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Leader-member exchange differentiation and followers' psychological strain: exploring relations on the individual and on the team-level

Mathias Diebig¹ · Susan Gritzka¹ · Peter Angerer¹ · Rebecca Erschens³ · Michael Gast² · Harald Gündel² · Sophie Hofmann² · Florian Junne⁴ · Carla Schröpel³ · Kai Niclas Klasmeier^{5,6}

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Abstract

Due to social comparison in the team, leader-member exchange (LMX) differentiation has been shown to play a crucial role for explaining follower outcomes. LMX differentiation may be beneficial for some followers, but also detrimental for others, when perceived as unfair. In order to understand the impact of LMX differentiation on work-related outcomes, LMX differentiation should be described by three properties (relative LMX position, LMX variability, and team-level LMX). The aim of the study is to focus on LMX differentiation and test relationships between different properties of LMX and followers' psychological strain. In sum, 75 teams with 322 followers answered an online survey about their leaders' LMX and their individual levels of psychological strain. Results of multilevel modeling showed that the relative LMX position was negatively related to psychological strain on the individual level. This relation was moderated by LMX variability and team-level LMX. However, we did not find significant relations between team-level LMX and team-level psychological strain. The present study extends previous research by looking at relations between LMX and psychological strain on an individual follower level as well as on the team level. Our results suggest that the relative position of LMX within a team seems to play a crucial role for individual follower psychological strain. Results imply that leaders should aim to improve LMX relationships within their team and to reduce differences between team members. Leadership trainings should impart knowledge and skills to improve LMX quality and include elements about LMX differentiation, its origins, as well as consequences.

Keywords Psychological strain · LMX differentiation · Relative LMX · LMX variability

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Introduction

Organizations strive to achieve optimal functioning of their members to fulfil overriding organizational goals. Optimal functioning thus covers many aspects important to organizations like performance as well as physical and mental health (Tay et al., 2023). In this light, psychological strain is of great importance not only for organizations, but also for individuals and teams. It is established that psychological strain may have an indirect (via affecting health-relevant behaviors) as well as a direct effect on individual health (O'Connor et al., 2021). Thus, psychological strain may influence organizational functioning when, for instance, individuals are absent from work or when they do not show their full performance potential. Accordingly, it is critical to identify which aspects of work may evoke psychological strain of employees. One line of research has proposed that leadership in general and in particular the quality of

working relationships with one's direct leader is critical for individual levels of strain (Harms et al., 2017; Montano et al., 2017). However, previous studies that have linked relation-oriented leadership behaviors to psychological strain have mainly focused on a dyadic perspective between one leader and one follower (Ellis et al., 2018; Martin et al., 2023). Only recently have researches begun to also look at relations between leadership and psychological strain while involving the team level (Bormann & Diebig, 2021; Liang et al., 2022). Moreover, empirical studies that have related leader-member exchange (LMX) to psychological strain have revealed inconsistent findings regarding the direction of relations between variables (Hesselgreaves & Scholarios, 2014; Schyns, 2006).

Scholars have argued that leader-follower relationships do not occur in isolation but are embedded in a larger team context with multiple LMX relationships between one leader and all of their followers. This process by which leaders develop different quality relationships with each member of their team has been labeled *LMX differentiation*. LMX differentiation has been assumed to facilitate individual follower performance by providing resources and giving support according to individual preferences of followers (Graen & Uhl-Bien, 1995). However, LMX differentiation has also been expected to detract from individual performance when the different levels of relationship quality within a team are perceived as preferential treatment or unfair (Yu et al., 2018). Liang et al. (2022) demonstrated that one's relationship with the leader - on its own and in relation to others' relationships with the same leader - may serve as an important source for well-being. They showed that high LMX quality reduced work stress of individual followers. However, high LMX differentiation weakened that beneficial effect.

In their seminal review, Martin et al. (2018) state that LMX differentiation may be identified by three properties (i.e., relative position, variability, and central tendency). Relative position describes the location of each team member within the work team in comparison to other members of the same team; variability describes the degree of within-team variation in each team member's LMX quality; central tendency describes the average LMX quality within the team. Martin et al. (2018) conclude that it is necessary to consider all three properties to fully assess the effects of LMX differentiation. While the study of LMX differentiation is increasing (Yu et al., 2018), it is noticeable that our literature search revealed relatively few studies that covered all the different properties of LMX differentiation. There are even fewer studies where the three properties of LMX differentiation form the main theoretical model (Furtado & Sobral, 2023). To the best of our knowledge there are just a handful of studies that have applied all three properties

of LMX within one theoretical model focusing on either employee performance (Epitropaki et al., 2016; Furtado & Sobral, 2023), turnover intentions (Harris et al., 2014), or absenteeism (Tremblay et al., 2021).

Thus, we aim to advance knowledge of LMX theory by looking at multiple properties within our study and by focusing on relations between relative LMX (RLMX), LMX variability, team-level LMX, and followers' psychological strain. We adopt a cross-level research model of LMX to make assumptions about the properties of LMX differentiation at different levels of analysis (individual-level vs. team-level). With this approach, we highlight that each individual follower is also part of a larger team. While RLMX puts the focus on each individual follower in comparison to other team members, LMX variability and team-level LMX set the focus on all members of a team. According to Gooty and Yammarino (2016) we aim to test if relations between constructs change as they traverse levels and whether properties of LMX differentiation relate to psychological strain for the team as a whole or for only some members of this team. We test for direct relations between RLMX and individual-level psychological strain as well as between team-level LMX and team-level psychological strain. We also test whether team-level LMX and LMX variability function as moderators for the relation between RLMX and individual as well as group-level psychological strain.

