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ORIGINAL PAPER

Managers are Less Burned-Out at the Top: the Roles of Sense of Power and Self-Efficacy at Different Hierarchy Levels

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Abstract

While managers generally seem to enjoy better mental health than regular employees, there are also plenty of reports about them suffering from burnout. The present study explores this relationship between hierarchy level and burnout in more detail. In doing so, we not only investigate what impact managerial rank may have on burnout, but we also contrast two different theoretically meaningful mediators for the relationship: sense of power (feeling in control over people) and work-related self-efficacy (feeling in control over tasks). The results of two surveys—the first with 580 managers (single-source) and the second with 154 managers matched with ratings from close others (multi-source)—show a negative relationship between managers' hierarchy level and burnout that is explained by both mediators independently. Additional analyses reveal that high sense of power and high self-efficacy are both necessary conditions for low levels of burnout. Such fine-grained analyses allow us to understand why managers at the top are less threatened by burnout, in contrast to what some media reports suggest.

Keywords Hierarchy level · Sense of power · Self-efficacy · Burnout · Necessary condition analysis

Burnout is a "psychological syndrome of exhaustion, cynicism, and inefficacy, which is experienced in response to chronic job stressors" (Leiter & Maslach, 2004, p. 93). As such, burnout is associated with cognitive impairment related to executive functions, attention, and memory (Deligkaris, Panagopoulou, Montgomery, & Masoura, 2014). At work, it can lead to erroneous decision making (McGee, 1989), diminished job performance, enhanced turnover intentions, decreased organizational commitment and organizational citizenship behaviors (Cropanzano, Rupp, & Byrne, 2003; Wright & Bonett, 2002), increased personal conflict (Maslach, Schaufeli, & Leiter, 2001), and absence from work and/or premature retirement (Ahola, Toppinen-Tanner, Huuhtanen, Koskinen, & Väänänen, 2009). Such effects not only pertain to the affected individuals but they can also spread to coworkers through emotional contagion processes (Barsade, 2002). Against this background, manager burnout is especially detrimental to organizations because of the additional influence that managers[1] have on lower-ranking employees (cf. Barsade, 2002; Byrne et al., 2014; McGee, 1989).

Having said that, studies suggest that with an increasing hierarchy level, employees are mentally healthier (Melchior et al., 2011; Porter & Lawler, 1965; Rahkonen, Laaksonen, Martikainen, Roos, & Lahelma, 2006; Rugulies et al., 2013; Wiernik et al., 2013). However, in most of this work, researchers only compared the outcomes of management and non-management employees (notable exceptions: Muntaner, Eaton, Diala, Kessler, & Sorlie, 1998; Sherman et al., 2012), which results in a fallacy—namely, that all managers are in good health, independent of their hierarchy level. However, being in a lower, middle, or upper management position can entail meaningful differences. Formally, the higher an individual's management position, the more responsibility this individual gains. This responsibility, in turn, is also accompanied

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[1] We use "managers" to describe all employees formally appointed to supervise subordinates.

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by more power and control. Such formal gains in power and control are often associated with the respective psychological experiences, that is, the experience of more power and control (French & Raven, 1959), making formal power increments psychologically relevant (Galinsky, Rucker, & Magee, 2015; Haidt & Rodin, 1999). To that end, Sherman et al. (2012) were the only ones to empirically explore why the hierarchy level may be negatively related to mental illness. They found among military officers and government officials that higher hierarchy levels are associated with a greater sense of power (defined "as the perception of one's ability to influence another person or other people"; Anderson et al. 2012a, p. 316), which in turn has a mitigating effect on one's levels of anxiety and the stress hormone cortisol. Surprisingly though, self-efficacy has not been considered in such investigations, despite its long tradition in clinical psychology for explaining affective disorders and affective dysfunctional states (e.g., Bandura, 1977, 1988; Bresó, Schaufeli, & Salanova, 2011; Leiter, 1992; Shoji et al., 2015).

Given this background, the present paper seeks to investigate whether the negative relationship (and the proposed mediator) that Sherman et al. (2012) found between the managers' hierarchy level and mental health (a) extends to manager burnout specifically, (b) is true for a broader manager sample, and (c) can be explained similarly or even better by managers' work-related self-efficacy instead of their sense of power. We test the latter by simultaneously estimating the relative importance of sense of power and work-related self-efficacy. Furthermore, we combine this analysis with an exploration into whether both constructs are merely sufficient explanations (as indicated by regression analysis) or are actually necessary for low levels of burnout by way of necessary condition analysis (NCA) (Dul, 2016). By contrasting sense of power and self-efficacy as two potential mechanisms explaining the negative link between hierarchy level and manager burnout, we contrast the two psychological experiences that come with increased hierarchy level: feeling in control over others versus feeling in control over tasks.

Theoretical Background

Why does formal power generally go hand in hand with better mental health? According to the job demands-resources model (Bakker & Demerouti, 2007; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Schaufeli & Bakker, 2004; Schaufeli & Taris, 2014), feelings of control that accompany higher hierarchy levels can serve as a resource which buffers "aspects of the job that require sustained physical or mental effort and are therefore associated with certain physiological and psychological costs" (Demerouti et al., 2001, p. 501). As such, feelings of control can significantly reduce stress responses (Bakker & Demerouti, 2007; Demerouti et al., 2001; Schaufeli & Bakker, 2004; Schaufeli & Taris, 2014). However, with more than 100 existing control-related constructs, "control" is a very broad term that needs to be specified (Haidt & Rodin, 1999).

The most evident form of control in the context of hierarchy might be managers' control over others (Galinsky et al., 2015; Mintzberg, 1980). The evoked psychological state is referred to as sense of power and can be defined "as the perception of one's ability to influence another person or other people" (Anderson et al. 2012a, p. 316). In that sense, sense of power captures an interpersonal form of control as it refers to "how much control, power, and agency they [the individuals] have vis-à-vis others" (Anderson et al. 2012a, p. 316). However, managerial responsibility may not only be accompanied by an increased sense of control over others, but also over one's own tasks. This facet is nicely captured in the construct of self-efficacy (Haidt & Rodin, 1999). It is defined as "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (Bandura, 1994, p. 71). Self-efficacy thus refers to the experience of control over a specific domain (Haidt & Rodin, 1999). In the present paper, we focus on the domain of work—specifically, managers' work-related self-efficacy beliefs. Note that, even though work-related self-efficacy is the focus of our study, for the sake of readability we will simply refer to "self-efficacy".

In sum, we strive to explain the relationship between hierarchy and burnout by considering two aspects of control (sense of power and self-efficacy), which, respectively, represent the inter- and intrapersonal aspect of control. While sense of power has its basis in power research and, thus, logically connects to hierarchy level (Sherman et al., 2012), self-efficacy is far more established in clinical psychology and is clearly linked to the outcome of burnout (Bandura, 1977, 1988; Bresó et al., 2011; Leiter, 1992; Shoji et al., 2015). By pitting both against each other, we seek to understand which control experience can better explain the relationship between managers' hierarchy level and their mental health.

Why Hierarchy Positively Relates to Sense of Power

In line with other researchers (Anderson, John, & Keltner, 2012a; Galinsky et al., 2015; Magee & Galinsky, 2008; Sherman et al., 2012), we suggest that individuals at higher hierarchy levels experience a greater sense of power due to the characteristics of these levels. First, higher hierarchy levels can be seen as a proxy for having more power (Magee & Galinsky, 2008). Such formal power is defined as "an individual's relative capacity to modify others' states by providing or withholding [material or social] resources or administering punishments" (Keltner, Gruenfeld, & Anderson, 2003, p. 265). Consequently, subordinates often submit to the control of the manager, hoping to avert negative attention while also enhancing their chances for personal advantages such as a

higher salary or promotion (Kudisch, Fortunato, & Smith, 2006). Second, powerholders presumably have greater knowledge, skills, and abilities than their subordinates and are therefore likely to receive obedience and respect from their subordinates (Magee & Galinsky, 2008). Third, regardless of managers' potentially superior knowledge or skills, people are unlikely to challenge or criticize authorities (E. R. Smith & Mackie, 1995). Instead, people sometimes demonstrate—almost habitually—obedience to, compliance with, and admiration for authorities (i.e., for the powerful) especially in high power-distance cultures (Hofstede, 2011). Thus, managers at higher hierarchy levels should effectively have more power over others as well as psychologically experience more power than their lower-ranking counterparts.

Why Hierarchy Positively Relates to Self-Efficacy

Researchers underlined that Bandura (1982) "proposed that being cast in a subordinate role or assigned an inferior label has a negative impact on self-efficacy" (Cherniss, 1993, p. 148). Conversely, we argue that a managerial position—and, thus, a heightened hierarchy level—is positively associated with self-efficacy. According to Bandura's theory of self-efficacy (1977), beliefs of self-efficacy result from four different kinds of experiences.

First, *mastery experiences* are defined as recent life successes achieved through effort (Bandura, 1977). According to the theory, the more sustained the effort was, the more resilient the perception of self-efficacy will be. In line with the self-serving bias (Miller & Ross, 1975), we argue that individuals tend to attribute effort and personal mastery with successfully "moving up" the organizational hierarchy. Each step up the ladder (e.g., via promotions) may therefore be interpreted as a signal that the individual has mastered the previous level, which should then fuel their self-efficacy. Notably, such subjective interpretations do not necessarily need to be accompanied by objective facts (cf. self-serving bias; Miller & Ross, 1975). Beyond this, managers may also rely on three further sources to develop their self-efficacy beliefs.

With *vicarious experiences*, Bandura (1977) refers to individuals' observation of coworkers who have succeeded in a self-relevant situation and with whom they identify. With increasing hierarchy level, managers get closer to other managers. While managers at the bottom still work together with employees without any managerial experience, managers at higher levels often only work with other managers. Thus, managers at higher hierarchical levels are surrounded by a greater pool of individuals who are similar to them and who have also succeeded professionally, thus raising the chances of finding a similar role model who strengthens managers' beliefs in their own abilities (Bandura, 2009).

The third sort of experience is *verbal persuasion*. This refers to how self-efficacy is fueled by others telling the respective individual that they are able to succeed in a given situation. As managers rise through the ranks and the power differentials become greater, they may find that criticism is gradually replaced by praise and encouragement. Some of this may be due to merit (i.e., the reason why, in an ideal world, they were promoted), but it may also be due to the same reasons mentioned above (e.g., fear of repercussion, hope for personal advantages, or cultural norms) (Hofstede, 2011; Kudisch et al., 2006; Smith & Mackie, 1995). In the extreme, subordinates eying their next pay raise or promotion (Kudisch et al., 2006) might ingratiate themselves by praising their managers, even if this praise is unwarranted. Such ingratiation may nevertheless improve managers' perceptions of their abilities and, thereby, increase their experience of self-efficacy.

