzzle piece of mental health prevention, but staff shortage and financial pressure in the health care sector need to be addressed on a political level.

Limitations

Although we conducted our review according to the standards of the PRISMA statement (Liberati et al. 2009), we are aware of limitations of this review. Because of terms like 'communication' or 'interaction', our search strategy remained broad and thus agreement among the screeners was in parts unsatisfactory. Furthermore, only articles in German and English language were included. We also decided to choose a restrictive definition of the outcome criteria, mental health, following the WHO (World Health Organization 2001) instead of a broader definition that included job satisfaction as a predictor of positive mental health (Gregersen et al. 2016). In this way, we kept our PICOS criteria clearly structured but were also aware of the potential loss of leadership interventions with other possible stress-preventive contents. We also decided to include only studies with a pre–post-design. This explains the huge reduction from search hits (11,221) to included studies (7). We accepted this reduction, as we were interested in the change potential of leadership interventions and are aware of the neglecting of cross-sectional studies.

Conclusions

So far, there exist a small number of scientifically evaluated leadership interventions aiming to foster mental health in the health care sector. When summarizing the evidence basis of these studies, interventions that address leadership seem to be the most promising strategies to address mental health in

health care employees. Especially interventions with reflective and interactive parts in group setting at several seminar days seem to be effective. However, leadership interventions for maintaining or fostering mental health can be seen as under-examined, so leadership research with regard to mental health from a behavioral prevention and with a (structural) organizational perspective should be extended with high-quality study designs. This is the basis for meta-analytical approaches to review the effect of leadership interventions aiming to maintain or foster mental health. From a practical point of view, mental health-oriented leadership approaches with a focus on relational competence have the potential to combine organizational and behavioral strategies for the promotion of mental health and should be structurally integrated into the regular education of health care workers (e.g., physicians and nurses). There is a great need for health care leaders who are sensitized for behavioral and organizational approaches to the urgent issue of mental health prevention in hospitals as well in ambulatory care. Especially under the aspect of modern technology and artificial intelligence relational and communicative competences are needed to foster the mental health of employees. However, despite their importance, leadership interventions are no substitute for political action against staff shortages and better general conditions in the health care system.

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Compliance with ethical standards

Conflicts of interest The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Investigating the Role of Stress-Preventive Leadership in the Workplace Hospital: The Cross-Sectional Determination of Relational Quality by Transformational Leadership

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Introduction: A good relationship quality between leaders and staff members promotes mental health and prevents stress. To improve the relationship quality, it is important to identify variables which determine relationship quality at the workplace. Therefore, this study aims to identify specific leadership characteristics which support the development of a positive relationship between hospital leaders and staff members.

Methods: A cross-sectional study design was applied. A total number of 1,137 leaders ($n = 315$) and staff members ($n = 822$) of different professions (physicians, nursing staff, therapeutic professionals, administration staff, IT staff, clinical services, office assistants, scientists, others) working at a tertiary hospital in Germany assessed transformational leadership style as a staff-oriented leadership style and leader-member relationship quality by self-report questionnaires [integrative leadership questionnaire (FIF), leader-member exchange (LMX-7) questionnaire]. The data were statistically analyzed by mean comparisons and a multiple linear regression analysis.

Results: Leaders rated their own transformational leadership style ($M = 3.98$, $SD = 0.43$) systematically higher than staff members assessed their leader ($M = 2.86$, $SD = 1.04$). Evaluation of relationship quality showed similar results: leaders evaluated their relationship quality to one exemplary staff member higher ($M = 4.06$, $SD = 0.41$) than staff members rated their relationship quality to their direct leader ($M = 3.15$, $SD = 0.97$). From the staff members' perspective, four sub-dimensions of transformational leadership, that is, "individuality focus," "being a role model," "fostering innovations," and "providing a vision" showed large effect sizes in the regression analysis of relationship quality ($R^2 = 0.79$, $F(14,690) = 189.26$, $p < 0.001$, $f = 1.94$).

Discussion: The results of our study are in line with previous investigations in other working contexts and point to a profession-independent association as the professional

group of participants did not contribute to the variance explanation of the regression analysis. The exploration of potential determinants of relationship quality at work can, for example, support the development of leadership training programs with a focus on transformational leadership style. This might be an opportunity to foster high relationship quality between leaders and staff members and consequently might represent one strategy to prevent stress in the health care sector.

Keywords: transformational leadership, relationship quality, health care sector, staff members, leaders

INTRODUCTION

Considering the maintenance of employees' mental health as an operational task, and thus as a leader's task, has indeed an ethical aspect and is also a legal imperative in Germany. In 2012, the legal obligation of German employers to assess and reduce psychological health risks at the workplace was substantiated by an amendment of the respective German occupational health and safety act (1). Accordingly, the employer has to judge the risk to which employees are exposed to at their workplace including psychological stress at work and to determine which measures of occupational safety and health are necessary to reduce this risk. With regard to psychological stress at work, working conditions as well as social relationships (e.g., workplace bullying and harassment) and the working culture have to be addressed (2), with leadership being one important aspect.

Empirically, leadership has been found to be an important variable in relation to job performance (3, 4) as well as employees' health (5, 6). That is, different leadership styles are differentially associated with employees' job performance and mental health. Destructive leadership is defined as a deleterious behavior against a person and/or an organization in an active or passive way (7). It reduces productivity and has detrimental effects on the health of staff members (8), whereas appreciative leadership behavior leads to a higher work satisfaction (9), higher intention to stay at the present workplace (10), and higher well-being of staff members (11–13) as well as to improvements in leaders' own well-being (14).

A unifying characteristic of all these staff-oriented leadership behaviors is the importance of the relationship between leaders and staff members. A leadership approach that elaborates on this dyadic relation between direct leaders and their staff members is the leader–member exchange (LMX) approach [for an overview, see (15)]. The LMX approach targets the specific and individual dyad between one leader and one staff member. Thus, relationship quality between a leader and his/her various staff members can differ (16) and the development of the dyadic relationship can be described as a continuous process [e.g., Refs. (15, 17)].

A mature relationship has been positively related to several positive health and performance-oriented outcomes for staff members: for example, job performance (18), procedural distributive justice (19), and general job satisfaction (20). On the other hand, mature relationships were negatively related to turnover intention and role conflicts at work (3). Consequently, a mature relationship between leader and staff member is

preferable at the workplace, although high relationship quality can be perceived as a rather abstract construct without clear recommendations on how to establish such relationships on a behavioral basis (21). Thus, research has tried to reveal factors that contribute to a mature leader–staff member relationship at the workplace on the part of staff members and leaders (3, 21). Although good relationships at the workplace are not only stress preventive for staff members but also for leaders, we decided to concentrate in this study on stress preventive implications for staff members (22).

In this study, we focused on behavioral leadership characteristics which have been found to be subject to change (23) and could explain a substantial variance of the quality of the leader–member relationship (3). The leadership style that has been found to be associated with mature leader–member relationships (3) is known as transformational leadership (24). Transformational leadership behavior is an appreciative and toward personal growth-oriented leadership style aiming to motivate staff members through, for example, long-term aims and adjustment of values. It supports staff members to focus not only on individual goals but also on group and organizational goals (25). Transformational leadership comprises six different core behaviors (25–27), which have been labelled as “fostering innovation,” “team spirit development,” “performance development,” “individuality focus,” “providing a vision,” and “being a role model” (28).

Empirically, transformational leadership behavior shows robust relations to performance-oriented and health-oriented outcomes. Specifically, transformational leadership is associated with increased job performance (27, 29), work-related satisfaction, and motivation [e.g., Refs. (29, 30)], attachment to the leader (31), fewer days of absence due to sickness, and fewer critical incidents at the hospital [e.g., Ref. (32)], as well as less perceived stress and higher well-being [e.g., Refs. (33–36)].

Although the association of transformational leadership in general with improved quality of the leader–member relationship (LMX) seems well supported by the current literature (37–39), the specific sub-dimensions of the transformational leadership approach that foster the quality of the leader–member relationship have not been well researched to date. Furthermore, evidence is lacking especially with regard to specific working contexts and professional groups, such as at the workplace hospital.