We use the conservation of resources (COR) theory (Hobfoll et al., 2018) and the social comparison theory (Festinger, 1954) as theoretical mechanisms to explain proposed relationships. *COR theory* is relevant for understanding direct relations between LMX quality and psychological strain. LMX quality may function as a driver of followers' resource availability that is assumed to lower their levels of psychological strain (Liang et al., 2022). LMX quality may represent different resources that are relevant for followers' functioning and well-being. For a more precise understanding of LMX differentiation, we integrate COR theory with social comparison theory. *Social comparison theory* is relevant for understanding the consequences of RLMX and LMX variability on follower outcomes. RLMX enables us to test the social comparison mechanism in our study, as it provides information relevant for processing resource allocation within the team. LMX variability may be viewed as contextual factor that shapes followers' interpretation of obtained resources. Relying on social comparison theory, we theorize that specific instances of resource allocation may trigger social comparison and lead to psychological strain. In sum, social comparison theory allows us to describe how perceptions of individual LMX in comparison to other team members is related to psychological strain. COR theory, on the other hand, enables us to describe the general positive relation between LMX quality and psychological strain.

For a more comprehensive view and to resolve inconsistencies in past work, we aim to present a more fine-grained operationalization of LMX differentiation and their association with individual as well as group-level psychological strain. Therefore, our study makes important contributions to the LMX literature: Firstly, we extend research on LMX differentiation and psychological strain by adding a multi-level perspective to our outcome variable and by testing the consequences of LMX differentiation on an individual as well as team-level. Secondly, we jointly consider all three properties of LMX differentiation within one model. By focusing on COR theory and social comparison theory we aim to explain the role of LMX differentiation for individual followers and their work team. This integrative perspective helps us to discover information relevant to the well-being of followers while explaining the process of resource allocation within the team setting.

Properties of leader-member exchange differentiation

LMX quality describes how well the relationship between leader and follower is evaluated by both parties (Scandura & Graen, 1984). This relationship may be perceived as a high-quality one characterized by trust and respect and may include concern for the problems of followers. In contrast, the LMX relationship may be perceived as a low-quality relationship in which the focus is set on what is specified in the formal job description. Low-quality relationships are characterized by low levels of interaction and support.

One of the main premises of LMX theory is that leaders develop differential relationships of varying quality among followers of their team. Therefore, the individual leader-follower relationship should not be considered independently of the larger system. The process by which leaders form different quality exchange relationships is referred to as *LMX differentiation*. The extent to which relationships between leaders and followers differ within the team may negatively affect followers. Followers may compare their LMX quality with others, which may disturb the internal structure of a work team. LMX differentiation has been shown to be detrimental to solidarity within teams (Yu et al., 2018) and may weaken the beneficial effects of LMX quality (Liang et al., 2022). It is assumed that the LMX differentiation process is based on three properties (Martin et al., 2018).

Firstly, RLMX describes the relative position of each team member's LMX quality with respect to other members of the team of the same leader. RLMX thus reflects the relative standing of a team member's LMX compared to other team members. RLMX may be illustrated by evaluations of individual LMX quality perceptions against team-level values. A positive value of RLMX describes that a

team member receives a high LMX quality in reference to the average LMX quality. Secondly, LMX variability is the degree of variation in team members' LMX quality. Thirdly, team-level LMX describes the within-team central tendency that reflects the team mean score of LMX quality.

Psychological strain and leader-member exchange

Psychological strain is defined as the subjectively perceived emotional and cognitive strain in occupational contexts. It is a state of mental impairment that results from the experience of uncertainty (Mohr et al., 2006). Psychological strain may be used as a sensitive indicator to capture slight deviations from normal well-being. Within a stressor-strain framework, psychological strain is positioned as a precursor to more serious psychological impairments such as psychosomatic complaints or depression. It has been shown that the effect of social stressors (such as leadership interactions) on mental illnesses (such as depressive symptoms) is only indirect and mediated via psychological strain (Dormann & Zapf, 2002).

Psychological strain has been applied as an important health-related outcome in leadership research in general, and more specifically within the LMX literature. However, previous findings show an inconsistent pattern of relations between psychological strain and LMX. For example, Schyns (2006) has linked LMX variability (referred to as LMX consensus) to psychological strain using a sample of employees in German banks and insurance companies. Results did not reveal a significant relation between both constructs but tended to suggest that more LMX variability was related to higher psychological strain at the individual level. Another study conducted in the nursing context investigated the relation between psychological strain and LMX quality (Hesselgreaves & Scholarios, 2014). It showed that the relation between LMX quality and strain depended on the seniority of followers (junior-level vs. senior-level frontline staff in nursing). For junior-level followers LMX reduced psychological strain, but for senior-level followers a curvilinear relationship between LMX and strain was observed with both low- and high-quality LMX leading to greater strain. In sum, previous research on LMX and psychological strain only provides an incomplete picture of rather inconsistent findings. For a more comprehensive view and to resolve inconsistencies in past work, we investigate the three different properties of LMX differentiation and their association with individual as well as group-level psychological strain.

In general, previous work that focuses on LMX differentiation while considering all three proposed properties of LMX differentiation is scarce. Most studies only rely on LMX variability as a measure of LMX differentiation while

also controlling for individual LMX quality (cf. Xie et al., 2019). Some approaches link the three different properties of LMX differentiation to performance and job satisfaction within multiple study research models (Epitropaki et al., 2016; Furtado & Sobral, 2023). To date, only one study has linked all properties of LMX differentiation to followers' individual level of vigor (which may be understood as a measure of positive psychological strain; Tremblay et al., 2021). Using a sample of teams from a Swiss retailer, Tremblay et al. (2021) showed that RLMX was positively related to feelings of vigor. This relation was strengthened when LMX differentiation was high. However, the review of the current empirical literature shows that relations between the different properties of LMX differentiation and psychological strain remain scarce. When differentiating between psychological strain at the individual and team level, research becomes even more incomplete. Thus, our study may be seen as an important step towards synchronizing different elements of LMX differentiation with important work outcomes at different levels.