Finally, Bandura (1977) suggests that individuals also deduce from their *physiological states* how self-effective they feel. The more physiologically averse they are to a given situation, the less self-effective they will feel. We posit that managers at higher hierarchy levels have faced a higher number of difficult situations than their lower level colleagues. In overcoming these difficult situations as part of the managers' climb up the hierarchy level, the managers learned that they were able to manage these situations (cf. mastery experiences) and developed more routine ways of handling them. Thus, with every subsequent iteration, managers will likely react less aversively to difficult work situations and be more likely to draw positive conclusions about their self-efficacy belief from their physiological states.

In sum, while it seems sensible to expect that management positions per se invite higher self-efficacy, we contend that these beliefs about self-efficacy become further compounded as the manager moves up the hierarchy. Based on our reasoning concerning the effects of the hierarchy level, we formulate our first hypothesis as follows:

Hypothesis 1. A manager's hierarchy level is positively related to (a) the manager's sense of power and (b) the manager's self-efficacy.

Why Sense of Power Negatively Relates to Burnout

According to the theory of inhibition and approach (Keltner et al., 2003), and in line with Magee and Galinsky (2008), individuals who receive formally allocated power—and who therefore also perceive themselves as more powerful (Galinsky et al., 2015)—have more access to resources than individuals at lower hierarchy levels. They are better equipped to both deliver these resources and impose penalties (Keltner et al., 2003). Moreover, they can act more freely without facing too many restrictions set by others (Keltner et al., 2003). According to the theory of inhibition and approach (Keltner et al., 2003), the increased security stemming from these increased resources promotes approach tendencies (such as focusing the individuals' attention on

rewards) and approach-related affects (such as positive mood and manic emotions). Biologically speaking, while in this state the body releases higher concentrations of dopamine (Keltner et al., 2003), a neurotransmitter that mediates reward-motivated behavior (Bear, Connors, & Paradiso, 2007). Furthermore, by focusing on positive events, individuals with a heightened sense of power gain greater resilience toward disorders such as depression, anxiety (Dickson & MacLeod, 2004), and clinical burnout (Zellars, Hochwarter, Perrewe, Hoffman, & Ford, 2004)[2]. In contrast to individuals with a higher sense of power, individuals with a lower sense of power are often targeted for punishment by these higher-leveled individuals. Individuals with a lower sense of power are additionally at increased risk of social threats (Keltner et al., 2003). As a result, low sense of power individuals show inhibition tendencies (such as turning their attention to threats) and inhibition-related emotions (such as depressed and anxious emotions) (Keltner et al., 2003). In terms of physical reactions, they have heightened concentrations of norepinephrine and cortisol (Keltner et al., 2003). Norepinephrine motivates the body and brain to act, causing heightened arousal and anxiety (Bear et al., 2007), while cortisol is released in response to stress (Bear et al., 2007). Both stress and anxiety are associated with burnout symptoms (Golkar et al., 2014; Leiter & Maslach, 2004).

Other empirical studies affirm the positive effect of sense of power on general mental health. Researchers have shown, for instance, that sense of power has a mitigating effect on cortisol levels and self-reported anxiety (Sherman et al., 2012). Moreover, high sense of power has been positively associated with a general, subjective sense of well-being (Anderson, Kraus, et al., 2012b) and optimism (Anderson & Galinsky, 2006).

Why Self-Efficacy Negatively Relates to Burnout

According to Bandura's theory of self-efficacy, self-efficacy positively influences people's affective reactions to the environment (Bandura, 1986). Individuals high in self-efficacy react to the environment with less fear because they believe in their ability to control a threatening situation (Bandura, 1994). They believe they can handle challenging situations and are not stressed when facing occupational demands (Bandura, 2009). Instead, they will feel able to cope, whether by proactively influencing their environment or enlisting social support (Bandura, 2009). Based on this view, Bandura (2009) claimed "people are contributors to their life circumstances not just products of them" (p. 179). Accordingly, research shows that individuals who have felt self-effective at work prior to entering a new position with relatively limited resources will start to proactively engage and craft their jobs to increase the availability of resources (Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009) (of course, certain highly bureaucratized organizations may curtail such job crafting and limit resource gain).

This sense of agency mitigates anxiety, worry, and depression, which allows for adaptive behavior (Bandura, 1988). Indeed, while feeling helplessness can lead to avoidance and mental health problems (Seligman, 1975), positive self-efficacy beliefs have a clearly positive impact on people's mental health, protecting them from affective dysfunctional reactions such as stress, depression, and anxiety (Bandura, 1988, 1994, 2009). Moreover, an array of studies—from cross-sectional to longitudinal to meta-analysis—have found a negative relationship between self-efficacy and burnout. Many of these concern teachers and principals in the educational sector, but similar results have been found in the business sector, including sales and information technology, and the health sector (e.g., Brouwers & Tomic, 2000; Shoji et al., 2015; Skaalvik & Skaalvik, 2007). One quasi-experimental study also demonstrated the effectiveness of a self-efficacy intervention in decreasing burnout symptoms among university students (Bresó et al., 2011). Leiter, one of the pioneers in burnout research, even describes burnout as a "crisis in self-efficacy" (Leiter, 1992, p. 107). Accordingly, we expect that higher self-efficacy will go hand in hand with less burnout.

In sum, we formulate a hypothesis that takes both the effect of sense of power and the effect of self-efficacy into account simultaneously:

> *Hypothesis 2*. A manager's (a) sense of power and (b) self-efficacy is negatively related to the manager's burnout.

The above reasoning results in a dual-path mediation hypothesis. We have theoretical reasons to believe that both mediators will work somewhat independently and yet in parallel. As outlined above, we theoretically deduced that both are associated with the hierarchy level, but relate conceptually to different aspects of control. Thus, we formulate a combined parallel mediational hypothesis (see Fig. 1):

> *Hypothesis 3*. Both sense of power and self-efficacy simultaneously, but independently, mediate the negative relation between a manager's hierarchy level and the manager's burnout.

Exploratory Questions

While we feel confident theorizing about both concepts as mediators, we are less inclined to predict the relative strength of

[2] Note that the extent to which approach tendencies and, thus, associated positive emotions are evoked by sense of power (Keltner et al., 2003) depends on culture (Galinsky et al., 2015). Specifically, while individuals from Western countries respond quicker to reward-related words when primed with the word "power", individuals from East Asian countries respond quicker to responsibility-related words (Zhong, Magee, Maddux, & Galinsky, 2010). Relatedly, participants in Western countries take more resources when having high power, while those from Asian countries take less (Kopelman, 2009). Because we investigate individuals from Western countries, our reasoning is also informed by the theories for that region.

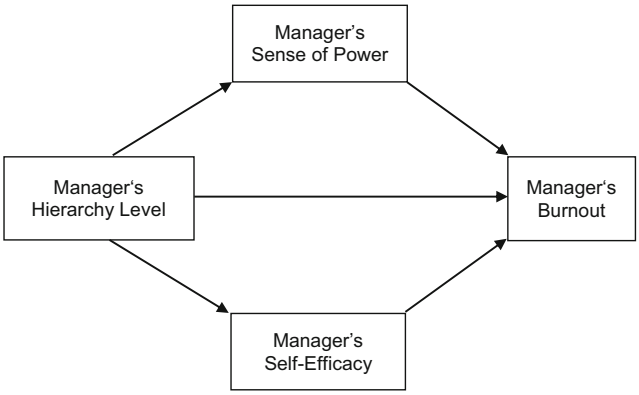


Fig. 1 Hypothesized parallel mediation model

each indirect effect. There are conflicting viable arguments in this regard: One could argue that sense of power exerts a stronger effect due to its being more tethered to one's hierarchy level (our independent variable) than self-efficacy. Yet, in clinical psychology research, self-efficacy is usually the prime suspect for burnout (our dependent variable) (Bandura, 1994, 2009; Bresó et al., 2011). In short, we can only speculate about which mediator is stronger, thus, we begin by exploring this.

Our second exploratory question is to uncover whether both mediators are actually *necessary conditions* (see Dul, 2016). That is, while mediation analyses only suggest a probabilistic statement on the mediators' sufficiency, they do not address whether they are also necessary for low levels of burnout. If not, sense of power and/or self-efficacy could theoretically be replaced by other variables that are related to hierarchy level and burnout. This paper is one of the first to make use of the necessary condition analysis approach within a mental health context. In this way, we hope to contribute to a better understanding of what conditions are necessary for, and not just associated with, low levels of burnout.

Our third exploratory question pertains to the sources of burnout assessments. To our knowledge, we are the first among researchers of manager burnout to not only assess self-perceptions, but also close others' (i.e., close friends, romantic partners and/or relatives) perceptions of burnout. In doing so, we can determine whether managers' perceptions align with others who are close to them. If so, this could be a first hint that managers' close others could serve as a "mood indicator"—and perhaps be motivated to seek help for the manager if warning signs start to appear. However, a lack of alignment is also possible for several reasons. For instance, because "[l]eaders tend to believe that they have to be strong" (Bunker, 2010, p. 14), higher estimates of manager burnout by close others could imply that the managers are suppressing their feelings and underestimating their burnout level. In any case, even though hierarchy level is not a psychometric variable, a multi-source approach helps to address potential concerns regarding the effect sizes of the paths from the mediators to burnout (Podsakoff, MacKenzie, & Podsakoff, 2012).

General Methods Across Both Studies

We conducted two studies, both of which tested the hypothesized mediation mechanisms (H1 to H3) while also exploring the points outlined above where appropriate.

General Sample Collection and Procedure

We collected data in Germany via two online panels from the market research platform Global Marketing Insite (GMI). GMI panels are often used for polling market or political issues. Recent research shows that such panel data are often of higher quality than traditional subject pool samples (Hauser & Schwarz, 2016), and generally comparable in quality to other means, e.g., paper and pencil (Gosling, Vazire, Srivastava, & John, 2004). Furthermore, using online surveys and online panels allows us to access broad target groups that are otherwise hard to reach, thus improving the robustness of the findings (Gosling et al., 2004). We guaranteed unique samples for each study by issuing participant IDs in the panel management. In return for participation, next to helping research, participants received 12.50 Euro in study 1 and 9.50 Euro in study 2 for their participation in the form of market points that they could later redeem for various goods. The payment for study 1 was higher than for study 2 as study 1 was part of a bigger data collection containing additional scales for colleagues working in the field of neuropsychology. These additional scales increased the length of study 1's survey. The concepts of the additional scales did not overlap with ours and were positioned behind our scales. Thus, they did not have an influence on the participants' answers.