To explore determinants that could be associated with higher relationship quality between leaders and staff members at the workplace hospital seems to be an important point as

relationship quality between the direct leader and her staff members is one of the few working conditions which can be influenced by leaders and staff members themselves and therefore constitutes an opportunity for stress prevention (33). As the workplace hospital is a psychologically demanding workplace where studies showed an increasing burnout and depression level in physicians (40) and where chronic work overload was also associated with poorer patient care (41, 42), maintaining psychological health, e.g., by strengthening relationship quality is of particular importance. Although professional groups within the workplace hospital differ in their every day work, they are unified by the fact of social interaction and relationships between leaders and staff members. Thus, further research is needed to clarify the specific determinants, as part of the transformational leadership behavior, that lead to improved leader-member relationships at this specific organization [for an overview on the relevance of context see Ref. (43)].

Therefore, this study was conducted in the context of a tertiary hospital in Germany to examine the association between transformational leadership sub-dimensions with the quality of the perceived leader-member relationship.

The study aims to answer the following research questions:

1. How do leaders perceive the quality of their relationship with staff members and vice versa?
2. Does the perception of transformational leadership differ between leaders and staff members?
3. In which way are the sub-dimensions of transformational leadership behavior associated with the quality of leader-member relationships from the view of staff members in the workplace hospital?

MATERIALS AND METHODS

Implementation

A cross-sectional online survey was conducted from May 23, 2018, to July 18, 2018, and was approved by the ethics committee of the University Hospital and Medical Faculty of Tübingen (622/2017BO2) as well as by the chief executive board and the employees' council of the tertiary hospital. Completion time for the online survey was about 10 min. Overall, $N = 10,101$ employees received the survey invitation and the response rate was 11.26%.

Materials

We created an online survey with questions on transformational leadership behavior and relationship quality using validated standardized instruments delivered *via* the Unipark survey software (QuestBack GmbH). Questions on both aspects were asked either from the leaders' or the staff members' perspective. That is, leaders evaluated their own leadership behavior, whereas staff members assessed their direct supervisor. To discriminate participating employees according to their hierarchy level, employees had to define themselves either as leaders or as staff

members. Yet, there was no possibility to assess leaders and their directly associated team due to data protection requirements.

Questionnaire Assessing Transformational Leadership

The questionnaire used to assess the sub-dimensions of transformational leadership was the "integrative leadership" questionnaire (Fragebogen zur Integrativen Führung, FIF) (28), a standardized instrument which measures leadership and communication style in four modules. In our survey, we applied transformational leadership as one part of the "integrative leadership" questionnaire. The construct of transformational leadership in the questionnaire draws on the concept of Heinitz and Rowold (26) and Ref. (25), see **Figure 1** for more details). Participants were asked to rate 32 statements using a five-point Likert scale from 1 (agree not at all) to 5 (totally agree). The item ratings can be summarized in six different scale scores or in one overall transformational leadership score. The scales of transformational leadership show a sufficient internal consistency with Cronbach's $\alpha = 0.83$ – 0.92 for the staff members' assessment provided by the manual (28) and Cronbach's $\alpha = 0.86$ – 0.94 for the staff members' assessment by our study. In addition, Cronbach's $\alpha = 0.75$ – 0.83 for the leaders' assessment provided by the manual (28) and Cronbach's $\alpha = 0.67$ – 0.81 for the leaders' assessment by our study. The convergent validity of the transformational leadership scale of the FIF was confirmed by high correlations with the frequently used questionnaire Transformational Leadership Inventory (TLI) (25, 26).

Questionnaire Assessing the Quality of the Leader-Member Relationship

The LMX-7 questionnaire (15, 44) in its German version is based on the LMX model (15) which represents the relationship quality between leaders and staff members. It is a standardized unidimensional scale with seven items. Participants are asked to rate seven questions and statements on a five-point Likert scale from 1 (low relationship quality) to 5 (high relationship quality) either in a version for leaders to assess the relationship quality to one exemplary staff member or in a version for staff members to assess the relationship quality to their direct leader. Graen and Uhl-Bien (15) postulated that the LMX-7 measures the three highly correlated relationship aspects respect, trust, and obligation as one LMX dimension. The ratings of the participants can be summarized and presented through one overall LMX score. The LMX-7 has shown high internal consistency for staff members' ratings (Cronbach's $\alpha = 0.89$ and $\alpha = 0.92$), whereas internal consistency was not reported for leaders' rating (44). In our study, LMX-7 showed an internal consistency of $\alpha = 0.74$ for leaders and $\alpha = 0.93$ for staff members.

Statistical Analyses

For the description of the participants as well as for descriptive specifications of leadership behavior and relationship quality, mean (M), percentage (%) and distribution in the form of standard deviation (SD) were applied. To compare leaders' and staff members' ratings, we used *t*-tests as the data satisfied the



FIGURE 1 | Description of transformational leaderships sub-dimensions (translated by the authors from the description by 28, pp. 8–9).

condition of normal distribution. To determine the effect size of mean comparisons, Cohen's *d* was applied. A result of $d \leq 0.2$ can be interpreted as a small, $d \leq 0.5$ as a medium, and $d \leq 0.8$ as a large effect size (45). Moreover, a multiple linear regression was conducted to explore the association between transformational leadership subdimensions and LMX overall score. Assumptions of multiple regressions (linearity, normality, homoscedasticity, and independence of residuals) were checked, and *f* was reported for the effect size. A result of $f \leq 0.10$ can be interpreted as a small, $f \leq 0.25$ as a medium and $f \leq 0.40$ as a large effect (46). The level of significance was set for all analyses to $\alpha = 0.05$, and all analyses were conducted by using IBM SPSS version 25. For

multiple comparisons, we adjusted alpha levels by Bonferroni correction. Total scores of transformational leadership behavior and relationship quality were only calculated when no missing values occurred in sub-dimensions. Concerning the linear multiple regression, cases were only included when no values of subdimensions and total scores were missing. As the variable *Professional Group* was categorical with the categories: physicians, nursing staff, therapeutic professionals, administration staff, IT staff, clinical services, office assistants, scientists, and other professions, dummy coding was used for the linear multiple regression. For the baseline group, the category Administration staff was chosen as this professional group was the largest.

A dummy variable is defined in our linear multiple regression as the difference in relationship quality perception for the administration staff and one other professional group [either physicians or nursing staff or therapeutic professionals or IT staff or clinical services or office assistants or scientists or other professions; for a detailed description of dummy coding, see Ref. (47), p. 208–215].

RESULTS

Population

A total of 1,137 employees of a tertiary hospital in Germany participated in the study, with 315 (27.7%) identifying themselves as leaders and 822 (72.3%) as staff members without leadership responsibilities. Of the staff members, 554 (74.8%) were female and 187 (25.2%) were male, whereas in the leader group 174 (59.6%) were female and 118 (40.4%) were male. One hundred four participants provided no information on their gender. For detailed information on the characteristics of the participants, see Tables 1–2.

TABLE 1 | Age group frequencies depending on hierarchy level.

Age groups in years	Hierarchical group			
	Staff members		Leaders	
	%	n	%	n
<20–24	3.7	30	0.3	1
25–30	15.1	123	3.5	11
31–35	11.2	91	9.3	29
36–40	12.6	103	12.2	38
41–45	8.6	70	15.1	47
46–50	13.7	112	13.5	42
51–54	15.1	123	17.6	55
>55	20.1	164	28.5	89

%, percent; n, number of participants; n = 6 staff members and n = 3 leaders didn't provide information on their age, N = 1128.

Transformational Leadership Behavior at the Hospital

Leaders (M = 3.98, SD = 0.43, n = 275) and staff members (M = 2.86, SD = 1.04, n = 737) differed significantly in their perception of the total transformational leadership score at their workplace [$t(1,000.31) = -24.21, p < .001, d = 1.23$]. Leaders assessed themselves as leading more transformational than the staff members evaluated their direct leaders. This result was seen for all sub-dimensions as well: leaders rated themselves in all dimensions higher than staff members evaluated their leaders (see Table 3). Except one sub-dimension (performance development) which revealed a medium size effect, all other sub-dimensions showed a high effect size.

LMX at the Hospital

Leaders and staff members perceived the relationship quality between leaders and staff members at the hospital in significantly different ways [$t(1054.83) = -21.68, p < .001$]. Leaders (M = 4.06, SD = 0.41, n = 293) rated the relationship quality they offered to one exemplary staff members higher than the subordinates rated their relationship quality with their direct leaders (M = 3.15, SD = 0.97, n = 777).