Conservation of resources and leader-member exchange

Conservation of resources theory offers a perspective to explain the link between LMX quality and psychological strain. COR is a stress theory that highlights resource loss as main mechanism driving stress reactions in individuals. The main premise of COR theory is that individuals strive to build, retain, and protect resources they value. It is proposed that individuals who lack resources will experience stress and be prone to further resource loss (Hobfoll et al., 2018). Previous research has positioned leader behavior as a resource within the COR framework (Bormann & Diebig, 2021). It is assumed that followers may evaluate their leader's behavior as a constantly available resource. LMX quality may, therefore, be interpreted as a resource because high LMX quality is associated with supporting followers when needed (Liang et al., 2022). It has been shown that high LMX quality may be beneficial for followers as it is associated with not only high social support by the leader but also intense information exchange (Wilson et al., 2010). High LMX quality is also related to the availability of important other resources provided by leaders (e.g., training, autonomy, or feedback; Graen & Uhl-Bien, 1995). Followers are able to better cope with stressful situations when they may rely on their own and their leader's resources (Liang et al., 2022). This notion is in accordance with the central premise of COR stating that the availability of resources helps individuals to reduce stress and strain (Hobfoll et al., 2018).

The theoretical evidence thus far suggests that LMX quality may be seen as an important resource provided by

leaders that helps followers to reduce their levels of psychological strain. This resource perspective, however, does not help us to explain how the LMX differentiation process may act as a boundary condition that hampers the positive effect of LMX. Therefore, the resource approach needs to be complemented by a social comparison approach to also add the team-level to the individual-level perspective used to describe relations between LMX quality and psychological strain.

Social comparison and leader-member exchange

Social comparison theory may explain perceptions of LMX differentiation within teams. Social comparison theory proposes that individuals strive to compare themselves with similar others to evaluate their abilities and standing (Festinger, 1954). Social comparison theory contends that people inevitably compare themselves with others at the workplace. Social comparison theory explains how followers evaluate their relationship with their leader in light of other followers within the same team and describes how these evaluations have implications for followers (Liden et al., 2016). It has been shown that followers constantly compare their quality of relationship with their leader with that of other followers. This comparison may affect attitudinal and behavioral outcomes (Hu & Liden, 2013). If the social comparison process is unfavorable, it is assumed that followers may be dissatisfied, suffer from unpleasant emotions, and experience stress (Vidyarthi et al., 2010). It has been shown that comparison with someone who is better off can lead to negative affect. This upward comparison may be threatening because it reminds individuals how poor their circumstances are. It is assumed that a satisfactory social comparison process occurs when followers possess a better-than-average LMX quality within the team, whereas a non-satisfactory social comparison process appears when followers hold a worse-than-average LMX quality with their leader within the team (Hu & Liden, 2013).

Individual level psychological strain and leader-member exchange

As outlined above and in accordance with COR theory, we propose that LMX quality may be considered as a resource that reduces follower's psychological strain. A high LMX quality helps followers to deal with unfavorable working conditions as well as critical job demands. Also, high LMX quality also includes that followers profit from important job resources that may directly reduce demands and adverse psychological consequences.

When also integrating the team-perspective into our framework, a positive RLMX describes that a follower

receives a high LMX quality in comparison to other team members, whereas a negative RLMX describes that a follower has a worse-than-average LMX quality relationship. Followers with a positive RLMX may profit from resources that are provided by their leader and receive preferential treatment (Matta & van Dyne, 2020) which may trigger social comparison processes. Recently, Lee et al. (2019) highlighted that the impact of LMX quality on follower outcomes is not simply explained by the quality of the leader-follower relationship itself, but also by how the leader treats other team members. Based on COR theory, positive RLMX that is characterized by assistance and support from the leader (Gerstner & Day, 1997), represents an important resource at work and helps followers to better cope with stressful situations. Followers may rely on their leader when receiving better-than-average levels of LMX quality and may perceive their leader as a constantly available resource (Poethke et al., 2022). Followers can assess the extent to which they have the resources necessary to cope with stressful situations in comparison to other team members. This might lead to the experience of negative emotions when making upward comparisons and noting that others have more resources available (Greenberg et al., 2007). We conclude that followers with negative RLMX not only have fewer resources available than others, but they also experience negative emotions when they notice that others receive preferential treatment.

H1 RLMX will be negatively related with followers' levels of psychological strain.

LMX variability helps us to determine differences in perceived LMX quality within a team. The higher the LMX variability, the more likely it is that followers experience different values of RLMX. LMX variability displays inequality and may serve as critical boundary condition that shapes how followers appraise the resources they obtain. In turn, this may influence outcomes such as work stress (Yu et al., 2018). It has been proposed that LMX variability may evoke social comparison processes (Xu et al., 2023), which are assumed to deplete team members' cognitive and emotional resources (de Wit et al., 2012). Recent empirical studies have shown that LMX variability may harm the team structure. For example, it has been shown that high variability may negatively influence commitment and cohesion (Chiniara & Bentein, 2018; Seo et al., 2018), disturb coordination (Herdman et al., 2017; Li & Liao, 2014), and may even increase the occurrence of conflicts within a team (Boies & Howell, 2006; Choi et al., 2020).

The higher the LMX variability, the larger the difference between an individual and other team members. In this case, some followers receive the most resources, whereas

others receive only a few (or even none). We expect that the relation of RLMX and psychological strain will depend on the amount of LMX variability. If variability is high, social comparison processes may emerge within the team because differences are more noticeable. As a result, the beneficial relation between the availability of resources and psychological strain is leveled down. Contrarily, if variability is low, differences will be less salient and relations between LMX quality and psychological strain are not thought to be affected in a destructive way. We assume that in this case, small differences between levels of RLMX within the team become less striking and social comparison processes may not inhibit the stress-reducing potential of resources.

Taken together, high values of LMX variability will enfold disadvantageous processes resulting in high levels of psychological strain of followers (Ellis et al., 2018). According to COR theory, high variability of LMX within the team could indicate a threat of potential loss and, therefore, enhance stress. Within teams with high LMX variability a perceived drain of resources may emerge resulting in a sense of being emotionally exhausted, because team members are less confident and satisfied with their own relationship to their leader. We, therefore, propose the following hypothesis:

H2 LMX variability moderates the relation between RLMX and followers' levels of psychological strain: The relationships will be more (less) negative when LMX variability is low (high).