To take part in the survey, participants had to be at least 18 years old, employed, and in a management position wherein they were formally authorized to supervise subordinates. We followed the Declaration of Helsinki (World Medical Association, 2013) in the study protocol. In the processes of our institution and country, the studies did not need to go through an ethics review process because they neither included any manipulations or misleading information, nor involved assessments judged to have collateral psychological effects. Furthermore, participants could stop answering at any time. At the end, they were given the opportunity to leave comments on the survey. Nobody left a comment regarding any psychological distress due to the study. We determined via several test runs that the manager survey could not reasonably be completed in less than 7.5 min; the close other survey required at least 3 min. Hence, participants who fell below these limits were screened out automatically toward the end of the survey ($N = 60$ in study 1, $N = 13$ matched pairs (managers and their significant others) in study 2[3]). Furthermore,

[3] In two cases, both the managers and their significant others were too fast. In two other cases, only the managers were too fast. In nine other cases, only the significant others answered too quickly.

we used instructional manipulation checks (IMCs, cf. Oppenheimer, Meyvis, & Davidenko, 2009) in order to identify and filter out participants who carelessly responded by answering the questions without reading them. Specifically, we added items like "Please mark the middle item, i.e., number three, here" to our regular survey questions. Participants who did not mark them correctly were screened out ($N = 191$ in study 1, $N = 2$ matched pairs in study 2[4]). Researchers highly recommend including IMCs, as they have been shown to improve reliability (Oppenheimer et al., 2009). We used three IMCs in study 1 and five in study 2.

General Data Analysis

To investigate our hypotheses (H1 to H3), we calculated multiple regressions. We tested the mediational effects (i.e., the parallel indirect effects of sense of power and self-efficacy on the relationship between manager's hierarchy level and burnout , H3) via PROCESS. PROCESS is an SPSS-macro that uses bootstrapping to calculate the significance of mediations, moderations, and combined models (Hayes, 2013). This non-parametric resampling technique helps construe a confidence interval for the indirect effect (Preacher & Hayes, 2008). The advantage of this technique is its robustness against non-normally distributed data. We used PROCESS Model 4, which additionally allows for parallel mediations, and calculated the significance of the indirect effects acting in parallel. We considered H3 to be supported when both indirect effects were statistically significant.

To answer our first exploratory question of which indirect effect (if any) is stronger, we compared the parallel indirect effects via the command "contrast". This command strives to disprove the null hypothesis that the subtraction of both indirect effects equals zero (Preacher & Hayes, 2008). Thus, a statistically significant result means that both indirect effects differ significantly from one another.

We tested our second exploratory question—that is, the necessity of sense of power and self-efficacy for burnout—via the necessary condition analysis (NCA) package developed by Dul (2016) for the statistical software R. A recently developed tool, NCA is used to identify conditions that are necessary for the occurrence of an outcome. Because multiple regression is an additive model ($Y = a + b_1X_1 + b_2X_2 + \ldots$), researchers can only use it to identify the extent to which different predictors contribute to the investigated outcome. In other words, they can only say if these predictors are "nice to have" when explaining the outcome. They cannot say if these predictors are a "must", that is, necessary for certain levels of the outcome (Dul, 2016). NCA addresses this shortcoming.

Instead of relating the data to a probabilistic model, the technique works descriptively and exclusively with the data by analyzing the scatter plot of the two investigated variables. Specifically, "it searches for empty areas in scatterplots and draws 'ceiling lines' that separate empty and full data areas" (Dul, 2016, p. 15). To illustrate, imagine a coordinate system for two dichotomous variables X and Y (cf. Dul, 2016, p. 17, Fig. 2). The area in the coordinate system for $X = 0$ and $Y = 0$, $X = 1$ and $Y = 0$, and $X = 1$ and $Y = 1$ is full of data but empty for $X = 0$ and $Y = 1$. As a result, an empty space only exists for $X = 0$ and $Y = 1$, underlining that a low value in X cannot produce a high value in Y. Instead, only a high value in X can produce a high value in Y. Thus, a high value in X is *necessary* for a high value in Y. The so-called *ceiling line* would be drawn along the area $X = 0$ and $Y = 0$ so that it separates the area of $X = 0$ and $Y = 0$ from the area of $X = 0$ and $Y = 1$. Thus, it separates the empty area from the full data area to indicate where the constraint of Y starts to be caused by a low value in X (cf. Dul, 2016, p. 17, Fig. 2).

With the help of this method, we can show whether a high sense of power and high levels of self-efficacy are necessary for low levels of burnout. If so, we would find an empty area in the coordinate system for low levels of sense of power and low levels of burnout, as well as for low levels of self-efficacy and low levels of burnout. In other words, the participants would only be able to feel less burned-out with high levels of either variable.

To draw a ceiling line separating the area full of data from the ceiling zone, we used the ceiling line techniques called *ceiling envelopment with free disposal hull* (CE-FDH) and *ceiling regression with free disposal hull* (CR-FDH). The former is more sensitive to outliers and measurement errors than alternative ceiling techniques because it excludes observations within the ceiling zone (Dul, 2016). It draws a piecewise linear function by first producing a vertical line from the minimum of Y for the minimum of observation X to the maximum of Y for the minimum of observation X. Then, it draws a horizontal line to the right until an observation on or above this line. Then, it moves vertically up to the maximum Y for this X. It repeats this procedure until the maximum of X so that it forms a stepwise function. The latter draws an ordinary least square regression line through the upper-left edges of the CE-FDH function. CR-FDH normally leaves some observations in the ceiling zone and the ceiling zone may be smaller (Dul, 2016). CR-FDH is recommended for parametric techniques if the ceiling line displays the data along the border acceptably. This may not be the case when the sample is relatively low (Dul, 2016), in which case CE-FDH is preferred.

The effect sizes are calculated by dividing the ceiling zone by scope. We followed benchmarks given by Dul (2016) to interpret the magnitude of effect sizes: $0 \leq d < 0.1$ is considered a small effect, $0.1 \leq d < 0.3$ is considered a medium effect, $0.3 \leq d < 0.5$ is considered a large effect, and $d \geq 0.5$ is considered a very large effect. Dul (2016) recommends rejecting the necessary condition hypothesis when d is lower than 0.1.

Further information can be derived from three other parameters: *accuracy*, *condition inefficiency*, and *outcome inefficiency*. The first indicates the percentage of observations

[4] Two significant others answered the instructional manipulation checks wrongly so that we had to delete them and their respective manager.

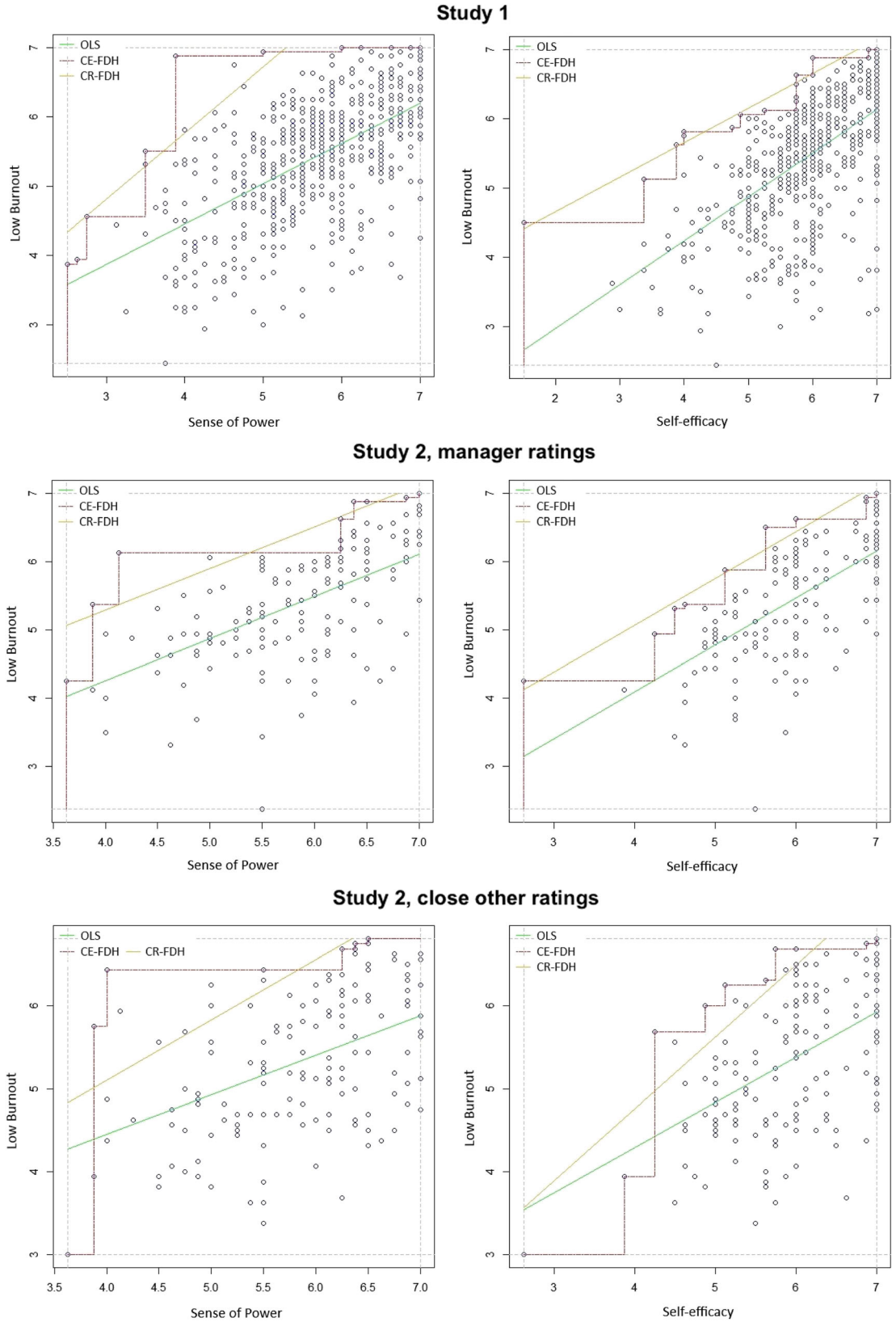


Fig. 2 Scatter plots of the necessary condition analyses for burnout in studies 1 and 2. High numbers in *Y* stand for low levels in burnout. The stepped red line (CE-FDH, ceiling envelopment with free disposal hull) and the straight yellow line at the top (CR-FDH, ceiling regression with free disposal hull) are the ceiling lines and the straight green line at the bottom is the ordinary least squares (OLS) regression line. Colors only in the online version