Sub-Dimensions of Transformational Leadership as Potential Determinants of Relationship Quality from a Staff Members' Perspective

vLinear multiple regression analysis was applied to assess the extent to which the sub-dimensions of transformational leadership behavior determine the variance of the perceived relationship quality at the hospital from a staff members' perspective. Professional groups of the staff members (see Table 2) were also entered as dummy variables into the linear multiple regression to control potential professional related differences in the association of transformational leadership and relationship quality. All assumptions of multiple regression analysis were met, and predictors were all entered simultaneously

TABLE 2 | Proportion of professional groups depending on hierarchy level and depending on professional groups overall.

Professional groups	Hierarchical level				Overall	
	Staff members		Leaders		%	n
	%	n	%	n		
Physicians	53.8	84	46.2	72	13.7	156
Nursing staff	67.6	142	32.4	68	18.5	210
Therapeutic professionals ^a	80.8	59	19.2	14	6.4	73
Administration	70.4	157	29.6	66	19.6	223
IT	78.9	56	21.1	15	6.2	71
Clinical services ^b	72.7	8	27.3	3	1.0	11
Office assistants	89.3	100	10.7	12	9.9	112
Scientists	77.0	87	23.0	26	9.9	113
Others	76.8	129	23.2	39	14.8	168

%, percent; n, number of participants, N = 1137.

^ae.g. physiotherapist, psychotherapist.

^be.g. caretaker service, catering.

TABLE 3 | Leaders' and subordinates' ratings of transformational leadership sub-dimensions.

Sub-dimensions of TFL	Staff members			Leaders			t(df)	p	d
	M	SD	n	M	SD	n			
Fostering innovations	3.15	1.10	811	4.27	0.50	307	(1,082.34) = -23.38	<.001	1.15
Team spirit development	2.84	1.18	805	4.07	0.60	304	(1,017.23) = -22.69	<.001	1.17
Performance development	2.89	1.09	794	3.66	0.73	300	(799.81) = -13.30	<.001	0.77
Individuality focus	2.78	1.22	805	4.02	0.61	307	(1,038.91) = -22.41	<.001	1.14
Providing a vision	2.55	1.17	798	3.57	0.74	306	(872.58) = -17.26	<.001	0.96
Being a role model	3.00	1.30	803	4.35	0.55	299	(1,085.18) = -24.26	<.001	1.18

TFL, transformational leadership; M, mean; SD, standard deviation; n, number of included participants; t, t-test statistic; df, degrees of freedom; p, p-value; d, Cohen's d.

into the model (see Table 4 for correlations of continuous variables). The result of the linear multiple regression analysis is presented below in Table 5.

The total variance of relationship quality that could be explained by this model was 79% [$R^2 = 0.79$, $F(14,690) = 189.26$, $p < .001$] which corresponded to a large effect ($f = 1.94$). The sub-dimensions “fostering innovation,” “individuality focus,” “providing a vision,” and “being a role model” were included as significant determinants of the variance explanation. Standardized beta values (β) revealed that on a single factor level the sub-dimensions “individuality focus” and “being a role

model” made the strongest contribution to explain the variance of relationship quality.

DISCUSSION

To our knowledge, this is the first study which investigates sub-dimensions of transformational leaderships and the quality of leader-member relationships across all professions in the workplace hospital from leaders' and staff members' point of view. Leaders and staff members' perception of

TABLE 4 | Intercorrelations of transformational leadership sub-dimensions and relationship quality from a staff members' perspective.

Variables	1	2	3	4	5	6	7
1. Staff members' total LMX	—	0.78***	0.76***	0.66***	0.84***	0.77***	0.80***
2. Fostering innovations		—	0.78***	0.70***	0.75***	0.77***	0.77***
3. Team spirit development			—	0.71***	0.74***	0.74***	0.78***
4. Performance development				—	0.62***	0.75***	0.70***
5. Individuality focus					—	0.74***	0.73***
6. Providing a vision						—	0.78***
7. Being a role model							—

Pearson correlations for staff members (n = 705) are presented above the diagonal. *** p < .001.

TABLE 5 | Linear multiple regression analysis for staff members' perception of relationship quality.

Sub-dimensions	B	SE(B)	β	t	p	CI(B)
Constant	0.93	0.06	—	14.49	<0.001	0.80–1.05
Admin. vs Physicians	-0.11	0.07	-0.04	-1.70	0.09	-0.24 to 0.02
Admin. vs nursing staff	-0.12	0.06	-0.04	-1.92	0.06	-0.22 to 0.00
Admin. vs Therapeutic professionals	-0.02	0.07	-0.06	-0.32	0.75	-0.17 to 0.12
Admin. vs IT staff	-0.02	0.08	-0.01	-0.24	0.81	-0.18 to 0.13
Admin. vs Clinical services	0.11	0.23	0.01	0.50	0.62	-0.34 to 0.56
Admin. vs Office assistants	-0.08	0.06	-0.03	-1.24	0.22	-0.20 to 0.05
Admin. vs Scientists	-0.04	0.07	-0.01	-0.056	0.58	-0.17 to 0.09
Admin. vs Other professions	0.04	0.06	0.02	0.69	0.49	-0.07 to 0.15
Fostering innovation	0.11	0.03	0.13	3.66	<0.001	0.05–0.17
Team spirit development	0.05	0.03	0.07	1.96	0.05	0.00–0.11
Performance development	0.02	0.03	0.02	0.63	0.53	-0.03 to 0.07
Individuality focus	0.35	0.02	0.43	14.52	<0.001	0.30 to 0.39
Providing a vision	0.08	0.03	0.09	2.62	<0.01	0.02 to 0.13
Being a role model	0.19	0.03	0.25	7.55	<0.001	0.14 to 0.24

B, unstandardized coefficient; SE, standard error of B; β , standardized coefficient Beta; t, t-test; p = p-value; CI, confidence interval of B, n = 705 subordinates; Admin., Administration staff, $R^2 = 0.79$, $F(14,690) = 189.26$, $p < .001$.

transformational leadership and relationship quality at the workplace hospital differed significantly on an overall basis and at a dimensional level. That is, leaders rated transformational leadership behavior and relationship quality higher than the staff members of the same hospital did. Furthermore, the results provide insight into the association between the sub-dimensions of transformational leadership and relationship quality from a staff members' point of view: The sub-dimensions "individuality focus," "being a role model," "fostering innovations," and "providing a vision" explained 79% of the variance of the perceived relationship quality, whereas the professional group of staff members could not contribute to the variance explanation.

When comparing our rating results of transformational leadership to the results of a representative sample of German leaders and subordinates provided by the manual of the questionnaire of integrative leadership (FIF) (28), the ratings of our sample can be located in the lower half of the average range. That is, transformational leadership was perceived as average in our sample with a tendency to lower staff members' ratings.

Relationship quality has been examined with the here used questionnaire LMX-7 in the health sector before (48). Research showed scale values for staff members' perception of LMX relating to their direct leader in the medium range between 3.34 and 3.36 (21) and 3.32 (49). Our results are comparable to these study results with the tendency to lower staff members' ratings parallel to the ratings of transformational leadership. Although our rating results seem at least comparable to other study results, taking into account relationship qualities' impact on staff members' well-being (50) and the potential improvement through transformational leadership with regard to fewer undesirable patient outcomes (e.g., medication errors), more job satisfaction (30), and higher occupational and patient safety culture in hospitals (51) an increasing rate of transformational leadership behavior and relational quality might be seen as desirable for the workplace hospital.

According to the rating discrepancy between leaders and staff members previous studies discussed that employees tended to rate their job performance more positively and less variably in self-assessments compared with other sources (e.g., peers, supervisors, subordinates) because of more indulgence and less discriminant validity (52). This result seems in line with our findings where leaders rated their transformational leadership behavior more positively and had less variance in their assessments than staff members showed in their ratings of transformational leadership behavior of their direct leaders. The ratings of the participating leaders in our sample could be contaminated by social desirability, similar to the results of Sarros et al. (53) who found significant correlations between personality characteristics (e.g. courage, compassion) and social desirability in leaders' self-assessments.