Team-level LMX describes the average LMX quality within a team. Team-level LMX is an indicator of available resources within the team. We propose that the availability of resources is a major aspect that links LMX to psychological strain. If team-level LMX is high, the relative status of a team-member becomes only salient if he or she receives relatively low levels of LMX quality (Martin et al., 2018). If team-level LMX is low, followers may compete for the few remaining resources. For low team-level LMX, the relation between RLMX and psychological strain becomes even stronger. In this case, followers experiencing high levels of RLMX may appreciate that they receive some of the scarce resources their leader provides. Being on the bright side within the team may intensify the negative relation with psychological strain since comparisons with other team members become more salient. If followers do receive low levels of LMX within the team, they may experience even greater strain due to a lack of resources and prominent social comparison processes.

H3 Team-level LMX moderates the relation between RLMX and followers' levels of psychological strain: The

relationships will be more (less) negative when team-level LMX is low (high).

Team-level level psychological strain and leader-member exchange

Drawing on COR theory, we expect access to important resources to be a protective factor resulting in reduced levels of psychological strain also for the team as a whole (Hobfoll et al., 2018). As high LMX quality includes that leaders provide followers with required resources for their tasks (Gerstner & Day, 1997), we also assume that high levels of team-level LMX are associated with low levels of team strain.

COR theory assumes that, in particular, social resources are important to an individual's level of psychological strain (Hobfoll, 2001) as these types of resources provide instrumental assistance to cope with demands and help to create a team identity. These social resources may provide individuals not only with actual assistance, but also with a feeling of attachment to a group (Hobfoll et al., 1990). Team strain builds upon the combination of team members' perceptions of individual psychological strain. Accordingly, the availability of important work-related resources may not only downsize perceptions of psychological strain on the individual level, but also on the team level. If a leader has multiple high quality LMX relationships within the team, then these followers may also experience low levels of psychological strain. This would be beneficial for team strain in total, because the team may profit as a whole.

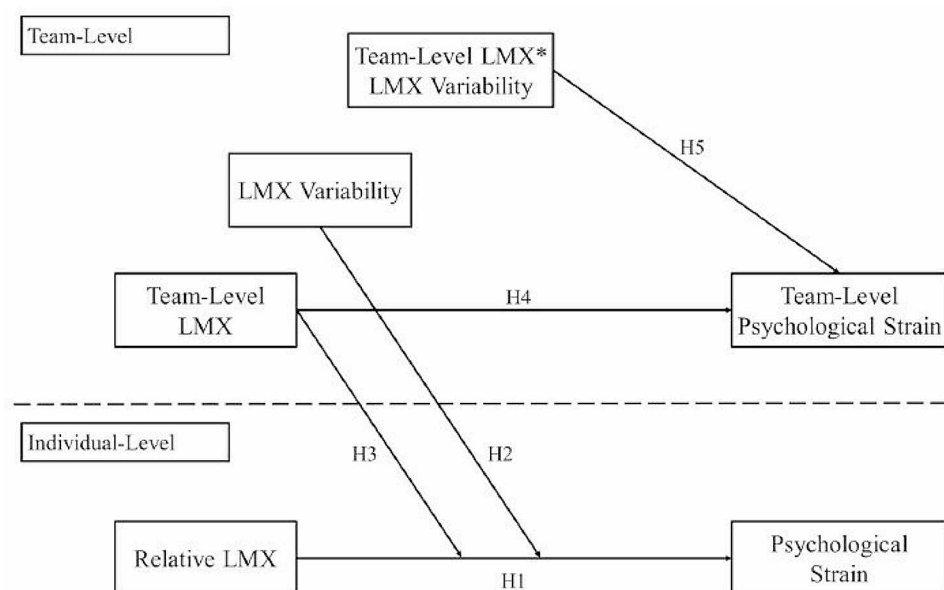
H4 Team-level LMX will be negatively related with team-level psychological strain.

When focusing on LMX variability as a property of LMX differentiation, relations might change depending on how strong LMX relationships vary. High LMX variability indicates that some followers receive very little resources, whereas others receive many. This might trigger social comparison mechanisms that may downsize the overall positive effect of high team-level LMX (Yu et al., 2018). If LMX quality strongly varies, the availability of resources may be unevenly distributed and relations with psychological strain may be weaker on the team level. If LMX quality does not vary, there will not be such high fluctuations in resource availability. In this case, all team members would profit in the same manner from their leaders' resources and experience less psychological strain.

As already described on the individual level, we again assume that high variability of LMX will mitigate the beneficial relation between LMX quality and psychological strain. A high variability means that there are some followers for whom the leader is not constantly available to provide them with important resources. As a consequence, followers may not rely on receiving the social support function of LMX. Thus, LMX is not available as a job resource when needed. This might cause psychological stress (Poethke et al., 2022). From this point of view, followers do not perceive an appropriate level of support, but are rather uncertain whether they might receive support or not. In sum, we assume the following hypothesis (cf. Fig. 1):

H5 LMX variability moderates the relation between team-level LMX and team levels of psychological strain: The

Fig. 1 Research model and hypotheses



relationships will be more (less) negative when LMX variability is low (high).

Method

Sample and procedure

We recruited teams for this study, which was part of a larger research project (Lehmann et al., 2021). We contacted teams in three regions in the southwest of Germany and applied a random sampling approach accompanied by snowball sampling in cooperation with several local multipliers (e.g., local health insurance company, chamber of commerce). Information material was sent via email through suitable channels and presented at different events. We first obtained informed consent of team leaders to allow their followers to participate in the study. When team leaders agreed, we sent them a link to an online survey and encouraged them to forward this survey to their followers. Participation was voluntary, and followers gave informed consent to participate in the study. The institutional ethics committee of the first author approved the study procedure (No. 5684). The data was matched using self-generated code variables to assign followers to teams.

Overall, 75 teams with 322 followers were included in our analysis ($M=4.29$ followers per team; $SD=2.66$). In total, 174 team leaders participated in our larger research project. Of these team leaders, 155 agreed to partake in their followers. In total, 339 followers completed the online survey. We could match 322 followers to their respective teams ($N=75$), because the remaining team leaders did not forward the survey to their followers or if forwarded, followers did not choose to participate. We also excluded 14 followers, as we could not match codes to teams. We excluded another three followers because they participated twice in the survey.