that are not laying in the ceiling zone. The second shows when an increase in the necessary condition no longer leads to an increase in the outcome. For instance, considering a situation where X has a range between 0 and 10 and $X = 5$ already leads to the highest level of Y. Thus, $X = 6$ or $X = 7$ would not increase the outcome anymore; put differently, an increase in X would not make a difference from the midpoint of the X scale onward. As a result, the condition inefficiency would be 50%. Lastly, the third parameter indicates the outcome value at which a certain value in the predictor is not necessary. For instance, consider a situation where X (e.g., effort) and Y (e.g., performance) have a range between 0 and 10. Imagine that $X \geq 3$ is necessary for a $Y > 5$ but no specific value of X is necessary for $Y \leq 5$. In other words, very low effort (e.g., $X = 1$) would already be sufficient for an average performance ($Y = 5$). Thus, the outcome Y is not constrained by the predictor in the range from 1 to 5 so that the outcome inefficiency of Y would be 50%. The lower the value for both inefficiency measures, the higher the effect size (for more details, see Dul, 2016).

Finally, in our second study, we tested our third exploratory question—that is, how close others reflect the way managers feel. In other words, we tested our hypotheses and the other exploratory questions twice: once by focusing on managers' own ratings and once by including their matched close others' ratings.

Methods - Study 1

We received complete data from 580 managers (31% females) who had an average age of 43.85 ($SD = 9.43$, $Mdn = 44$, range = 22-64). The occupational area "business organization, accounting, law and administration" represented the largest participant group (23.3%), followed by "commercial services, merchandise trade, distribution, hotel and tourism" (20.3%), and "raw material extraction, production and manufacturing" (18.8%). The categories are based on the classification system of the (German Federal Labor Office (Bundesagentur für Arbeit [Federal Labor Office], 2010) (an exhaustive list of the represented occupational areas can be found in Appendix Table 6). Fewer than half of the managers (42%) had a university degree as their highest educational level, 24% of the managers had upper secondary education, and 34% of the managers had lower secondary education (cf. ISCED-2011 published by UNESCO (2012) for classification). All hierarchical levels were represented in the sample (lower level, 20%; medium level, 44%; higher level, 26%, highest level, 10%).

Following common research practice (cf. Riggio, Zhu, Reina, & Maroosis, 2010) with regard to assessing *managers' hierarchy level*, we let participants select their hierarchy level: lower, medium, higher, and highest. Following Sherman et al. (2012), we assessed *sense of power* using the sense of power scale developed by Anderson, John, and Keltner (2012a). This scale measures the extent to which people experience control and power in their relationships with others (e.g., "At work, in my relationships with others, I can get them to listen to what I say"). Participants evaluated the eight items on a seven-point Likert scale from 1 (strongly disagree) to 7 (strongly agree).

We assessed *self-efficacy* using the eight-item New General Self-Efficacy scale developed by Chen, Gully, and Eden (2001). This scale measures the extent to which people believe that they can generally master the challenges they face in life. We chose this scale as it measures self-efficacy beliefs that are not highly influenced by ephemeral events (Chen, Gully, & Eden, 2001). Instead, they are a just bit more stable than their task-specific counterpart (e.g., Gist & Mitchell, 1992), as they arise from former experiences including successes and failures (Chen et al., 2001). Therefore, the present scale is specifically suitable for testing our hypothesis regarding the relation between hierarchy level and self-efficacy. To make sure that the participants related all the statements to the work context, we added the phrase "at work" to all the statements. In this way, the statements were specific enough for our purposes, while preserving the construct's generalizability to different kinds of work tasks and environments. An example item is "At work, I believe I can succeed at most any endeavor to which I set my mind". Participants answered using a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

To measure *burnout*, we used the 16-item Maslach Burnout Inventory—General Survey developed by Schaufeli, Leiter, Maslach, and Jackson (1996). The scale measures the frequency at which people feel exhausted (e.g., "I feel emotionally drained from my work"), cynical (e.g., "I have become more cynical about whether my work contributes anything"), and professionally inefficient at work (e.g., "At my work, I feel confident that I am effective at getting things done" (reverse coded)). Answers can range from 1 (never) to 7 (always).

Results - Study 1

Confirmatory Factor Analyses

To check the factor structure of our scales, we conducted confirmatory factor analyses (CFA) via the statistical program Amos 26.0.0. In accordance with recommendations and reviews of pro and contra arguments (Little, Rhemtulla, Gibson, & Schoemann, 2013; Matsunaga, 2008), we used item parceling before conducting the CFA. Item parceling is only recommended under certain conditions (Matsunaga, 2008), which our data fully met. First, our tested model was quite complex with a large number of *dfs* (458) and, at the same time, comparably small sample sizes. Especially in our sample of study 2, the sample size ($N = 154$) was significantly below the recommended 10:1 ratio of sample size per free parameter (Bentler & Yuan, 1999). Second, the error covariances of some items were very large (some were above

100.00). Third, Shapiro-Wilk tests showed that our data are non-normally distributed (study 1: $W(580) = .96$, $p < .001$ for sense of power; $W(580) = .94$, $p < .001$ for self-efficacy; $W(580) = .97$, $p < .001$ for burnout; study 2: $W(154) = .95$, $p < .001$ for sense of power; $W(154) = .94$, $p < .001$ for self-efficacy; $W(154) = .98$, $p = .014$ for self-reported burnout, and $W(154) = .97$, $p = .017$ for other-reported burnout).

We formed parcels for sense of power, self-efficacy, and each of the three subdimensions of burnout. We combined three items per parcel if possible; otherwise, we combined two items per parcel via random algorithm (Matsunaga, 2008). We modeled burnout as a higher-order factor with its subdimensions (exhaustion, cynicism, and professional efficacy) within a three-factor model, with sense of power and self-efficacy serving as the other two factors. We compared this model to a model treating burnout as a single factor without its subdimensions and to a model with burnout, sense of power, and self-efficacy all loading on one factor. In all models, we allowed for covariances between the factors. We analyzed the scales by means of three quality criteria: the *Comparative fit index* (CFI), the *Tucker-Lewis index* (TLI), and the *Standardized root-mean-square residual* (SRMR) (Hu & Bentler, 1998; Jackson, Gillaspy, & Purc-Stephenson, 2009). According to recommendations (Hu & Bentler, 1999), we assessed our model against the value of .95 for the maximum-likelihood based fit indexes CFI and TLI in combination with .09 for SRMR. In line with Hu and Bentler (1999), we used CFI with SRMR for small sample sizes (i.e., study 2) and TLI with SRMR for large sample sizes (i.e., study 1). Table 1 shows that, across both studies, the model with burnout as a higher-order factor exhibited the best data fit.

Internal Consistencies, Intercorrelations, and Mediations

Table 2 presents the scales' internal consistencies and intercorrelations, as well as their means and standard deviations. All scales achieved satisfactory internal consistencies and all the intercorrelations corresponded to our hypotheses. We considered including gender as a control variable in our analyses because (1) women report higher scores than men on burnout scales (Purvanova & Muros, 2010) and (2) fewer women than men find themselves in higher management positions (Eagly & Carli, 2007). We also considered including age because of the age-related prevalence of burnout (Brewer & Shapard, 2004) and because of the assumption that older people occupy higher management positions more often than younger people. However, age and gender did not correlate with the independent and dependent variables simultaneously. Instead, only age correlated with sense of power and burnout. Following the latest guidelines, we thus excluded both variables from the subsequent analyses[5] (Bernerth & Aguinis, 2016).

Table 3 shows the associations of the hierarchy level with sense of power, self-efficacy, and burnout via regression analyses. To investigate the associations with burnout, we created three models: In model 1, we investigated the relations without controlling for the mediators. In model 2a and 2b, we separately controlled for each of the mediators. In model 3, we investigated both mediators simultaneously in one model (all models are listed in Table 3). Table 3 shows that the results are in line with our hypotheses:

First, in support of H1a and H1b, hierarchy level was positively related to sense of power, $b = .38$, $p < .001$, 95% CI [.30, .5], and to self-efficacy, $b = .22$, $p < .001$, 95% CI [.15, .29]. Furthermore, in line with previous research, sense of power and self-efficacy had a negative association with burnout when controlling for only one of them (model 2a and 2b). Second, in support of H2a and H2b, sense of power and self-efficacy had a negative association with burnout, $b = -.39$, $p < .001$, 95% CI [−.47, −.32] and $b = -.42$, $p < .001$, 95% CI [−.49, −.34] when investigating them simultaneously in the third model. Beyond our hypotheses, Table 3 shows that the parallel inclusion of both mediators increased the explained variance of the single mediations by .11 and .10, respectively (i.e., from .34 in model 2a and .35 in model 2b to .45 in model 3). These results solidify the importance of accounting for sense of power and self-efficacy simultaneously.

To test if sense of power and self-efficacy simultaneously mediated the negative relation between the hierarchy level and burnout (H3), we further calculated the unstandardized[6] parallel indirect effects of the hierarchy level on burnout via PROCESS. We tested their significance via bootstrap-confidence intervals (bootstrap sample size = 10,000). In support of H3, the calculated confidence intervals did not include zero, indicating that both parallel indirect effects were

[5] Only in study 1 did age sometimes show significant regression coefficients. Otherwise, the coefficients of age and gender were nonsignificant. The inclusion of age and gender as control variables did not change the results of study 1 nor those of study 2 (single-source data). In study 2 (multi-source data), the regression coefficient of sense of power on other-reported burnout hardly decreased from .19 in the model without controls to .17 with controls. However, the regression coefficient of sense of power with controls turned marginally significant with a p value of .097 (two-sided testing) and with an indirect effect with a confidence interval including zero, $b = -.07$, 95% boot CI [.01, −.16]. The drop in significance value might be explained by the fact that we included control variables in the analyses that do not correlate with the dependent variable and, thus, reduced the power of our statistical test (Bernerth & Aguinis, 2016).