Aside from this potential bias, it is worthwhile to discuss the meaning of such different perceptions of leaders and staff members concerning transformational leadership on an organizational level. Aarons et al. (54) interpreted these different perceptions as clues to the organizational culture

quality. The results of their study showed an association between transformational leadership rating and organizational culture: the higher the rating discrepancy between leaders and staff members, the worse the organizational culture was, especially when leaders rated themselves as better than their staff members did. This shows the need to shorten the rating distance between leaders and staff members, although leaders' and staff members' rating cannot be related to each other directly.

To get a better understanding of what leaders can contribute to relationship quality from a staff members' perspective, we ran a regression analysis with the result that four sub-dimensions of transformational leadership behavior ("individuality focus," "being a role model," "fostering innovations," and "providing a vision") significantly determined the relationship quality between leaders and staff members, whereas the professional group of the staff members did not contribute to the variance explanation. These findings may support the theoretical assumptions and empirical approaches of previous research that transformational leadership is associated positively with the LMX model (15, 20, 24, 38).

To discuss and classify the impact of the four sub-dimensions of transformational leadership on relationship quality a comparison to other study results concerning the dimensions "individuality focus," "being a role model" and "providing a vision" is possible whereas the dimension "fostering innovation" has not been found to determine relationship quality before. That is, the explanation for the impact of the dimension fostering innovation is rather speculative. The effect of the dimension "fostering innovation" could be explained by the health care sector as study context: Employees working there could show a higher affinity to innovations in general as improving patient care through innovative treatment methods can be seen as one important part of medical advance which is important for employees' every day work in the health care sector. Although the association of "fostering innovations" and relationship quality has not been explained explicit yet, this dimension has been associated significantly positive to other staff-oriented variables like job satisfaction, affective commitment and organizational citizenship behavior (28).

The dimensions "individuality focus" and "being a role model" could explain a considerable higher part of variance than "fostering innovations" in the performed regression analysis. Both aspects could be seen as a part of high employee orientation and are in line with other empirical approaches. Deluga (55) examined the relationship of transformational leadership and relationship quality on a sub-dimensional level as well. He found on the basis of the four factorial transformational leadership model (56) the sub-dimension "charisma" [corresponding to parts of the sub-dimension "providing a vision" and "being a role model" in our study; see Ref. (28)] and "individual consideration" [corresponding to the sub-dimension "individuality focus" in our study; see Ref. (28)] as two predictors for relationship quality in the military context. Yukl et al. (57) showed in their study that the transformational leadership sub-dimensions "leading by example" [corresponding to the sub-dimension "being a role

model” in our study; see Ref. (28)] could explain parts of the variance of relationship quality.

Our results revealed comparable sub-dimensions of transformational leadership related to relationship quality for the hospital context as Deluga (55) found for the context of the U.S. Navy. This concordance has been shown despite very different working contexts and thereby could lead to the assumption that the relation of transformational leadership subdimensions and relationship quality could be quite independent of the working context. The idea of generalization is also supported by the result of our regression analysis that the professional group of staff members did not contribute to the variance explanation of relationship quality. The association between transformational leadership and relationship quality is independent of the professional group in our study. Future investigations could examine this aspect further by including first and secondary care hospitals or focusing on other sectors. For example, the economic sector where leaders have more direct access to monetary resources, as studies have shown that transformational leadership style is especially relevant when leaders have no direct access to monetary reward systems (29) and when workplaces are more hierarchically structured (36), which are both applicable for our study as well as for Deluga’s (55) study context but won’t fit to the economic sector in the same way.

Further research is needed to investigate the effect level of sub-dimensions of transformational leadership behavior (e.g. individual level, dyadic level, group level or organizational level). Seltzer and Bass (58) assumed that the sub-dimension “charisma” and thus also the sub-dimension e.g., “providing a vision” mainly have an effect on a dyadic level as well as the outcome variable relationship quality. We assume that “individuality focus” and “being a role model” could also show an effect on a dyadic level as they can be perceived as the relationship-based sub-dimensions of transformational leadership.

Limitations

First, ratings of leaders and staff members cannot be associated directly with each other (the leaders rated by staff members might not be the ones that have participated in the study). That is, it could be possible that the most transformational leaders and the most unsatisfied staff members participated and distorted the survey results in the respective directions. Future studies should aim to enable the connection between a leader’s self-ratings and the ratings of their actual respective staff members. Second, future investigations need to use more than just one measurement method (e.g., self report questionnaires and qualitative data from outside observers). As the exclusive use of self-report tools is an important limitation of our study. Third, we had a low response rate, and participation in our survey was voluntary, which may also have rendered the sample less representative with, for example, the more motivated employees participating. Fourth, the cross-sectional design hinders causal inference from the study results but gave the opportunity to consider the relation of transformational leadership sub-dimensions and relationship

quality without adding any temporal variables in this early stage of study (59). Another point is the high proportion of variance explanation in the regression analysis which could be a hint for overestimation of the relation between the sub-dimensions of transformational leadership and relationship quality although the two constructs can be distinguished by their theoretical background: Whereas transformational leadership focuses on leadership behavior, the model of relationship quality refers to the relationship between leaders and staff members. Despite this potential overestimation, the investigated association can be seen as one important part of relationship quality research besides other examined determinants like subordinates’ characteristics, interactional characteristics, and context variables (60).

To sum up, the hypotheses that can be raised from our results may well justify future studies that employ interventional longitudinal designs to enlighten the effects of transformational leadership on relationship quality as well as the by now theoretical based assumption that there is an opportunity to prevent stress by fostering relationship quality.

Practical Implication

This study explored specific determinants of relationship quality in the workplace hospital to explore opportunities to enhance relationship quality. Based on our results first, leaders should remember that their transformational leadership behavior could have an impact on the relationship quality with their staff members. And that by fostering the relationship quality, an opportunity to prevent stress in their staff members comes along. Second, leaders should get the opportunity to participate in leadership training programs to reflect, develop, and improve their transformational leadership skills. Studies have already shown that transformational leadership can be improved by leadership interventions (61, 62).

The next step should be to assess whether this can lead to a change in perceived relationship quality as an important working condition regarding staff members’ well-being in the health care sector. Besides other important measures (e.g. reduction of high quantitative demands, improving personnel shortage, addressing the hazardous of working with critical ill patients), this ultimately might represent one of the promising strategies to prevent stress-related disorders in the health workforce.

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Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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BMJ Open Feasibility, psychological outcomes and practical use of a stress-preventive leadership intervention in the workplace hospital: the results of a mixed-method phase-II study

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ABSTRACT

Objectives Hospitals are psychologically demanding workplaces with a need for context-specific stress-preventive leadership interventions. A stress-preventive interprofessional leadership intervention for middle management has been developed. This phase-II study investigates its feasibility and outcomes, including work-related stress, well-being and transformational leadership.

Design This is a mixed-methods study with three measure points (T0: baseline, T1: after the last training session, T2: 3-month follow-up). Additionally, focus groups were conducted to assess participants' change in everyday work.

Setting A tertiary hospital in Germany.

Participants N=93 leaders of different professions.

Intervention An interactive group setting intervention divided in five separate sessions ((1) self-care as a leader, (2) leadership attitudes and behaviour, (3) motives, needs and stressors of employees, (4) strengthen the resource 'team', (5) reflection and focus groups). The intervention was conducted between June 2018 and March 2020 in k=5 runs of the intervention.

Outcome measures Feasibility and acceptance were measured with a self-developed intervention specific questionnaire. Psychological outcomes were assessed with the following scales: work-related strain with the Irritation Scale, well-being with the WHO-5 Well-being Index and transformational leadership with the Questionnaire of Integrative Leadership.

Results After the intervention at T2, over 90% of participants reported that they would recommend the intervention to another coworker (92.1%, n=59) and all participants (n=64) were satisfied with the intervention and rated the intervention as practical relevant for their everyday work. Participants' self-rated cognitive irritation was reduced, whereas their well-being and transformational leadership behaviour were improved over time. Focus group discussions revealed that participants

Strengths and limitations of this study

- The concept of the stress-preventive leadership intervention was developed with the help of inter-professional mental health experts and based on a systematic review of leadership interventions in the healthcare sector.
- The intervention was piloted with an extensive mixed methods approach.
- To assess psychological outcomes, standardised questionnaires were used.
- The focus group interviews were evaluated with a standardised method of qualitative content analysis.
- Due to the uncontrolled study design, only intrapersonal change could be recorded over time.

implemented intervention contents successfully in their everyday work.