Teams came from various companies and worked in various industry sectors (e.g., financial and insurance activities; information and communication; electricity, gas, steam and air conditioning supply). On average, followers were $M=40.57$ years old ($SD=12.12$; $min=18$; $max=63$). Most followers were female (53%). 37% of followers had completed vocational training as their highest educational background, 22% technical college, 17% had a polytechnic degree, and 17% a university degree.

Measures

Psychological strain

Followers provided information on their level of psychological strain using eight items from the German version of the Irritation Scale (IS; Mohr et al., 2006; Mohr et al., 2005), which is a measure to assess strain in an occupational context (sample item: “I get irritated easily although I don’t want this to happen.”). The IS measures two aspects of psychological strain: (1) cognitive irritation and (2) emotional irritation, both resulting from a perceived goal discrepancy. The response format ranged on a 7-point Likert-Scale from 1 (*I strongly disagree*) to 7 (*I strongly agree*). Cronbach’s alpha was 0.91.

LMX

Followers answered the German version of the LMX-7 questionnaire to assess leader-member exchange (Scandura & Graen, 1984; Schyns, 2002). The LMX-7 consists of seven items (sample item: “How well does your immediate supervisor understand your work-related problems and needs?”). Answers were collected on a 5-point Likert-Scale ranging from 1 (*not at all*) to 5 (*very well*). Cronbach’s alpha was $\alpha=0.89$. Consistent with prior LMX differentiation measures (cf. Harris et al., 2014; Henderson et al., 2008), *LMX variability* was calculated as within team standard deviation of LMX ratings. We computed LMX variability scores at the team level as the standard deviation of LMX scores drawn separately from follower ratings. A high value represents high variability. *Team-level LMX* represents the mean value of answers from all followers in a team. This calculation has been applied in previous work on LMX (cf. Boies & Howell, 2006; Zhao et al., 2022). *RLMX* was calculated as individual LMX minus team mean LMX. This calculation enables us to display individual deviations from the group mean not as error variance, but as the substantive variance of interest (Furtado & Sobral, 2023). This operationalization has also been applied in previous research on RLMX (cf. Epitropaki & Martin, 2013; Henderson et al., 2008; Tse et al., 2012). The calculation of the different LMX measures is also presented in Table 1.

Analytical approach

As data were collected from individual followers (Level 1) that are nested in teams (Level 2), we applied multi-level modeling (i.e., a two-level random slope model with cross-level interaction) in R (R Core Team, 2021; package lme4 version 1.1–31; Bates et al., 2015) with a restricted maximum likelihood estimator (Maas & Hox, 2005). We

Table 1 Calculation of different LMX measures

	Formula	References
Relative LMX	$RLMX_{ij} = LMX_{ij} - \overline{LMX}_j$	e.g., Epitropaki and Martin (2013); Henderson et al. (2008)
Team-level LMX	$\overline{LMX}_j = \frac{1}{i} \sum_{i=1}^i LMX_{ij}$	e.g., Boies and Howell (2006); Zhao et al. (2022)
cLMX variability	$LMX SD_j = \frac{1}{i} \sum_{i=1}^i (LMX_{ij} - \overline{LMX}_j)^2$	e.g., Harris et al. (2014); Henderson et al. (2008)

RLMX relative LMX, *SD* standard deviation, *i* index of an individual within a team, *j* index of a team

collected questionnaire data from individuals about their LMX perceptions with their leaders and about their individual levels of psychological strain. As all LMX constructs and psychological strain showed notable shares of variance at the team level (see Table 2), the use of multilevel modeling seems justified (Bliese, 2000). Following recommendations, we centered our predictor variable on the team mean and added the team mean on Level 2 (see Enders & Tofghi, 2007). Particularly, the multilevel modeling approach allows to analyze the individual strain levels of the members of a team and the shared variance of all team members (i.e., team-level strain) separately. For LMX, individual LMX perceptions of all members of one team were aggregated to a team level LMX score. LMX variability represents the standard deviation of the individual LMX perceptions of the members of the same team (i.e., variability of LMX within a team). The relative position of each team member was computed as the difference of the individual LMX value of the follower with his or her team level LMX score (i.e., team-mean centering). In sum, LMX relative position reflects the individual level of analysis and team-level LMX as well as LMX variability reflect the team level of analysis. To test our proposed cross-level interactions, we modeled the Level 1 relationship between relative LMX and psychological strain as a random slope (Aguinis et al., 2013). Additionally, we standardized our cross-level moderators before running the analysis. The sample size of 322 followers nested in 75 teams is sufficient to detect medium-sized effects (Scherbaum & Pesner, 2019). The R script and R output of the main analysis are available as supplementary files.

Discriminant validity and common method variance

To test for discriminant validity and distinctness of measures, we analyzed several confirmatory factor analyses (CFAs). As the psychological strain measure comprises two subscales (i.e., cognitive and emotional stress; Mohr et al., 2006), we modeled them as separate latent factors. This resulting three-factor model (i.e., LMX, cognitive stress, and emotional stress) had a good fit ($\chi^2 = 279.81$, $df = 87$, $p < .01$, $CFI = 0.94$, $RMSEA = 0.08$, $SRMR = 0.05$). The model performed better compared to a two-factor (i.e., items for cognitive and emotional stress loaded together on

one latent factor, $\Delta\chi^2 = 403.26$, $\Delta df = 2$, $p < .01$) and a single-factor solution ($\Delta\chi^2 = 1588.50$, $\Delta df = 3$, $p < .01$).

To address concerns for common method bias regarding inflated correlations among our study variables, we estimated an unmeasured latent method factor in our three-factor model and tested whether this method factor attenuated the latent correlations (see Podsakoff et al., 2003). This analysis provided some evidence for the absence of a common method bias, as the latent correlations did not decrease and were still significant (average latent correlation in the three-factor model without method factor: |0.378| vs. average latent correlation in the three-factor model with method factor: |0.358|).