[6] Clarification: The specific indirect effects can be interpreted as "the amount by which two cases differing by a unit on X are estimated to differ on Y through the intervening variable independent of the other intervening variable" (Hayes, 2013, p. 140). As this interpretation "does not include the metric of the intervening variable […], standardization or other forms of arithmetic gymnastics applied to the measurement scales is not necessary" (Hayes, 2013, p. 140), even if the mediators were measured on different scales (Hayes, 2013).

Table 1 Confirmatory Factor Analyses of Sense of Power (SOP), Self-efficacy (SE), and Burnout across Studies 1 and 2

Study	Model	χ^2	*df*	CFI	TLI	SRMR	χ^2—difference test
1	SOP, SE, burnout as higher-order factor	256.887	48	.962	.948	.0658	
	SOP, SE, burnout as one factor	1142.633	51	.802	.744	.1081	885.746, $df = 3$, $p < .001$
	One factor comprising SOP, SE, and burnout	2248.896	54	.602	.514	.1501	1106.263, $df = 3$, $p < .001$
2a	SOP, SE, burnout as higher-order factor	123.360	48	.952	.933	.0862	
	SOP, SE, burnout one factor	451.926	51	.742	.666	.1424	328.566, $df = 3$, $p < .001$
	One factor comprising SOP, SE, and burnout	617.731	54	.637	.557	.1474	165.805, $df = 3$, $p < .001$
2b	SOP, SE, burnout as higher-order factor	86.90	48	.971	.961	.0869	
	SOP, SE, burnout one factor	333.282	51	.793	.732	.1815	246.392, $df = 3$, $p < .001$
	One factor comprising SOP, SE, and burnout	650.00	54	.563	.465	.1668	316.718, $df = 3$, $p < .001$

Item parceling with three, and where not possible, with two items per parcel. Factors correlated. *SOP* sense of power, *SE* self-efficacy, *CFI* comparative fit index, *TLI* Tucker-Lewis index, *SRMR* standardized root-mean-square residual, *Study 2a* self-reported burnout, *Study 2b* other-reported burnout. Study 1: $N = 580$. Study 2: $N = 154$

statistically significant—sense of power, $b = -.15$, 95% CI [−.19, −.10], and self-efficacy, $b = -.09$, 95% CI [−.13, −.06].

To answer whether sense of power or self-efficacy was a stronger mediating mechanism, we calculated the contrast between the two parallel indirect effects via PROCESS. The contrast result indicates that the indirect effects did not differ significantly between the two variables, $b = -.06$, 95% CI [−.11, .00]). Thus, neither mediator can be considered stronger than the other.

We further conducted a robustness check to address an argument that the effects may not exist above and beyond a sampling bias due to positive (self-)attitudes. As such, only high-functioning managers with fewer mental health issues may have "survived" and made it to the top. In an attempt to alleviate such concerns, we additionally analyzed a model in which we controlled for self-esteem. Self-esteem is a general disposition (Blascovich & Tomaka, 1991) that safeguards against stress (Brown, 2010) and thus, according to the alternative logic, should facilitate a person's climb to the top (Kammeyer-Mueller, Judge, & Piccolo, 2008). We measured self-esteem in study 1 via a validated single-item measure (Robins, Hendin, & Trzesniewski, 2001). Even when controlling for self-esteem, hierarchy level still showed significant associations with sense of power, $b = .31$, $p < .001$, CI 95% [.24, .38], and self-efficacy, $b = .13$, $p < .001$, CI 95% [.07, .19]. Furthermore, sense of power and self-efficacy still related to burnout significantly, separately with $b = -.44$, $p < .001$, CI 95% [−.51, −.37] for sense of power and $b = -.44$, $p < .001$, CI 95% [−.53, −.36] for self-efficacy, as well as simultaneously $b = -.34$, $p < .001$, CI 95% [−.42, −.27] for sense of power and $b = -.32$, $p < .001$, CI 95% [−.39, −.23] for self-efficacy. The indirect effects also remained significant with $b = -.11$, 95% Boot CI [−.15, −.07] for sense of power and $b = -.04$, 95% Boot CI [−.07, −.02] for self-efficacy. Thus, these results suggest that the proposed effects hold despite a potential sampling bias that would speak of reverse causality.

To assuage concerns that the associations may solely arise from an overlap of constructs, specifically, an overlap between self-efficacy and the burnout subdimension professional efficacy, we re-ran the regression analyses with only the burnout dimensions exhaustion and cynicism, excluding the professional efficacy dimension. The resulting regression coefficients remained in line with our hypotheses. Importantly,

Table 2 Study 1 and study 2: means, standard deviations, intercorrelations, and internal consistencies of the variables

Variables	*M*	*SD*	1	2	3	4	5	6	7	*M*	*SD*
1 Hierarchy level	2.25	0.89	**(-)/(-)**	.37**	.32**	−.29**	−.30**	.11	−.04	3.51	0.78
2 Sense of power	5.65	0.88	.38**	**(.84)/(.83)**	.65**	−.58**	−.44**	.17*	.04	5.89	0.80
3 Self-efficacy	5.89	0.81	.24**	.53**	**(.94)/.(94)**	−.63**	−.50**	.04	−.04	5.91	0.78
4 Self-reported burnout	2.59	0.87	−.21**	−.59**	−.59**	**(.92)/(.92)**	.69**	−.10	−.01	2.60	0.85
5 Other-reported burnout	---	---	---	---	---	---	**(-)/(.88)**	−.10	.03	2.67	0.86
6 Age	43.85	9.43	.07	.12**	.02	−.10*	---	**(-)/(-)**	.05	43.38	9.15
7 Gender	1.69	0.46	−.02	−.05	−.02	.00	---	.17**	**(-)/(-)**	1.62	0.49

Study 1, $N = 580$, on left side of the diagonal; study 2, $N = 154$, on right side of the diagonal. Cronbach's alphas are indicated in bold where applicable. Gender: 1 = female, 2 = male. *$p < .05$, **$p < .01$, two-sided

Table 3 Study 1: mediation models for burnout

	Sense of power				Self-efficacy				Burnout													
									Model 1				Model 2a				Model 2b				Model 3			
Explanatory variables	*b*	*SE*	*LLCI*	*ULCI*	*b*	*SE*	*LLCI*	*ULCI*	*b*	*SE*	*LLCI*	*ULCI*	*b*	*SE*	*LLCI*	*ULCI*	*b*	*SE*	*LLCI*	*ULCI*	*b*	*SE*	*LLCI*	*ULCI*
Hierarchy level	.38***	.04	.30	.45	.22***	.04	.15	.29	− .21***	.04	− .29	− .13	.01	.04	− .06	.08	− .07*	.03	− .14	− .01	.03	.03	− .03	.10
Sense of power													− .59***	.04	− .66	− .52					− .39***	.04	− .47	− .32
Self-efficacy																	− .61***	.04	− .68	− .54	− .42***	.04	− .49	− .34
Overall *F*	98.99***				34.95***				27.11***				150.32***				156.05***				158.38***			
R^2	.15				.06				.05				.34				.35				.45			

N = 580. *$p < .05$, ***$p < .001$, two-sided. *LLCI* lower limit 95% confidence interval for the indirect effect, *ULCI* upper limit 95% confidence interval for the indirect effect. In model 1, we investigated the relations without controlling for the mediators. In model 2a and 2b, we separately controlled for each of the mediators. In model 3, we investigated both mediators simultaneously.

self-efficacy still showed significant associations with burnout, and the indirect effects via self-efficacy remained statistically significant[7]. Thus, our results are not driven by a tautological overlap between the mediator and the dependent variable.

Necessary Condition Analysis

To answer whether high levels of sense of power and self-efficacy are necessary conditions for low levels of burnout, we calculated necessary condition analyses on the relation between sense of power and burnout, as well as self-efficacy and burnout. Scatter plots (Fig. 2), a table of the NCA parameters (Table 4), and a bottleneck table of sense of power and self-efficacy (see Appendix Table 7) help to illuminate the relations. As the NCA can only illustrate and investigate positive relationships, we had to recode burnout for the analysis so that high levels in *Y* stand for low levels of burnout.

To start, Fig. 2 shows the scatter plots for the relation between sense of power and burnout, as well as self-efficacy and burnout, for both study 1 and study 2. The plots show three lines: The straight line at the bottom represents the ordinary least squares (OLS) regression line, the straight line at the top represents the ceiling line plotted by using ceiling regression with free disposal hull (CR-FDH), and the stepped line represents the ceiling line plotted by using ceiling envelopment-free disposal hull (CE-FDH, see the "General Data Analysis" section for a description). The larger the ceiling zone in relation to the scope (i.e., the larger the empty zone in the left corner that is separated by the lines from the data points in relation to the zone with data points), the higher the necessity of sense of power and self-efficacy, respectively, for low burnout, and the higher the effect size. Dul (2016) recommends considering an effect of at least medium size—that is $0.1 \leq d < 0.3$—as meaningful.

Table 4 shows that high levels of both sense of power and self-efficacy were necessary conditions for low burnout. Both effects were considered meaningful, with sense of power as a medium effect ($d_{\text{CE-FDH}}$ = .16; $d_{\text{CR-FDH}}$ = .18) and self-efficacy as a medium to large effect ($d_{\text{CE-FDH}}$ = .31; $d_{\text{CR-FDH}}$ = .27). The condition inefficiency of self-efficacy (CE-FDH, 2.27%; CR-FDH, 5.20%) and of sense of power (CE-FDH, 22.22%; CR-FDH, 37.98%) show that relatively high levels of sense of power and very high levels of self-efficacy were

[7] Specifically, hierarchy level was positively related to sense of power, $b = .38$, $p < .001$, 95% CI [.30, .45], and self-efficacy, $b = .22$, $p < .001$, 95% CI [.15, .29]. Sense of power and self-efficacy had a negative association with burnout when controlling for only one of them, $b = -.64$, $p < .001$, 95% CI [− .73, − .55], and $b = -.58$, $p < .001$, 95% CI [− .68, − .48]. Sense of power and self-efficacy had a negative association with burnout, $b = -.48$, $p < .001$, 95% CI [− .58, − .37] and $b = -.35$, $p < .001$, 95% CI [− .45, − .24] when investigating them simultaneously in the third model. The results of the parallel indirect effects were significant with sense of power: $b = -.18$, 95% CI [− .25, − .12] and self-efficacy: $b = -.08$, 95% CI [− .12, − .04].