Conclusions This intervention was feasible and showed first promising intraindividual changes in psychological outcomes. Participants confirmed its practical relevance. As a next step, the intervention will be evaluated as part of a multicentre—randomised controlled trial within the project SEEGEN (SEEelische GESundheit am Arbeitsplatz KrankeNhaus).

INTRODUCTION

Hospitals are demanding workplaces characterised by high demand and low control^{1 2} and high effort–reward imbalance.^{3 4} Work-related strain, reduced well-being and even symptoms of mental illnesses such as depression are common in hospital workers.^{5 6} Also sick days caused by mental illnesses are higher in the healthcare sector than in other fields of work in Germany.⁷ Since the beginning of

2020, hospital workers are additionally burdened by the acute health crisis due to the Covid-19 pandemic which is related negatively to their well-being.⁸ Reducing psychological strain in hospital employees is of great importance for both the individual and the society as well-being of hospital workers is related to their intention to leave,⁹ to productivity,¹⁰ to patient safety^{11–13} and ultimately to public welfare. Thus, stress-preventive measures in hospitals are urgently needed.

One stress-preventive measure at the workplace can be constructive leadership behavior.¹⁴ Transformational leadership is a constructive change-oriented leadership behaviour, which helps leaders to create a stress-preventive work structure and culture for followers by fostering innovations, supporting the development of team spirit and performance growth, focusing on followers' individuality, providing a vision and being a role model.^{15 16} Concerning the influence of leadership behaviour on followers' well-being, transformational leadership has been extensively examined. Transformational leadership has positive effects on followers increased well-being and reduced affective symptoms such as burnout.¹⁷

But previous research on leadership interventions showed mixed results. Whereas Tsutsumi¹⁸ postulated that leadership interventions show a short-term effect on followers' mental health, Kuehnl *et al*¹⁹ could not report effects of leadership interventions on followers' well-being. With regard to the healthcare sector the evaluation of leadership interventions with a focus on followers' or leaders' mental health have been almost neglected so far. In a recent systematic review, we found only a small number of leadership intervention studies in the health care sector.²⁰ Within the small study sample four studies assumed a significant positive trend for either leaders'^{21 22} or followers' mental health^{23 24} two studies could not identify a trend difference^{25 26} and one study only reported an association between the personal competence and work strain/psychological impairment via regression analysis.²⁷

Due to the scarcity of data on leadership interventions in the workplace hospital, little is known about change potential, feasibility and acceptance of leadership interventions and about leaders' subjective experience in their everyday work after intervention participation. Therefore, we developed an interprofessional stress-preventive leadership intervention for the middle management in the workplace hospital based on evidence-based concepts and needs analysis through semistructured interviews. The leadership intervention aims to target hospital leaders' own strain management, their competence to design working conditions and their constructive leadership behaviour.

We focused on leaders' own strain management since leaders' in the healthcare sector can experience high psychological strain due to their demanding work tasks.²⁸ Moreover, leaders' own strain is negatively related to their leadership behaviour and their workplace relationships.²⁹ This holds especially true for leaders of middle management as they work close to the base and experience rather

high psychosocial demands. Strengthening leaders' own strain management skills could heighten their awareness of stress in the workplace hospital and make them role models in stress management, which could help to reduce strain among their followers.

By familiarising leaders' with work-related stress models for example, effort–reward imbalance,⁴ leaders could be strengthened in their ability to design followers' working conditions stress-preventively. Since working conditions such as role clarity or predictability mediate the effect of leadership behaviour on followers' well-being,³⁰ an improvement in working conditions could further promote followers' well-being.

With concepts of constructive leadership behaviour like transformational leadership behaviour we would like to foster leaders' health oriented leadership behaviour as it's association with followers' well-being has been investigated ample.¹⁴ What needs to be added to previous research are more effective leadership intervention approaches in the workplace hospital with view to followers' mental health and the link of leaders' leadership behaviour to their own well-being. First studies showed mixed results. Zwingmann *et al*³¹ reported a negative association of transformational leadership and leaders' emotional exhaustion. Kaluza *et al*³² found constructive leadership to be related with leaders' work-related well-being in their meta-analytically approach.

In order to pilot this new stress-preventive leadership approach, we focused in this phase-II study on feasibility, acceptance and intrapersonal changes of participating leaders, measured by psychological outcomes as well as qualitative focus groups. Therefore, we asked the following research questions: (1) How do participants evaluate the feasibility and acceptance of the stress-preventive leadership intervention? (2) Do self-rated evaluation of work-related psychological stress, well-being and transformational leadership competency change in participants when measured before the intervention, after the last training session and after the intervention? (3) Has the intervention brought about a change in leaders' everyday work after participating in the intervention?

METHODS

Study design and registration

Participants

All leaders of middle management of the tertiary hospital with and without patient contact were invited to participate independently of their field of expertise. They were inclusively informed via email and could register themselves with the help of the hospital's Academy for Education and Personnel Development. Participants were given a written study information. After reading, informed written consent was obtained with the opportunity to withdraw their consent at any time. By withdrawing consent, participants' questionnaire data would be deleted. Participants were defined as drop outs for the

analysis of psychological outcomes if they did not participate in the first module of the stress-preventive leadership intervention since this module set the groundwork for all the upcoming modules. Physicians and nurses received Continuing Medical Education (CME) credits for their participation.

Patient and public involvement

Prior to the leadership intervention 60 semistructured individual telephone interviews with 30 leaders of middle management and 30 employees without leadership position were conducted to discuss required content and format of a stress-preventive leadership intervention.³³ The results of this needs assessment were included in the development of the intervention. Beyond that, there was no further involvement of potential participants or public.

Intervention

Stress-preventive leadership intervention

The intervention was developed based on expert knowledge, a systematic literature search,²⁰ and a needs assessment. It took place in an interprofessional and interactive group setting and was conducted by two trainers (an educator and a psychologist). The intervention had a total duration of 24 hours, and was divided into five sessions. The first four sessions took place fortnightly and each covered a content module. The fifth session took place 3 months after the fourth session and covered a module for reflection and networking. While the first session lasted 8 hours, the sessions 2–4 lasted 4 hours each time. The first four sessions were supplemented by additional offerings (see figure 1). The intervention ran five times between 11 June 2018 and 3 March 2020. During this time, the whole intervention was repeated five times consecutively. A maximum of 20 leaders participated in each intervention group.

The intervention covered two main topics: the individual strain coping of leaders at the workplace hospital and the development of stress-preventive leadership attitude and behaviour based on the concept of transformational

leadership. See table 1 for further details on ingredients of the intervention.

The contents were presented as short keynote presentations. Furthermore, extensive group and individual work took place to reflect participants' individual situation and to encourage interprofessional communication and networking. Additionally, participants received detailed written summaries at the beginning of every intervention module and memory cards with the main messages of the module at the end of each module. Short e-mail reminders were sent to the participants between the intervention modules with citations and short remarks to remind them of the intervention content in their everyday work.

Data collection

Psychological outcomes (irritation, well-being and transformational leadership) were measured pseudonymously. They were collected at the beginning of the intervention (T0), directly after module 4 (T1), and after a 3-month follow-up (T2). Feasibility and acceptance were collected anonymously directly after every module and concerning the whole intervention after module 5. Module 5 included qualitative focus group discussions to capture leaders' changes in every day work by participating in the intervention.

Figure 1 gives an overview of the timeline of the intervention and data collection.

Quantitative variables

Irritation (Irritation Scale)

The concept of irritation describes cognitive as well as emotional strain in the working context. Cognitive irritation is defined as the incapacity to switch off from work, and emotional irritation comprises an increase of negative interactions and irritability.³⁴ Both constructs of cognitive and emotional strain in the working context are sensitive to change. Irritation was measured by the Irritation scale (IRR),³⁴ which consists of eight items, with three items measuring cognitive irritation and five items assessing emotional irritation. Participants evaluated themselves on a seven-point Likert scale ranging

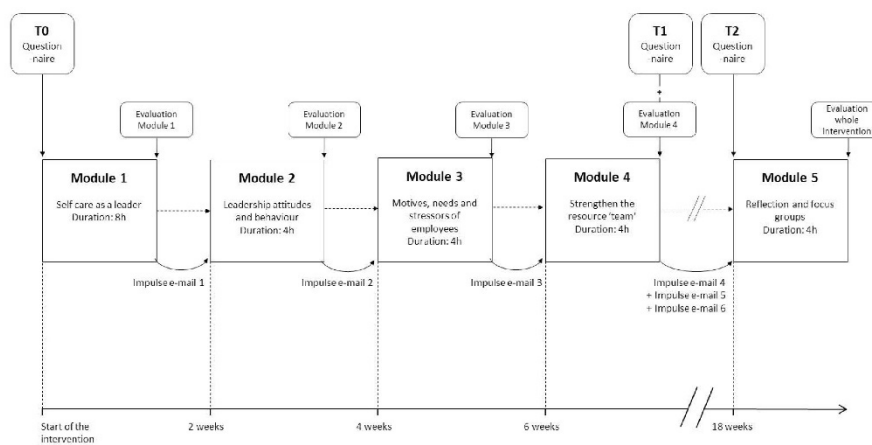


Figure 1 Intervention procedure.