Control variables

We have added several control variables to test the robustness of our findings. Particularly, we controlled for follower age and gender, leader-rated LMX and LMX agreement, and perceived effort-reward imbalance to rule out alternative explanations. In line with recommendations, we tested our hypotheses with and without control variables and compared the results (see Becker et al., 2016; Bernerth & Aguinis, 2016). Leader-rated LMX was measured with the same seven questions as follower LMX. Cronbach's alpha for leader-rated LMX was $\alpha = 0.59$. LMX agreement was operationalized as the standardized mean difference (*d*) in LMX ratings between leaders and followers on the team level. The *d* statistics were computed such that higher values indicate that the leader rated the quality of relationship higher than the team. As a measure for perceived effort-reward imbalance (ERI) we used 17 items of the ERI questionnaire (Siegrist et al., 2004) that represents the two scales effort (6 items; e.g. "I have constant time pressure due to a heavy work load") and reward (11 items, e.g. "I receive the respect I deserve from my superiors"). Answers were coded on a four-point scale ranging from 1 (not distressed) to 4 (very distressed). Cronbach's alpha for effort was 0.76 and 0.87 for reward, respectively. The ERI ratio was calculated from the quotient of the mean scales of effort and reward.

Table 2 Descriptive statistics and intercorrelations

	M	SD	ICC1	ICC2	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Follower age	40.57	12.12	—	—	—	—	—	—	—	—	—	—	—
2. Follower gender dummy female	0.53	0.50	—	—	0.02	—	—	—	—	—	—	—	—
3. Follower gender dummy divers	0.00	0.06	—	—	0.03	−0.06	—	—	—	—	—	—	—
4. LMX	3.69	0.72	0.29	0.64	−0.10	−0.01	−0.15**	—	−0.09	−0.56**	−0.37**	0.32**	−0.78**
5. Psychological strain	2.80	1.24	0.10	0.31	0.10	−0.05	−0.06	−0.29**	—	0.06	0.57**	0.00	0.09
6. LMX Variability	0.54	0.24	—	—	—	—	—	—	—	—	0.24	−0.10	0.49**
7. Effort-reward imbalance	0.53	0.26	0.08	0.28	0.09	−0.07	0.05	−0.45**	0.58**	—	—	−0.10	0.30**
8. Leader-rated LMX	4.07	0.32	—	—	—	—	—	—	—	—	—	—	0.34**
9. LMX agreement	0.68	1.27	—	—	—	—	—	—	—	—	—	—	—

Team-level correlations are presented above the diagonal ($N=62-75$); individual-level correlations are presented below the diagonal ($N=322$); follower gender dummies use male = 0 as reference category; * $p < .05$, ** $p < .01$

Results

Descriptive statistics, intercorrelations, intraclass correlations, and reliability estimates are presented in Table 2.

We tested our hypotheses in one multilevel model (see Fig. 2). Our results indicated support for Hypothesis 1, as RLMX was negatively related to psychological strain on the individual level ($B = -0.70$, $SE = 0.17$, $p < .01$). Regarding our proposed cross-level interactions, the results showed significant cross-level interactions of LMX variability ($B = 0.40$, $SE = 0.18$, $p = .031$) and team-level LMX ($B = 0.37$, $SE = 0.16$, $p = .019$) on the individual-level relation between RLMX and psychological strain.

For a further depiction of the cross-level interaction effects, we used simple slope plots (see Figs. 3 and 4). These showed that the relation between RLMX and individual psychological strain was stronger negative, when LMX variability was low (conditional effect of RLMX on psychological strain for high vs. low LMX variability: $B_{high} = -0.30$, $B_{low} = -1.09$). Thus, Hypothesis 2 was supported, as we hypothesized that the relationship between RLMX and psychological strain would be stronger negative when LMX variability was low vs. high. Simple slope plots for team-level LMX as a moderator showed that the negative relation between RLMX and individual psychological strain was less negative, when team-level LMX was high (conditional effect of RLMX on psychological strain for high vs. low team-level LMX: $B_{high} = -0.33$, $B_{low} = -1.06$). Thus, Hypothesis 3 also received support, as we hypothesized that the relationship between RLMX and psychological strain would be more strongly negative when team-level LMX was low.

In contrast to Hypothesis 4, we did not find a significant relationship between team-level LMX and team-level stress ($B = -0.14$, $SE = 0.11$, $p = .185$). In addition, the interaction of team-level LMX and LMX variability was not significant ($B = -0.03$, $SE = 0.08$, $p = .745$). Hence, Hypothesis 5 was also not supported. Besides this, LMX variability was not directly linked to team-level stress ($B = -0.03$, $SE = 0.11$, $p = .768$).

Our analyses regarding the influence of control variables revealed that the inclusion of control variables did not change the pattern of results (i.e., the findings would lead to the same conclusions regarding the hypotheses). The relation between relative LMX and stress, as well as the interactions were still significant, although the individual-level relation between relative LMX and stress became weaker ($B = -0.34$, $SE = 0.14$, $p = .020$). Additionally, we calculated variance inflation factors (VIF) to estimate the degree of multicollinearity. As all VIF were under 3, multicollinearity was not at play.

Fig. 2 Results of multilevel modeling. Presented coefficients are unstandardized results; * $p < .05$, ** $p < .01$