Table 4 Necessary condition analyses (NCA) results for study 1 and study 2

Analyzed parameters	Study 1				Study 2, self-reported burnout				Study 2, other-reported burnout			
	Sense of power		Self-efficacy		Sense of power		Self-efficacy		Sense of power		Self-efficacy	
	CE-FDH	CR-FDH	CE-FDH	CR-FDH	CE-FDH	CR-FDH	CE-FDH	CR-FDH	CE-FDH	CR-FDH	CE-FDH	CR-FDH
Ceiling zone	3.37	3.73	7.82	6.75	3.07	3.09	7.09	6.07	1.95	2.79	7.24	6.10
Scope	20.53	20.53	25.09	25.09	15.61	15.61	20.23	20.23	12.87	12.87	16.68	16.68
Accuracy (%)	100%	99.0%	100%	99.0%	100%	96.8%	100%	97.4%	100%	93.5%	100%	91.6%
Effect size	$.16^{++}$	$.18^{++}$	$.31^{+++}$	$.27^{++}$	$.20^{++}$	$.20^{++}$	$.35^{+++}$	$.30^{+++}$	$.15^{++}$	$.21^{++}$	$.43^{+++}$	$.37^{+++}$
Condition inefficiency (%)	22.22	37.98	2.27	5.20	0.00	5.60	0.00	3.81	14.82	19.32	0.00	14.23
Outcome inefficiency (%)	31.51	41.46	45.21	43.24	40.54	58.08	40.54	37.68	0.00	47.96	0.00	14.73

Study 1*:* $N = 580$. Study 2: $N = 154$. $^{+}$ $0 < d \leq 0.1$ = small effect, $^{++}$ $0.1 \leq d < 0.3$ = medium effect, $^{+++}$ $0.3 \leq d < 0.5$ = large effect. *CE-FDH* piecewise linear ceiling line, *CR-FDH* continuous ceiling line

necessary for the lowest level of burnout (for a complete list of the minimum levels of sense of power and self-efficacy necessary for certain levels of low burnout cf. complete bottleneck table in Appendix Table 7). For instance, the CE-FDH values illustrate that when the level of sense of power was above 77.78% and the level of self-efficacy was above 97.73%, a further increase in both conditions did not lead to a further increase in low burnout. Consequently, the managers scoring lowest on burnout had at least a mean level of sense of power of 77.8% and a mean level of self-efficacy of 97.7%. On a Likert scale from 1 to 7, these are means of at least 5.7 and 6.9, respectively.

To make sure that the results of our NCA were not just a function of the data's skewness, we simulated data by using a formula from Sorjonen, Wilkström, and Melin (2017) in the statistical program R. This formula calculates expected values based on sample size, the predictor's skewness, and outcome. The observed necessity results should be above these expected values and ideally outside their confidence intervals. In our simulation, all the confidence intervals of the expected effects included zero, for both sense of power, $d_{\text{CE-FDH}} = .04$, $SE = .03$, 95% CI [− .02, .11], $d_{\text{CR-FDH}} = .05$, $SE = .04$, 95% CI [− .02, .12], and self-efficacy, $d_{\text{CE-FDH}} = .06$, $SE = .04$, 95% CI [− .02, .14], $d_{\text{CR-FDH}} = .06$, $SE = .04$, 95% CI [− .02, .14]. In other words, the expected effects were nonsignificant suggesting that only based on the skewness of our data, one would not have found significant effects and, thus, necessary conditions. The significant effects observed are far above the expected effects and outside their confidence intervals, suggesting that the identified necessary conditions are not just due to the skewness of our data.

In sum, the results of study 1 support H1 to H3 and answer two of our exploratory questions: (a) both mediators seem to play an equally important role in explaining the negative relationship and (b) both sense of power and self-efficacy are necessary conditions for low levels of burnout.

Methods—Study 2

The procedure in study 2 mostly mirrored study 1, with the exception that we varied the assessment of the hierarchy level and managers were asked to forward a link to a close other of their choice (e.g., partner, best friend). The link guided the close others to a second questionnaire. There, we briefed them about the survey's objective—namely, how they perceive the target manager's mental burden at work and its consequences. We did not include managers in the analysis who did not forward the link to a close other ($N = 139$), as we were interested in the comparability of our single-source and multi-source data (To assuage any concerns that this may have led to biases: The results were robust and did not change when we included those managers into the analyses. These results are available in the online repository or from the first author upon request).

We received complete and matched data from 154 managers (38% females) who were on average 43.38 years old ($SD = 9.15$, $Mdn = 44$, range = 24–64). The majority was employed in the occupational area "commercial services, merchandise trade, distribution, hotel and tourism" (24.7%), followed by "business organization, accounting, law, and administration" (11.7%), and "raw material extraction, production and manufacturing" (9.7%) (see Appendix Table 6 for an exhaustive list of the represented occupational areas). More than half of the managers (59%) had a university or doctoral degree as their highest educational degree, 25% of the managers had upper secondary education, and 16% of the managers had lower secondary education. All hierarchical levels

were represented, with one manager (1%) at the lowest level, 10 (7%) at the second lowest level, 67 (44%) at the medium level, 62 (40%) at the second highest level, and 14 (9%) at the highest level.

The corresponding 154 close others (63% females) were on average 40.72 years old (SD = 10.57, Mdn = 40, range = 22–71). Sixty-three participants (41%) had a university or doctoral degree. On average, they had known the manager for 13 years (SD = 8.91). On a Likert scale from 1 (not at all good) to 7 (very good), 112 close others (73%) described the quality of the relationship as *very good* with a mean of M = 6.66 (SD = 0.63). Most participants (77%) had daily contact with the manager in question. More than three quarters of the participants (77%) indicated that they were in a romantic relationship with the manager, including being married to or engaged with the manager. Other participants were friends (14%), colleagues (8%), or relatives (3%). Because relationships can overlap (e.g., best friend and partner), we allowed participants to choose multiple answers.

To assess the *hierarchy level*, we presented a pyramid depiction of hierarchy levels, using five steps to represent each level from lowest to highest (cf. Singh-Manoux, Marmot, & Adler, 2001). We asked the managers to select one of the five levels corresponding to the subjective classification of their own position in the organization. To measure *sense of power, self-efficacy, and burnout,* we used the same scales as in study 1. This time, however, those items pertaining to the managers' burnout were additionally answered by their respective close others.

Results—Study 2

Internal Consistencies, Intercorrelations, and Mediations

As mentioned above, the internal consistencies of the scales presented in Table 2 were all satisfactory. As in study 1, all the intercorrelations between the scales corresponded to our hypotheses. Furthermore, the correlations between sense of power and other-reported burnout, as well as between self-efficacy and other-reported burnout, were negative. This gives us a first hint that the burnout assessment via close others seem to mirror the way the managers feel and can maybe serve as a proxy (answering our last exploratory question). Relatedly, the correlation between self-reported burnout and other-reported burnout was positive. As age and gender did not correlate significantly with hierarchy level or burnout, we again chose to exclude them as controls in our further analyses (Bernerth & Aguinis, 2016)[8].

[8] Those who are interested in the results can find them in footnote 5.

Table 5 shows the associations of the hierarchy level with sense of power, self-efficacy and both self- and other-reported burnout via regression analyses. Again, we created three models to investigate the associations with self-reported and other-reported burnout (cf. study 1; models listed in Table 5). The results shown in Table 5 are very similar to the results of study 1 and support our hypotheses:

First, in support of H1a and H1b, the hierarchy level was positively related to sense of power, b = .38, p < .001, 95% CI [.23, .53] and self-efficacy, b = .32, p < .001, 95% CI [.17, .47]. Furthermore, in line with previous research, sense of power and self-efficacy had a negative association with self-reported burnout and other-reported burnout (model 2a and 2b). Second, in support of H2a and H2b, sense of power and self-efficacy were negatively related to self-reported burnout when investigating them simultaneously, b = − .31, p < .001, 95% CI [− .48, − .14] and b = − .47, p < .001, 95% CI [− .64, − .30]. Again, the same was true for the association of sense of power, b = − .19, p = .058, 95% CI [− .39, .01], and self-efficacy, b = − .38, p < .001, 95% CI [− .57, − .18], with other-reported burnout. Beyond our hypotheses, Table 5 shows that the parallel inclusion of both mediators increased the explained variance of the single mediations by .10 and .04, respectively (i.e., from .35 in model 2a and .41 in model 2b to .45 in model 3; single-source data), and by .07 and .02, respectively (i.e., from .22 in model 2a and .27 in model 2b to .29 in model 3, multi-source data). These results further indicate the importance of accounting for sense of power and self-efficacy simultaneously.

Again, to test whether sense of power and self-efficacy simultaneously mediated the negative relation between the hierarchy level and both self- and other-reported burnout (H3), we calculated the unstandardized parallel indirect effects of the hierarchy level on burnout. The calculated confidence intervals did not include zero, indicating that the parallel indirect effects were all statistically significant, supporting H3—single-source data: sense of power: b = − .12, 95% CI [− .22, − .04], self-efficacy: b = − .15, 95% CI [− .24, − .07], and multi-source data: sense of power, b = − .07, 95% CI [− .18, − .01], and self-efficacy: b = − .12, 95% CI [− .20, − .05].

To assess the relative strength of sense of power or self-efficacy as a mediator, we again calculated the contrast between the two parallel indirect effects via PROCESS in the single-source and the multi-source data. The results indicate that the indirect effects of sense of power and self-efficacy did not differ significantly from each other, single-source data: b = − .03, 95% CI [− .11, .17], and multi-source data: b = − .05, 95% CI [− .10, .17]. Consequently, neither of the mediators can be considered stronger than the other.