**Table 1** Content of the stress-preventive leadership intervention

Module	Content	Conceptual basis
Module 1	Self care as a leader	
	<ul style="list-style-type: none"> ▶ Leaders influence on followers (psychological) well-being and health ▶ Introduction of evidence-based models on psychological strain at the workplace: effort–reward imbalance, organisational justice and demand-control model ▶ Reflection of individual stressors, stress reaction and coping mechanisms ▶ Mindfulness as one kind of coping strategy 	Elprana <i>et al</i> ⁶² ; Franke <i>et al</i> ⁶³ Karasek ² ; Kivimäki <i>et al</i> ⁶⁴ , Siegrist ⁴ Lazarus and Folkman ³⁹ , Kaluza ³² Mindfulness practice ⁶⁵
Module 2	Leadership attitudes and behaviour	
	<ul style="list-style-type: none"> ▶ Concept of transformational leadership and its transfer to the everyday work of hospital leaders ▶ Short introduction in the leadership concepts leader-member exchange and situational leadership and their application ▶ Reflection on individual reasons for being a leader 	Podsakoff <i>et al</i> ¹⁵ Graen and Uhl-Bien ⁶⁶ ; Blanchard <i>et al</i> ⁶⁷ Based on Krause and Storch ⁶⁸
Module 3	Motives, needs and stressors of employees	
	<ul style="list-style-type: none"> ▶ Discussion about working reasons of followers ▶ Theory and application of appreciative communication in dyadic interactions with followers (eg, positive and negative feedback, concept of empathy) based on the concept of transaction analysis 	For example, Kanning ⁶⁹ cf., Kriz ⁷⁰
Module 4	Strengthen the resource ‘team’	
	<ul style="list-style-type: none"> ▶ Reflecting teamwork with the concept stages of development, discussion about stage specific leadership behaviour ▶ Resources and deficits of teams and preparation to apply this concept with teams 	Tuckman ⁷¹ Francis and Young ⁷²
Module 5	Reflection and focus groups	
	<ul style="list-style-type: none"> ▶ Reflection of the stress-preventive leadership intervention ▶ Networking ▶ Focus group discussions 	Lazarus and Folkman ⁷³ , Kaluza ⁷⁴

from 1 (strongly disagree) to 7 (strongly agree) with higher scores indicating higher irritation. The items were aggregated into two subscales, cognitive and emotional irritation. A previous study assessing the psychometric properties of the scale found internal consistency ranging between 0.83 and 0.90.³⁴ In this study, the subscales of cognitive and emotional irritation were calculated. Their internal consistency measured by Cronbach’s alpha was $\alpha=0.89$ and $\alpha=0.89$, respectively.

Well-being (WHO-5 Well-being Index)

The concept of subjective well-being was implemented as a measurement of psychological health-related life quality.³⁵ In this study, the WHO-5 questionnaire^{36,37} was used to assess participants’ subjective well-being during the previous 2 weeks. Participants responded to five items on a unidimensional six-point Likert scale ranging from 0 (at no time) to 5 (all the time). The ratings were aggregating to one percentage score. To qualify subjective well-being, the WHO-5 questionnaire is commonly scored as a percentage score, with 100% indicating the highest well-being, and lower percentages a lower sum respectively.

The WHO-5 questionnaire shows a high internal consistency with Cronbach’s $\alpha=0.92$.³⁶ Internal consistency in this study was $\alpha=0.87$.

Transformational leadership (Questionnaire on Integrative Leadership)

To measure participants’ subjective evaluation of their transformational leadership behaviour, module A of the Questionnaire on Integrative Leadership (Fragebogen zur Integrativen Führung, FiF),¹⁶ with six scales (Individuality, Vision, Role Modelling, Innovation, Team Spirit and Performance development) was applied. Participants rated their own leadership style on 24 items on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Ratings were summed up to one overall average score. Internal consistency ranged between $\alpha=0.75$ and $\alpha=0.83$.¹⁶ In this study, internal consistency for transformational leadership behaviour was $\alpha=0.91$.

Feasibility and acceptance

Feasibility and acceptance of the stress-preventive leadership intervention were measured by a self-developed

intervention specific questionnaire and assessed after module 1 to module 4. After module 5, participants assessed their satisfaction, their recommendation and the practical relevance of the whole intervention (original questions see online supplemental material).

Qualitative data

Focus groups

An accompanying qualitative evaluation of the stress-preventive leadership intervention was carried out through focus group discussions in the fifth module. All participants had the opportunity to discuss perceived changes in their leadership behaviour as a result of the intervention. Participants were asked: What has changed for yourself as a result of the intervention 'stress-preventive leadership in the hospital'? How has it changed? Are there example situations? This question route was part of seven main question routes regarding changes after participation in the intervention (changes for leaders, changes for followers and effectiveness in the leadership role) and questions on the reflection of the contents of the intervention (reflection on the concept of stress-preventive leadership, the implementation of contents learnt and related barriers). Results of all question routes especially perceived limits and potentials of the implementation of a stress-preventive leadership intervention are reported elsewhere.³³ S=10 focus groups were conducted in two parts each, with a 10 min break after about 45 min, followed by another exchange for about 45 min. Per focus group, between 5 and 7 participants were discussing.

Quantitative analysis

For the description of participants, feasibility and acceptance the arithmetic mean (M), the standard deviation (SD), the range (range) and percentage values were used. For psychological outcomes linear mixed models were calculated to account for the internal time-dependent structure of the data. Analyses were conducted with R and R studio.^{38 39} We fitted the data with the restricted maximum likelihood criterion and included a random intercept for each participant to account for level-1 variance between participants. Linear mixed model warrants analyses even for cases with missing values. This way, we could keep participants in the sample even if some of their data was missing. For each of the four outcome variables—cognitive irritation, emotional irritation, well-being and transformational leadership—we fitted a linear mixed model. The fixed effects were the different measurement points as a categorical variable. Linear mixed effect models were estimated using the software from the lme4 and lmerTest packages.^{40 41}

Qualitative analysis

The focus group discussions were recorded and transcribed verbatim⁴² and anonymised simultaneously. The MAXQDA software was used to organise the data during analysis.⁴³ Data material was analysed using

Table 2 Participants' age separated in age groups

Age groups in years	Participants	
	%	n
25–30	9.1	8
31–35	14.8	13
36–40	22.7	20
41–45	19.3	17
46–50	14.8	13
51–54	15.9	14
>55	3.4	3

n=5 participants didn't provide information on their age, N=93 leaders participating in at least one session.

qualitative content analysis.⁴⁴ While the first transcripts (s=4) of the focus group discussions were completely coded, the remaining transcripts (s=6) of the discussions were completely reviewed, but only new content was coded and used for further analysis. The data were coded using deductive categories set including category definitions, anchor examples and coding rules.⁴⁵ Then the paraphrasing of the coded contents and the abstraction of the paraphrases using generalisations were performed. By abstraction of the paraphrases, the data material was reduced and further structured. The analysis steps of coding, paraphrasing and abstracting were carried out by at least two persons to support intersubjectivity.⁴⁶ Researchers from the disciplines of sociology and psychology conducted the analysis.