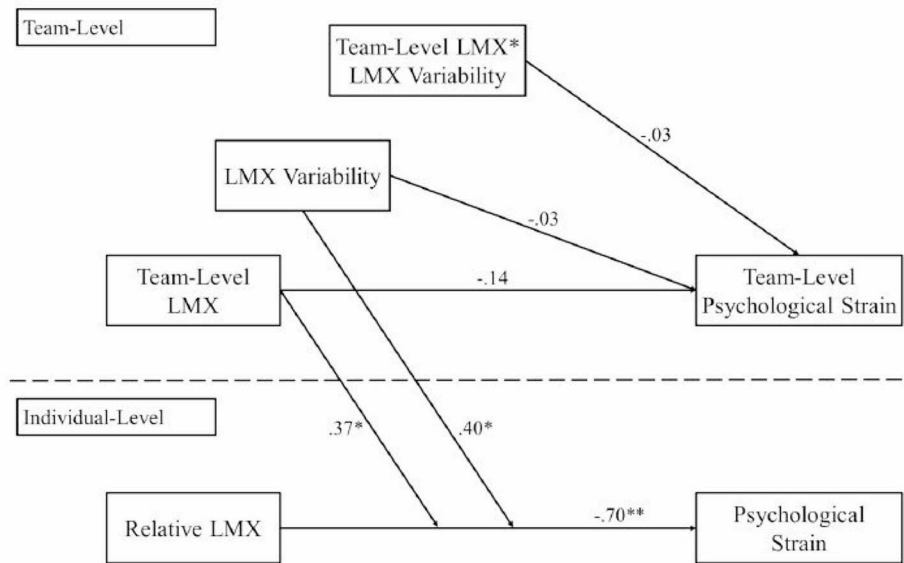
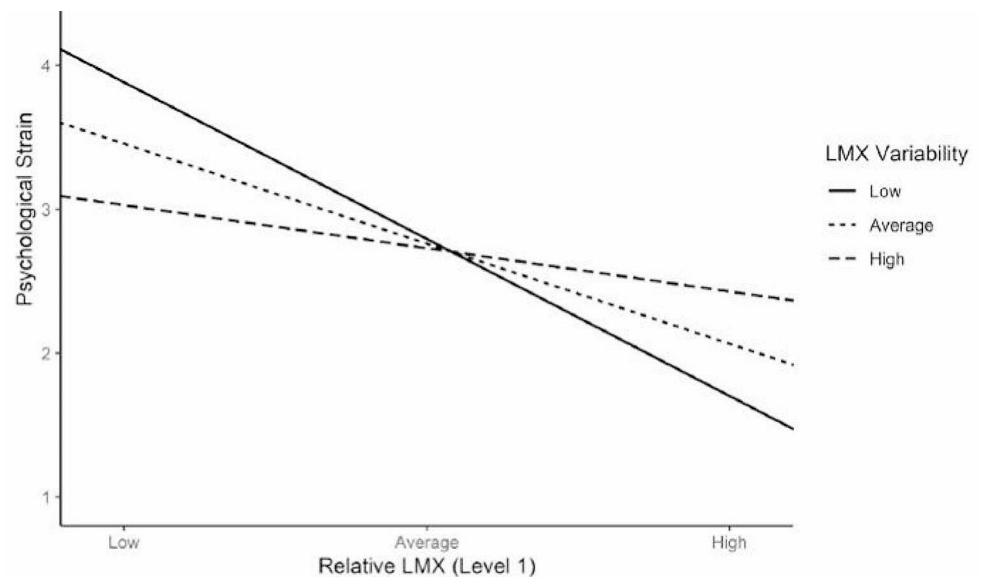


Fig. 3 Cross-level interaction of LMX variability



Discussion

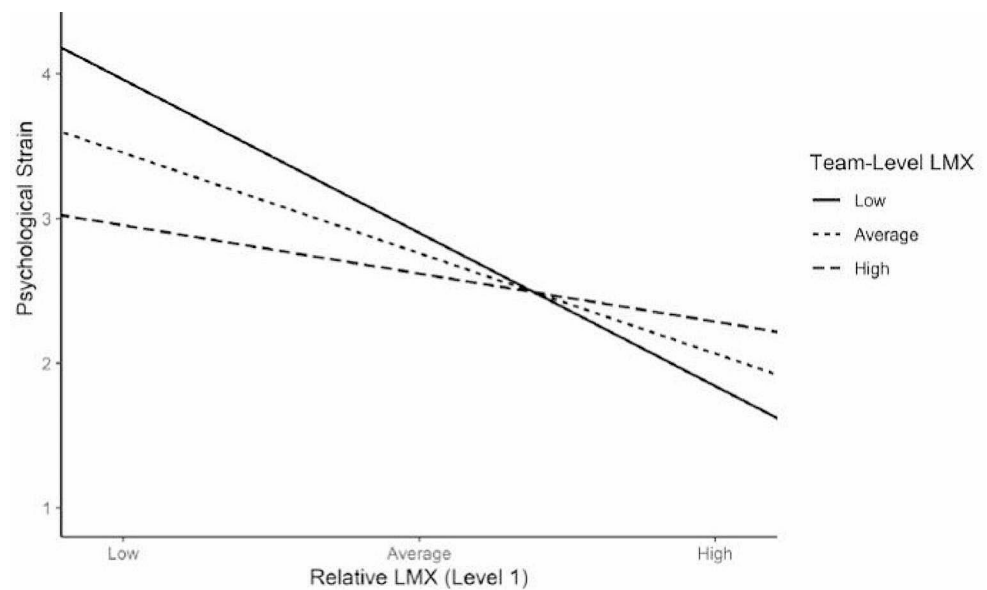
The aim of the study was to explore the link between LMX differentiation and followers' psychological strain in reference to perceptions of leader behavior at the individual as well as at the team level. We aimed to link properties of LMX differentiation with psychological strain. Results showed that RLMX was negatively related to psychological strain at the individual level. This relation was cross-level moderated by LMX variability. Regarding the cross-level interaction of team-level LMX, the relation was more negative for low team-level LMX in contrast to high team-level LMX. We did not find significant relations between team-level LMX and team-level stress. Our results suggest that the relative position of LMX quality within a team seems

to play a crucial role for follower stress. LMX relationships on the team-level do not seem to be directly related to team stress.

Theoretical implications

Individual-level psychological strain

In accordance with findings reported by Liang et al. (2022) our results suggest that higher LMX quality provides employees with more work-related resources which in turn helps them to appraise their work environments as less stressful. This finding is revealed by the negative relation between RLMX and psychological strain. Also, the relationship between RLMX and psychological strain was

Fig. 4 Cross-level interaction of team-level LMX

significant and negative when LMX variability was low, but was less negative when LMX variability was high. If relations between leaders and their followers differ greatly within the team, relations between RLMX and psychological strain become less important. That is, high levels of LMX variability mitigate the beneficial outcomes of LMX. We used social comparison theory to explain how RLMX and LMX variability interact while focusing on followers' individual levels of psychological strain. Against the background of our study results, negative social comparison processes may evoke the feeling of psychological strain, when LMX quality varies within the team and followers focus on their relative standing within the team.