As in study 1, we tried to reduce any concern that the associations could solely arise from an overlap between self-efficacy and the burnout subdimension professional efficacy. Thus, we conducted the same regression analyses by only

Table 5 Study 2: mediation models for self-reported and other-reported burnout

Explanatory variables	Sense of power				Self-efficacy				First line per construct/parameter: self-reported burnout; second line: other-reported burnout											
									Model 1				Model 2a				Model 2b			
	b	*SE*	*LLCI*	*ULCI*	*b*	*SE*	*LLCI*	*ULCI*	*b*	*SE*	*LLCI*	*ULCI*	*b*	*SE*	*LLCI*	*ULCI*	*b*	*SE*	*LLCI*	*ULCI*
Hierarchy level	.38***	.08	.23	.53	.32***	.08	.17	.47	− .31***	.09	− .48	− .15	− .09	.08	− .24	.07	− .10	.07	− .24	.04
									− .33*	.09	− .50	− .16	− .17*	.09	− .34	− .00	− .17*	.08	− .33	− .01
Sense of power													− .59***	.08	− .74	− .44				
													− .41***	.08	− .58	− .25				
Self-efficacy																	− .66***	.07	− .80	− .51
																	− .49***	.08	− .65	− .33
Overall *F*	23.98***				17.26***				13.64***				39.94***				51.84***			
									15.07***				21.07***				27.59***			
R^2	.14				.10				.08				.35				.41			
									.09				.22				.27			

Explanatory variables	Model 3			
	b	*SE*	*LLCI*	*ULCI*
Hierarchy level	− .04	.07	− .18	.10
	− .14	.08	− .30	.03
Sense of power	− .31***	.09	− .48	− .14
	− .19†	.10	− .39	.01
Self-efficacy	− .47***	.09	− .64	− .30
	− .38***	.10	− .57	− .18
Overall *F*	41.50***			
	19.94***			
R^2	.45			
	.29			

N = 154. † *p* = .058, **p* < .05, ****p* < .001, two-sided. *LLCI* lower limit 95% confidence interval, *ULCI* upper limit 95% confidence interval. In model 1, we investigated the relations without controlling for the mediators. In model 2a and 2b, we separately controlled for each of the mediators. In model 3, we investigated both mediators simultaneously

including the burnout dimensions exhaustion and cynicism. The regression coefficients were still in line with our hypotheses when professional efficacy was excluded from the overall burnout measure. Self-efficacy still showed significant associations with burnout and the indirect effects via self-efficacy remained[9]. Thus, our overall results were not driven by a potential conceptual overlap between the mediator and the dependent variable.

Necessary Condition Analysis

The scatter plots of study 2 in Fig. 2 for our single-source data (two graphs in the middle) and our multi-source data (two graphs below) as well as the NCA parameters in Table 4 indicate that the results of study 2 were similar to the results of study 1: Here, too, high levels of sense of power and self-efficacy were necessary conditions for high levels of low burnout for both the single-source and multi-source data.

Table 4 shows that the effects of self-efficacy were larger than the effects of sense of power, but all effects were considered meaningful: Sense of power showed medium effects with $d_{CE\text{-}FDH}$ = .20 and $d_{CR\text{-}FDH}$ = .20 (single-source) and $d_{CE\text{-}FDH}$ = .15 and $d_{CR\text{-}FDH}$ = .21 (multi-source), while self-efficacy showed large effects with $d_{CE\text{-}FDH}$ = .35 and $d_{CR\text{-}FDH}$ = .30 (single-source) and $d_{CE\text{-}FDH}$ = .43 and $d_{CR\text{-}FDH}$ = .37 (multi-source). The condition inefficiencies in Table 4 tell us that high levels of sense of power and self-efficacy were necessary for the lowest level of self-reported and other-reported burnout (for a complete list of the minimum levels of sense of power and self-efficacy necessary for specific levels of low burnout cf. complete bottleneck table in Appendix Table 7). For instance, the CE-FDH values of 0.00% in the single-source data illustrate that 100% of sense of power and 100% of self-efficacy (7 on a Likert scale from 1 to 7) were required to attain the lowest level of burnout (7 on a Likert scale from 1 to 7).

To ensure that our necessity results were not just a function of data skewness, we simulated data again (Sorjonen, Alex, & Melin, 2017). All the confidence intervals of the predicted effects included zero (single-source data, sense of power: $d_{CE\text{-}FDH}$ = .05, *SE* = .04, 95% CI [− .04, .13], $d_{CR\text{-}FDH}$ = .05, *SE* = .04, 95% CI [− .03, .14], self-efficacy: $d_{CE\text{-}FDH}$ = .05, *SE* = .04, 95% CI [− .03, .13], $d_{CR\text{-}FDH}$ = .05, *SE* = .04, 95% CI [−

[9] Specifically, hierarchy level was positively related to sense of power, *b* = .38, *p* < .001, 95% CI [.23, .54], and to self-efficacy, *b* = .32, *p* < .001, 95% CI [.17, .48]. Sense of power and self-efficacy had a negative association with self-reported burnout, *b* = − .36, *p* < .01, 95% CI [− .61, − .11] and *b* = − .38, *p* < .01, 95% CI [− .63, − .13], when investigating them simultaneously. The same was true for their parallel association with other-reported burnout, *b* = − .29, *p* = .0372, 95% CI [− .55, − .02] and *b* = − .30, *p* = .0297, 95% CI [− .57, − .03]. The results of the parallel indirect effects on self-reported burnout were significant with sense of power: *b* = − .14, 95% CI [− .29, − .03] and self-efficacy: *b* = − .12, 95% CI [− .24, − .03]. The parallel indirect effects on other-reported burnout were also significant with sense of power: *b* = − .11, 95% CI [− .24, − .01] and self-efficacy: *b* = − .10, 95% CI [− .19, − .01].

.03, .14]; multi-source data, sense of power: $d_{CE\text{-}FDH}$ = .06, *SE* = .05, 95% CI [− .04, .16], $d_{CR\text{-}FDH}$ = .07, *SE* = .05, 95% CI [− .03, .16], self-efficacy: $d_{CE\text{-}FDH}$ = .06, *SE* = .05, 95% CI [− .04, .16], $d_{CR\text{-}FDH}$ = .06, *SE* = .05, 95% CI [− .03, .16]. Thus, the values suggest that the identified necessary conditions are not due to the skewness of our data.

In sum, the results of study 2 showed the same predicted patterns as study 1 and thus support H1 to H3. Moreover, they confirm the pattern for our first two exploratory questions (regarding the relative importance and necessity of sense of power and self-efficacy). Finally, the overlapping results for single- and multi-source data suggest that close others mirror the way managers feel. Additionally, this method reduces potential concerns regarding the possible interference of a common source bias (Dionne, Yammarino, Atwater, & James, 2002; Podsakoff et al., 2012). Overall, the congruence between study 1 and study 2, even when including multi-source responses, places our findings on more robust footing.

Discussion

The field of managers' mental health "remains largely unexplored" (Barling & Cloutier, 2016, p. 6), which is why we set out to better understand the relation between managers' hierarchy level and mental health. Past empirical work did not differentiate between managers at different levels when investigating mental health, but treated managers of all levels as one homogeneous group by comparing them with non-managers (e.g., Melchior et al., 2011; Rugulies et al., 2013; Wiernik et al., 2013). The few that differentiated between managers at different levels focused on sense of power as the exclusive explanatory variable (Sherman et al., 2012) or did not provide explanations for the relation between hierarchy level and mental health (Muntaner et al., 1998). Moreover, they neglected to address burnout, which "is not just a relic of the 1970s – if anything, it seems to have become a more common problem, in many more workplaces, and in many more countries around the world" (Maslach, 2017, p. 144).

Our study shows that both interpersonal (sense of power or feeling in control over people) and intrapersonal (self-efficacy or feeling in control over tasks) concepts of control independently explain the negative relation between managers' hierarchy level and their level of burnout. Furthermore, we found that both mediators are equally strong and that high levels of both mediators are necessary for low levels of burnout. These findings held true when assessing the perceptions of both managers and their close others. With our work, we thus make several theoretical contributions to the power and self-efficacy literature as well as to the job demands-resources model (Bakker & Demerouti, 2007; Demerouti et al., 2001).

First, regarding sense of power, we broaden the framework of the theory of inhibition and approach (Keltner et al., 2003) as well as the psychology of power proposed by Galinsky et al. (2015). Namely, we show that a sense of power has positive effects on not only one's current emotions and mood, but also, in the long run, on one's mental health. Similarly, our work bolsters the latter framework (Galinsky et al., 2015)—which outlines different power measures and their outcomes mediated by sense of power—by adding "hierarchical level" to the framework. Thus, we introduce hierarchy level as an important structural power measure and an independent variable of sense of power.

Our work also advances the theory of self-efficacy (Bandura, 1977, 2009) with regard to its relationship with hierarchy. We are the first to advance that a supervisor role can have a positive effect on self-efficacy and that supervisors even differ in their self-efficacy beliefs depending on their hierarchy level. Our results show that formally allocated power, which has largely been ignored in self-efficacy research, is related to self-efficacy and not just to the more evident construct of sense of power.

Third, up to now, the job demands-resources model (Bakker & Demerouti, 2007; Demerouti et al., 2001) focused on a more task autonomy related form of job control as a resource (as is exemplified by a sample item of the measure of job control: "I can decide myself how to perform my work"; Demerouti et al., 2001, p. 504). This is unsurprising considering that the JD-R model evolved from the job demand-control model (Karasek, 1979) where control was defined as "the working individual's potential control over his tasks and his conduct during the working day" (Karasek, 1979, p. 289). With our study, we now underline the importance of considering two different kinds of control within the JD-R model when dealing with employees in managerial positions: the perceived control over others and control over one's own work tasks.

Moreover, by employing Necessary Condition Analysis (NCA), we are the first to suggest a refinement of previously postulated theories within an organizational context. Specifically, it seems that sense of power and self-efficacy are not just sufficient explanations, but rather necessary conditions for low levels of manager burnout. Thus, our work underlines the high importance of considering these constructs in burnout research, specifically, when it comes to questions of burnout prevention (cf. paragraph "Relevance and Practical Implications").

Last, we were able to replicate previously postulated relations, such as the positive association of managers' hierarchy level with sense of power (Sherman et al., 2012), the negative association of self-efficacy with burnout (Bresó et al., 2011; Brouwers & Tomic, 2000; Shoji et al., 2015; Skaalvik & Skaalvik, 2007), and the indirect effect of hierarchy level on mental health via sense of power (Sherman et al., 2012). Because we surveyed managers from an array of industries, we have confidence in the robustness of our findings. The inclusion of close others' perceptions of the managers'

burnout did not alter the outcome, which further bolsters confidence in our results.