RESULTS

Participants

N=93 leaders of the middle management of a tertiary hospital in southern Germany participated in k=5 stress-preventive leadership interventions. Of those, 49 leaders identified themselves as female, 39 as male and 5 did not disclose information on their gender. For an overview of participants' age distribution, see table 2. Table 3 provides information on the professional background of the participants. Participants average number of years in a hospital leadership position was M=5.57 years (SD=6.14, range=0–30, n=88) and their average number of followers was M=25, (SD=30, range=2–180, n=86). Since the intervention took place during participants' working hours, there were participants who could not participate in single sessions of the intervention due to clinical obligations, illness or holiday. The total amount of participants per session were for session 1 n=88, session 2 n=64, session 3 n=67, session 4 n=69, session 5 n=64. Five participants were excluded to further quantitative analysis of psychological outcomes because they did not participate in the first session of the intervention. Additionally, a subgroup of n=60 participants participated in one of 10 semistructured focus group discussions in session 5.



Table 3 Participants' professional background

Professional background	Leaders	
	%	n
Physicians	30.9	29
Nursing sector	24.5	23
Therapeutic professionals	9.6	9
Administration	12.8	12
Information technology (IT)	3.2	3
Clinical services	5.3	5
Scientists	1.1	1
Others	7.4	7

n, number of participating leaders; n=4 leaders did not provide information on their professional field, N=93 leaders participating in at last one session.

Feasibility

After the intervention, participants assessed the feasibility of the whole leadership intervention concept. All participants were satisfied or very satisfied with the stress-preventive leadership intervention and rated the intervention as very practical relevant or practical relevant (100 %, n=64). 92.1% (n=59) would recommend the intervention. For further information on the module-specific evaluation, see table 4.

Psychological outcomes

Overall, significant improvements were found for cognitive irritation, well-being, and transformational leadership. The development of the average scores across these four indices can be seen in figure 2.

To estimate the change in irritation, well-being and transformational leadership, we regressed those scores against time nested within individuals. The results of the linear mixed models of all indices can be seen in table 5. The table depicts the size of the fixed effect as well as its statistical significance based on Satterthwaite's estimation of df.⁴⁷ Error variance and variance of the random effects are reported in the lower half of table 5.

Effect sizes of the fixed effects were relatively small, most of the variance was explained by differences between

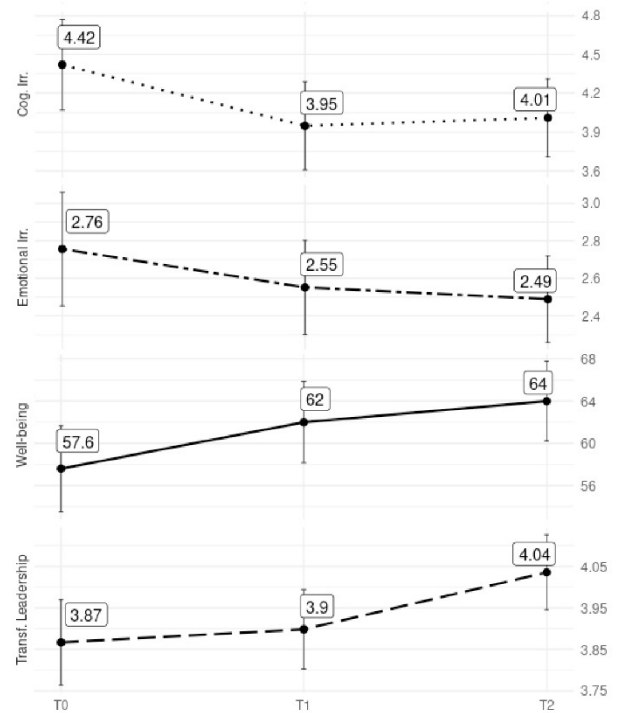


Figure 2 Development of average scores of irritation and emotional irritation, well-being and transformational leadership across the measurement points T0, T1, T2. Axes on the right show corresponding scale values. Bullets mark the mean values, whiskers the corresponding SE of the mean. Exact mean values are mentioned in the text boxes.

individuals, as can be seen in the overall high model fits Conditional R².⁴⁸ The proportion of variance explained by the fixed effect, that is, the change within time, is expressed in the Marginal R² value. For the significant fixed effects, the variance explained by the time variable is around 2%. The observed change in the outcome variables is thus significant but small.

Irritation (IRR)

Cognitive irritation significantly decreased over time, the most pronounced change occurred between baseline (T0)

Table 4 Module-specific evaluation of participants

Modules	Satisfaction					Practical relevance					Recommendation				
	++	+	-	n	m	++	+	-	n	m	++	+	-	n	m
	%					%					%				
Module 1	57.5	40.2	1.1	86	1	42.5	54.0	2.3	86	1	72.4	25.3	2.3	87	0
Module 2	53.1	43.8	3.1	64	0	54.7	42.2	3.1	64	0	73.4	26.6	0	64	0
Module 3	83.6	16.4	0	67	0	80.6	17.9	1.5	67	0	85.1	14.9	0	67	0
Module 4	50.7	43.5	5.8	69	0	53.6	42.0	4.3	69	0	47.8	18.8	2.9	48	21

%, presented percentage values; ++, the proportion of all participants who strongly agreed to the questions or statements; +, proportion of all participants who agreed to the questions or statements; -, proportion of all participants who tended to disagree; n, number of participants who answers to question; m, number of missing values.

Positive interaction within the team

Participants commented on team development and succeeded teamwork between leaders and teams. Leaders would have expanded their knowledge on stressors and resilience regarding followers, team culture and the function of a leader within a team. Some participants would have the idea to involve followers to a greater extent in problem-solving. Furthermore, they mentioned a greater degree of trust in their followers, a higher flexibility in task processing and a higher acceptance concerning unchangeable working conditions. Concerning their leadership behaviour participants would have tried to reduce the transfer of their own stress to their followers. Moreover, leaders would feel more responsible to solve conflicts between followers; they would prioritise requests from followers more strongly, would distribute working tasks more thoughtfully within the team and would try to foster the interaction within and their own transparency towards their team.

Well, for myself changed, for example, that I involve my staff members more in my tasks or topics. Even if they don't have to evaluate the topics themselves. But, just so they know, what is happening or which topics I am dealing with, if I don't have time. And actually I want them to know, because they bring up aspects that add to the topic – or whatever – and that's why it is very important to me to communicate and also that there is good exchange of ideas. Yes. (7517680-PO-01_Auftrag_05.11.18_20181015_140547).

Communication as leaders

Participants reported on a greater knowledge and sensitivity concerning communication techniques and processes. This would be reflected in a more empathetic and clearer attitude in discussions. On a behavioural level, this would lead to more frequent team meetings and communication with followers. Participants would try to listen more actively. In team meetings, the concerns and perceived strain of followers would be given more space and participants would strive for more frequent, intimate and positive feedback.

As well in meetings, for example with representatives of departments, I have made it my ambition to be the last to leave the room after the meeting, for example. Because I think, that's also part of it. Before, I often was the first to leave, in a manner like: Now we are finished, all good. Keep up the good work. And I hurried out the room to my office (laughs). And now I am the last and I am more aware of what some may have or don't have to say. (9487813-PO-01_Auftrag_05.05.20_20000102_084927)

Awareness of stress at the workplace in general

Participants mentioned being more aware of stress and illness at work in general, working structures that cause

mental illness (eg, communication deficits) and work-related mental illnesses of followers.

Also, I noticed, that I am concentrating more on the topic disease and health. Also, I would say, what I noticed before, oh, he is not doing so well at the moment or he seems to be stressed, but the simple thought, that it is something that over a longer period of time makes people sick, that thought didn't accrue to me most of the times to be honest. (7517680-PO-01_Auftrag_05.11.18_20181015_140547)

DISCUSSION

Main findings

The stress-preventive leadership intervention has been evaluated as highly satisfying, application-oriented and participants would recommend the intervention. Furthermore, ratings of cognitive irritation, well-being and transformational leadership changed significantly over time. Cognitive irritation scores were significantly reduced at T1 and persisted over time. Well-being scores increased across all three measurement points and transformational leadership scores increased from baseline (T0) to follow-up (T2). No significant changes could be detected in emotional irritation. In the focus group discussions, participants reported an improvement concerning their own strain coping, changes in their way to cooperate and develop relationships with followers, a higher awareness for communication techniques and appreciative feedback culture as well as a higher awareness of mental health in the workplace hospital by participating in the intervention.