Team-level LMX was a moderator of the relation between RLMX and psychological strain. When team-level LMX is low, followers seem to compete for the few resources within the team provided by the leader. In this case, RLMX becomes more salient and relations with psychological strain become more negative. When team-level LMX is high, followers do not seem to compete for resources provided by the leader and even followers with low RLMX may not suffer from limited resources. As a conclusion, it is important to focus on the different properties of LMX when assessing LMX differentiation and its relations to individual psychological strain, since all three properties and their interplay seem to be relevant for psychological strain. If neglected, important information might be overlooked. Additionally, our results suggest that this multilevel consideration of LMX provides a more ample explanation of outcomes than focusing on one level alone (Martin et al., 2018). As we also controlled for leader-rated LMX as well as LMX agreement between leaders and followers, it seems that it is rather the self-perception of followers that is important for psychological

strain and not the perspective of leaders. This result mirrors assumptions that individual perceptions and experiences rather than other-source ratings are meaningful to explain intra-individual psychological states (Gabriel et al., 2019).

Team-level psychological strain

Findings with regard to the team level differ from findings with regard to the individual level of psychological strain. It shows that there was no direct relation between team-level LMX and team-level psychological strain. This relation was not moderated by LMX variability. In sum, perceptions of LMX were not related to psychological strain at the team level within our study. This finding contradicts expectations, as we hypothesized that high team-level LMX quality would be beneficial for the team as a whole with regard to psychological strain. For example, Boies and Howell (2006) showed that team-level LMX reduced conflict within the team as a team-level outcome. This relation was also dependent on the level of LMX variability within the team as moderator variable. Yet, we did not find a direct relation or an interaction between both team-level LMX constructs and team-level psychological strain. In a recent review, Buengeler et al. (2021) point out, that assessments of LMX variability seem to be incomplete in current research practice. They describe that LMX variability can take three different forms: separation, disparity, and variety. To explain mixed findings in LMX variability with regard to important work outcomes, they summarize that LMX variability may be detrimental for team-level outcomes when variability within the team would be perceived as separation or disparity. However, when understood as variety, it is expected to benefit group processes. Thus, it seems that LMX variability

should be treated in a more detailed manner than presented in our study. Our results suggest that LMX variability enfold its impact rather on individual-level outcomes than on team-level outcomes. It may be assumed that the positive as well as negative effects of LMX variability on individual outcomes might mutually cancel each other out, so that they fade out on the team level.

Limitations

There are some limitations that should be mentioned. Firstly, we applied a cross-sectional design that does not allow us to draw causal conclusions. We have presented theoretical reasons to believe that LMX leads to followers' psychological strain and controlled for other variables to rule out alternative explanations. Besides this, the sample size of our study can further limit conclusions that can be derived from our findings. Thus, future studies should focus on designs that allow for causal conclusions of relationships among study variables with a larger sample. Additionally, the cross-sectional design may imply common method bias (Podsakoff et al., 2003). Considering our extensive focus on interaction effects, this may be of less importance as interaction effects are hardly influenced by common method bias (Siemsen et al., 2010). Furthermore, we ran supplementary analyses (Harman single-factor test and influence of unmeasured latent method factor) to estimate the degree of common method bias. These analyses could show that our relations were not strongly affected by such a bias.

Secondly, our measures of LMX variability and RLMX are generated from a perspective that builds up on perceptions of all team members. As in most previous studies, we examined LMX relative position in mathematical terms. This conceptualization neglects the social process behind RLMX and does not focus on individual perceptions of how LMX quality is perceived relative to others in the team.

Thirdly, we treated LMX variability as a single construct and did not discriminate between possible different forms (Buengeler et al., 2021). As it has been shown that the different forms of LMX variability (i.e., separation, disparity, and variety) may be related to work outcomes differently, future research should build on this conceptualization to outline which forms of LMX variability play an important role with regard to followers' levels of psychological strain.

Fourthly, our research model has set the focus on followers' perspectives of LMX relationships within teams. While we have controlled for leader LMX as well as LMX agreement between leaders and followers, future studies should also put more focus on the role of leaders while exploring the relationship between LMX differentiation and psychological strain. It would be important to learn more about a leader's motives to engage in LMX differentiation and to

also test for differences between intended or unintended differentiation within teams.

Practical implications

Beyond the theoretical implications, these findings have implications for managerial practice as well. Results show that LMX differentiation seems to have a strong relation to individual levels of psychological strain. In particular, followers who have a low LMX relationship with their leader relative to other members of the team are at a disadvantage and experience higher stress at work. However, this relation weakens, when the leader aims to have equal LMX relationships with all members of the team. Also, our results imply that leaders should aim to build up their general levels of LMX to equalize relations within a team and make differences less prominent. Therefore, leadership trainings that impart knowledge as well as skills to improve LMX quality should be adopted within organizations (Graen et al., 2006). This is not only important against the background of the results of our study, but also in accordance with knowledge generated within previous work (Montano et al., 2017). Existing leadership trainings should be complemented by elements including information about LMX differentiation. It should be described what constitutes LMX differentiation as well as which consequences may arise, when leaders use differentiation as a central means within their leadership agenda. It should also be described how leaders' differentiation will shape their teams. Leaders should be sensitive to the consequences of their behaviors, as followers will notice differences in LMX relationships within the team. Communicating why leaders differentiate within the team may help to make differentiation more transparent. It has also been shown that emphasizing effective cooperation and coordination within the team may reduce the negative effects of differentiation (Hu & Liden, 2013).

Conclusion

Until recently, most LMX research did not consider the social context surrounding relationships between a leader and their followers. We tested whether three different properties of LMX differentiation were related to individual as well as team-level psychological strain. It showed that an individual's relative position of LMX quality is related to their level of psychological strain. The strength of this relationship depends on two moderators that we identified within this study: the team-level LMX as well as the LMX variability within the team. In conclusion, relations between LMX quality and psychological strain do only occur for the individual and not for the team as a whole.

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Data availability The original data are available from the corresponding author on reasonable request.

Declarations

Conflict of interest All authors declare to have no conflict of interest in this work.

Ethical approval The project has been approved by the ethics committee at the Medical Faculty of Heinrich Heine University Düsseldorf (No. 5684). All participants gave informed consent to participate. Participation in the study was voluntary, and data was saved and processed anonymously.

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