Limitations and Future Directions

Needless to say, one should interpret the results of this study within the context of its limitations. For one, causal conclusions are not possible due to the cross-sectional designs implemented. Indeed, we cannot fully exclude the possibility of (a simultaneous) reverse causality, meaning that only those managers rise up through the ranks who are high functioning in many ways, including a high positive self-regard, which also makes them less prone to burnout. Having said that, the implied causality of our model is supported by the results of experimental, quasi-experimental intervention, and longitudinal studies, in which researchers demonstrated a negative relationship between self-efficacy and burnout (Bresó et al., 2011; Brouwers & Tomic, 2000; Skaalvik & Skaalvik, 2007) and a positive relationship between the hierarchy level and sense of power (Anderson, John, & Keltner, 2012a). Also, as reported in the results section of study 1, our results remained statistically significant when controlling for dispositional self-esteem, thus suggesting that at least a selection-bias—that would imply reverse causality—is unlikely to explain the results.

Second, our sample could be biased in another way. Specifically, one could argue that recent changes in hierarchy level could generate increased insecurity, which might then thwart one's sense of power and self-efficacy beliefs. Since new positions usually consume an individual's attention in the early stages, especially for first-time managers (Hill, 2003), "newbies" may have lacked the time or energy to participate in our study. However, even if that were the case, research still shows that within the first year of transition, first-time managers' perceived control is already higher than their perceived control in their former position one year before the transition (Li, Schaubroeck, Xie, & Keller, 2018). This suggests that the phase of insecurity following a promotion may be relatively short. Nevertheless, it could be interesting for future scholars to more deeply study such hierarchy trajectories and their effects on sense of power and self-efficacy. As part of that, future researchers may want to also investigate managers' "motivation to lead" (Chan & Drasgow, 2001). Indeed, "newbies" who are inclined to lead because of their affective-identity-based motivation for it probably associate less stress with their (new) managerial role than, for instance, those with a social-normative motivation to lead, who construe the role as a duty (Chan & Drasgow, 2001; Ryan & Deci, 2000).

Third, our study featured relatively little data for low levels of sense of power and self-efficacy and for high levels of burnout. In other words, the surveyed managers tended to perceive themselves and were perceived by close others, as relatively psychologically stable. Even though we recruited via panels, the reason for the relatively good state of mental health could still suggest a certain degree of self-selection. Managers with mental illnesses might generally feel overwhelmed with their own emotional state and problems and thus be less inclined to participate in such surveys. Yet, such self-selection effects should have worked against confirming our mediation hypotheses due to the limited amount of variance. While future studies may be able to reach more extreme samples in terms of mental health (e.g., reaching out to mentally affected managers in online forums), our methods of testing our hypotheses can be considered rather conservative and should, overall, bolster confidence in the mediational findings.

Fourth, our use of the NCA revealed that sense of power and self-efficacy were both necessary conditions for low levels of manager burnout. However, there may be other conditions that are similarly necessary, but testing for them was outside the scope of this study. Future researchers may seek to fill this gap by testing a more exhaustive list of necessary conditions for low burnout. Furthermore, methods like polynomial regression with response surface modeling could provide additional insight into the interplay of sense of power and self-efficacy on burnout. For instance, one could investigate if high self-efficacy in combination with a low sense of power makes individuals more vulnerable to burnout than low self-efficacy in combination with a high sense of power.

Relevance and Practical Implications

Research shows that managers are less affected by burnout than non-managers, and our findings suggest that managers at the top are even less endangered; nonetheless, media reports and practitioner studies caution against managers' susceptibility to burnout. For instance, during a press conference at the International Motor Show in Germany, the CEO of BMW fell to the stage floor due to a circulatory collapse that was explained by severe work overload (Mortsiefer, 2015). The chief executive of the N. W. Ayer ad agency in Manhattan reported that she fantasized about jumping in front of a car to escape from the work pressure and get some rest (Ligos, 2002). Correspondingly, in a survey by the Center for Creative Leadership among American leaders, 75% considered their leadership role to be the cause of their stress (Campbell, Baltes, Martin, & Meddings, 2007). Similarly, German statistics show that 58% of company managers report having often experienced at least one psychovegetative complaint (i.e., complaints based around mental rather than physically detectable causes, such as insomnia or nervousness) within the past 12 months. In the same study, 17% reported feeling constantly exhausted, physically and emotionally, within the last year (Lohmann-Haislah, 2012). In Germany, clinics even specialize in the treatment of burned-out managers in response to the high demand (Mortsiefer, 2015) and entire books are devoted to the topic of managerial burnout (Albrecht, 2008; Cooper & Marshall, 1978). In sum, media reports of individual cases and practitioner surveys suggest that managers are prone to mental illnesses, particularly burnout, due to the overwhelming pressure

of the job at higher hierarchy levels (Levinson, 1996; Ligos, 2002; McConnell, 2013; Mortsiefer, 2015). As outlined above, such dysfunctional states are problematic for both the affected individuals and their organizations.

Obviously, organizations cannot simply promote all managers to higher ranks to protect them from burnout and, as mentioned above, this would not even be a 100% guarantee against it. Thus, we want to focus on practical implications for managers that are generally independent of their hierarchy level. First, our results (and especially those from our NCA) indicate that high levels of sense of power and self-efficacy are crucial factors for better mental health. Thus, we assume that interventions to bolster managers' sense of power and self-efficacy, independently of their hierarchy level, could have a substantial effect on their mental health. Granted, it might seem impossible to increase individuals' sense of power without changing their external circumstances. However, researchers have shown that even improvements in abstract thinking (that is, seeing the big picture) can increase one's sense of power (P. K. Smith, Wigboldus, & Dijksterhuis, 2008). This might even have long-term benefits, as the need to think abstractly rises with managers' rank (Mumford, Zaccaro, Harding, Jacobs, & Fleishman, 2000).

Regarding the training of self-efficacy, Bandura (2009) suggests several possible interventions that organizations could adapt. For instance, organizations could foster a psychologically safe working environment where mistakes are mainly treated as learning opportunities. Likewise, they could offer resilience training and provide the managers with competent role models so that the managers can learn how to handle setbacks and persistently pursue a goal (Bandura, 2009). Third, surrounding managers with competent colleagues who convince them to believe in themselves (e.g., in a mentor role) could increase the managers' effort and engagement and thus the possibility of mastery experiences (Bandura, 2009).

Another person-focused intervention that could protect managers from burnout—independently of their hierarchy level and indirectly linked to self-efficacy—would be a job crafting intervention (van Wingerden, Bakker, & Derks, 2017a, b). After having received such an intervention, employees became more proactive in crafting their jobs, which offered protection from feelings of helplessness while increasing self-efficacy beliefs (van Wingerden et al., 2017b). Self-efficacy, in turn, is positively related to job crafting (Tims, Bakker, & Derks, 2014). Furthermore, via job crafting, individuals can increase the availability of resources at work, which further reduces the risk of burnout (Tims, Bakker, & Derks, 2013; van Wingerden et al., 2017b). Therefore, job crafting (interventions) may be able to initiate a positive feedback loop.

Conclusion

While prior research found that managers experience less stress than employees, we extend this logic to the important topic of burnout. Specifically, we find that hierarchy comes with two types of control experiences, an interpersonal (sense of power) and an intrapersonal (self-efficacy) form of control, both of which are beneficial for managers' mental health. Moreover, we show that this effect occurs not only between managers and employees, but also within manager ranks as individuals ascend the career ladder.

Appendix 1

Table 6 Study 1 and study 2: occupational areas of the samples

Occupational areas	Study 1		Study 2	
	N	%	*N*	%
1. Agriculture, forestry, animal husbandry, and horticulture	4	0.7	2	1.3
2. Raw material extraction, production and manufacturing	109	18.8	15	9.7
3. Construction, architecture, surveying, and building services engineering	1	0.2	14	9.1
4. Natural science, geography, and computer science	83	14.4	11	7.1
5. Transport, logistics, protection, and security	7	1.2	14	9.1
6. Commercial services, merchandise trade, distribution, hotel and tourism	118	20.3	38	24.7
7. Business organization, accounting, law, and administration	134	23.3	18	11.7
8. Financial services, accounting, tax consultancy	51	8.7	13	8.4

Table 6 (continued)

Occupational areas	Study 1		Study 2	
	N	%	*N*	%
9. Health, personal hygiene, care, social services	33	5.7	8	5.2
10. Education and training	17	3.0	9	5.8
11. Linguistics, literature, humanities, social and economic sciences	1	0.2	3	1.9
12. Media, art, culture, and design	9	1.6	4	2.6
13. Military	0	0	1	0.6
14. Others	13	2.2	4	2.6
Total	580	100	154	100

Categories based on the standard classification of occupations of the (Bundesagentur für Arbeit [Federal Labor Office], 2010)

Table 7 Bottleneck table of the necessary conditions sense of power and self-efficacy for low burnout, study 1 and 2

Y, low burnout (%)	Study 1				Study 2, self-reported burnout				Study 2, other-reported burnout			
	X_1, sense of power (%)		X_2, self-efficacy (%)		X_1, sense of power (%)		X_2, self-efficacy (%)		X_1, sense of power (%)		X_2, self-efficacy (%)	
	CE-FDH	CR-FDH	CE-FDH	CR-FDH	CE-FDH	CR-FDH	CE-FDH	CR-FDH	CE-FDH	CR-FDH	CE-FDH	CR-FDH
0	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN
10	NN	NN	NN	NN	NN	NN	NN	NN	7.4	NN	28.6	NN
20	NN	NN	NN	NN	NN	NN	NN	NN	7.4	NN	28.6	5.3
30	NN	NN	NN	NN	NN	NN	NN	NN	7.4	NN	37.1	15.4
40	5.6	NN	NN	NN	NN	NN	NN	3.6	7.4	NN	37.1	25.4
50	22.2	9.0	34.1	11.3	7.4	NN	37.1	19.0	7.4	3.2	37.1	35.5
60	22.2	19.6	43.2	28.0	7.4	4.3	42.9	34.4	7.4	18.7	37.1	45.5
70	30.7	30.2	45.5	44.7	14.8	26.8	57.1	49.9	7.4	34.2	37.1	55.6
80	30.7	40.8	68.2	61.4	14.8	49.4	68.6	65.3	11.1	49.7	57.1	65.7
90	30.7	51.4	77.3	78.1	77.8	71.9	77.1	80.8	11.1	65.2	71.4	75.7
100	77.8	62.0	97.7	94.8	NA	94.4	NA	96.2	85.2	80.7	NA	85.8

Study 1*:* $N = 580$. Study 2: $N = 154$. Required minimum levels of the necessary conditions sense of power and self-efficacy for different levels of the outcome low burnout. *NN* not necessary, *NA* not available (since the values are laying above/in the ceiling line)

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Declarations

Competing Interests The authors declare no competing interests.

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