Feasibility

With regard to participants' ratings on satisfaction, practical relevance and recommendation, module 3 was rated particularly well with regard to all indices. This could be due to didactical or content-related aspects. Module 3 had the highest proportion of exercises in small groups and partner work. Participants had time to get in contact and strengthen interprofessional contacts. Moreover, the evaluation could emphasise the need for more peer-assisted learning for leaders generally. Peer-assisted learning is already used successfully with medical students⁴⁹ and in other contexts of academic medicine.⁵⁰ It could be extended to stress-preventive leadership approaches, for example, in form of regular intervention groups or peer to peer coaching as Gabbe *et al.*²⁵ conducted a mentoring approach for new chairs of medical departments in their pilot study. Although they could not report a beneficial effect of their mentoring programme, they emphasised the need of mentoring programmes at the respective workplace. In module 3, participants dealt with dyadic communication by practicing active listening, giving critical and positive feedback in an appreciative way based on situations of their everyday work in the hospital context. According to participants' positive evaluation, refreshing



basic communication skills seems important. This should be taken into account when developing future leadership interventions for the healthcare sector.

Psychological outcomes

The intrapersonal reduction of perceived cognitive irritation and the improvement of perceived well-being in hospital leaders in this study are in line with results of other stress-preventive leadership interventions in the healthcare sector. Haraway and Haraway²¹ found in their pre-post study a significant reduction of intrapersonal occupational strain from before the intervention to 1 month after the intervention. Luk²² reported a significant intrapersonal improvement of leaders' work-related well-being after the intervention compared with before the intervention.

In our study, the strongest reduction of average scores of cognitive irritation was observed between T0 and T1. Thus, participants reported a psychological strain reduction directly after the intervention, which remained stable until T2. When evaluating the effects of a stress-preventive intervention, it is important to consider its long-term effect. Ideally, beneficial training effects prevail, rather than fading quickly after the training. A 3-month stability of the observed improvements of relevant psychological outcome variables might be interpreted as a hint that potential effects do not cease instantly. A psychological strain reduction post-intervention has been observed in other person directed stress-preventive interventions as well. In their review, Awa *et al.*⁵¹ examined the effect of interventions on burnout-related symptoms. They reported a reduction of burn-out symptoms lasting until a 6-month follow-up in 82% of person-directed interventions but significant long-term effect over a period of 1 year on burn-out-related symptoms has been shown only in the study of Rowe.⁵² In this long-term study, Rowe⁵² conducted an intervention to reduce burn-out symptoms and reported sustained lower scores for burnout over 2.5 years, when participants got short intervention modules for refreshment at 5 months, 11 months and 17 months after their intervention. Thus, interventions with continuous training sessions over a longer period of time could extend the stress-preventive effect. To examine the long-term effects of stress-preventive leadership interventions more controlled long-term studies are needed with longer follow-up periods. If effects could be confirmed, stress prevention skills should be integrated as a regular part of leadership development as leaders need to train strain coping skills exactly like other human resource management skills. This statement is additionally supported by the result that leaders' own strain is negatively related to stress-preventive leadership behaviour.⁵³ One future-oriented example for an extensive leadership development programme with parts of stress-preventive leadership behaviour like for example, emotional intelligence or conflict resolution is the leadership development programme at Cleveland Clinic.⁵⁴

Besides the promising changes in psychological outcomes, participants reported higher scores on transformational leadership behaviour from baseline (T0) to follow-up (T2). This result points to an improvement in transformational leadership through the intervention under study here. This result is in line with the results of other studies in the healthcare sector. Saravo *et al.*⁵⁵ reported a significant improvement of transformational leadership after an intervention in the self-assessment of leaders and in the assessment by an external evaluator compared with before the intervention. For organisations, especially tertiary hospitals, it would be interesting to analyse if the steady changes in transformational leadership can impact the organisational culture.⁵⁶ If the improvement in transformational leadership steadily changes the organisational culture, it could be possible that it has a positive impact on role behaviour, such as in-role and extra-role behaviors⁵⁷ that would help hospitals in dealing with the growing pressure. However, so far research on the mechanisms that explain the long-term stability of the change in leading behaviour is lacking and should be addressed in future research.

In addition to that, the largest increase of average scores of transformational leadership over time was observed between T1 and T2. This observation could point to a delayed improvement of transformational leadership. This delayed development has also been reflected in the study of Abrell *et al.*⁵⁸ Followers' assessment revealed an improved transformational leadership style of their leaders not 3 months but 6 months after participating in a leadership intervention. This could be due to the fact that behavioural changes need time to be implemented in everyday work. Future intervention studies could examine transformational leadership in a controlled design with the help of manifold feedback sources (eg, followers, external evaluators) to assess transformational leadership in a more valid way for example, see Saravo *et al.*⁵⁵

When the observed changes in psychological outcomes and transformational leadership behaviour are considered together, we could underpin the hypothesis that leading in a transformational way benefits from leaders' improved mental health. Research has shown that transformational leadership is a psychologically demanding leadership style and needs psychological resources as transformational leadership behaviour can increase emotional exhaustion of leaders over time.³¹ Furthermore, Byrne *et al.*⁵⁹ could show that leaders' mental ill-health was negatively related to their transformational leadership behaviour and Lange *et al.*⁶⁰ reported a positive association between leaders' mindfulness and their transformational leadership behaviour. This highlights once again the need of good stress coping skills for hospital leaders. In addition, research should look at the overall ratio of costs and gains of transformational leadership for the leader, as the described evidence for both the demands as well as the benefits of such leadership behaviour should be taken into account. Future research should analyse under what



conditions the costs can outweigh the gains, as contextual elements seem to impact whether the leader perceives exhaustion over time³¹ or not. Especially the workplace hospital can vary with regard to the demand and control in general,^{1, 2} but specifically when burdened by acute health crises. Such aspects of the everyday work could explain the diametral effect of leading transformationally.

Focus groups discussions

With the help of focus group discussions, participants gave an insight in changes they made in their everyday leadership after having received the intervention. Such qualitative approaches were also used by other stress-preventive leadership interventions in form of essays²² or open questions before and after the intervention.²¹ The results of our focus group discussions showed that the intervention improved participants' knowledge of stress-preventive leadership and also affected their leadership values and behaviour which are important for sustainable changes in their everyday work as a leader. Through the focus groups discussions the psychological way in which the intervention contributed to these changes became clear. This supports the assumption that the intervention contributed to leaders' reduced irritation, improved well-being and improved transformational leadership. With the help of further qualitative approaches, future research has the opportunity to examine leadership change processes in detail. This would help to get a better understanding of what motivates and supports leaders to act in a stress-preventive way.

Strengths and limitations

This mixed-method phase-II study evaluated an evidence-based stress-preventive leadership intervention for middle management adapted to the highly psychologically demanding workplace hospital. It added quantitative and qualitative evidence on its' feasibility and practical use. Due to the uncontrolled study design and the voluntary participation, no statement can be made about the effectiveness of the intervention. In addition, the study results are only based on self-disclosure.

CONCLUSION

We developed a new stress-preventive leadership intervention for middle management in the workplace hospital. It contained an innovative combination of strain preventive concepts for leaders and constructive stress-preventive leadership behaviour concepts. Study results show participants' perceived reduction in work-related strain and improvement in well-being and transformational leadership after the intervention. In focus group discussions participants could describe changes in leadership behaviour and values that they attributed to participating in the intervention. These qualitative results support the assumption of effectiveness of the intervention. This intervention format is worthwhile to be further investigated in a randomised controlled trial (as it currently

is as one module of the SEEGEN-trial).⁶¹ Future studies should also capture the perspective of followers on transformational leadership and followers' work-related strain.

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Contributors FS, TS-D, SuS, MAR and FJ developed the stress-preventive leadership intervention. FS, TS-D and FJ obtained the approval from the Ethics Committee of the Medical Faculty of the University Hospital Tuebingen. FS, TS-D and IA were responsible for the recruitment process, FS, TS-D and SuS designed the intervention material and organised the data collection. FS, TS-D and SS conducted the focus groups. ET conducted the qualitative analysis with the interdisciplinary team including FS, TS-D, FJ and MAR. ZRA, IA and FS conducted the quantitative analysis. FS drafted the manuscript with considerable contribution from ZRA, IA, TS-D, FJ, RE, NM, AM, PA, MH, CN, SR, BP, HG and MAR. All authors read and approved the final version of this manuscript. FJ supervised the project. FS is the guarantor.

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