Organizational justice and health: Contextual determinants and psychobiological consequences
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Citation for published version (APA):
Herr, R. M. (2015). Organizational justice and health: Contextual determinants and psychobiological consequences

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Chapter 1 General introduction

Background

“Justice is sweet and musical; but injustice is harsh and discordant”

Henry David Thoreau (1817-1862), American writer and philosopher
(cited from Thoreau (1993, p. 28))

Transgressions of fairness\(^1\) are able to elicit strong emotions, are material for literature and other artistic expressions, are claimed in protest and political campaigns, and serve as basis of law and jurisdiction. Aversion to inequity is no typical human characteristic; nonhuman primates have been shown to reject unequal reward as well (Brosnan & De Waal, 2003; Proctor, Williamson, de Waal, & Brosnan, 2013). Preference for adherence to fairness standards are speculated to be part of the genetic make-up, as it facilitates continued cooperation within a group and hereby indirectly aids survival of the individual (Beugré, 2009; Brosnan & De Waal, 2014). However, it seems likely that the specifics of judgments of fairness are learned from cultural or work environments (Beugré, 2009).

Justice has come a long way from philosophical views – going back to Aristotle and Plato – to social science in the middle of last century. Philosophical approaches towards justice share a prescriptive orientation, which means that justice is regarded as a normative ideal, i.e., specify what people should do (Colquitt et al., 2005; Cropanzano, Goldman, & Benson, 2005). In recent years, this approach was supplemented by the descriptive approach of social scientists, which focuses on the description of the attitudes and behaviors concerning justice (Greenberg & Bies, 1992). Cropanzano et al. (2005, p. 63, emphasis in original) state that these theories are considered “descriptive because they articulate how people react to a given outcome, process, or interpersonal interaction. Something is ‘fair’ or ‘just’ not just it should be so but

\(^{1}\) Justice and fairness are used interchangeably (Colquitt, Greenberg, & Zapata-Phelan, 2005), however, there are recent views arguing for a distinction of these concepts (Goldman & Cropanzano, 2014).
because some person or persons believe it to be”. According to this descriptive view the perception of fairness is important. Cropanzano et al. (2005) mention fairness perceptions of outcome, process, and interpersonal interaction particularly. These three terms are closely related to the three components of organizational justice; the perceived fairness at the workplace.

Some researchers have specifically focused on organizational justice. The concept of organizational justice was originally developed in economic and social sciences and has established a particular focus on associations with psychology-relevant occupational outcomes, such as commitment, motivation, job satisfaction and performance (Colquitt, Conlon, Wesson, Porter, & Ng, 2001). In the last years organizational justice has increasingly gained a foothold in behavioral medicine. Elovainio, Kivimäki, and Vahtera (2002) were the first to identify organizational justice as an independent psychosocial predictor of key health parameters, like poor self-rated health, psychiatric disorders, and sickness absence. Subsequent studies confirmed these observations (for an overview Robbins, Ford, and Tetrick (2012)). The current thesis aimed to contribute to this literature by examining the association of organizational justice with hitherto not studied subjective health complaints. Moreover, contextual determinants and psychobiological consequences of fairness at the workplace are examined. This thesis therefore intents on an adjuvant integration of organizational justice conceptualizations into stress research. According to that, past theoretical considerations on organizational justice are connected to behavioural medicine.

**Ideas on organizational justice: an historical overview**

Organizational justice refers to fair treatment at work, however various theories and hypotheses have been developed to explain content and development of fairness judgments. Theory and research on organizational justice can be described in terms of four historical phases, or waves (Colquitt et al., 2005), which will be outlined below.

For illustrative purposes, a hypothetical case study will be used: John Doe. He is 35 years old, has a university degree and is working in the sale office of a medium enterprise producing car components for 7 years. His boss is 7 years older and called Sam Sample. One of his colleagues is Donny Joe.
Distributive justice: fairness of outcome distribution

What happens when John compares himself to Donny and realizes that Donny gets more money than he does, even though they do comparable work and have a comparable output in terms of quality and quantity? John likely feels treated unfairly. This type of injustice is called distributive injustice: the perceived fairness of the distribution of outcomes.

The first distributive justice wave of theory and research on organizational justice spanned the 1950s through the 1970s. Distributive justice deals with the fairness of outcome distributions. Homans (1961) – who coined the term distributive justice – defined social behavior as an exchange of goods, material, and non-material, such as symbols of approval or prestige. He argued that “if the costs of the members of one group are higher than those of another, distributive justice requires that their rewards should be higher too” (Homans, 1958, p. 603). The more people feel to be disadvantaged by the rule of distributive justice the more likely they are angry and dissatisfied (Homans, 1961).

Adams (1965) further developed ideas about distributive justice in his equity theory by postulating that persons calculate an outcome to input ratio and compare their ratio to that of others. If the ratios differ, than inequity in the distributions of resources is perceived. Is the ratio of a person higher than the ratio of a referent other (Figure 1.1, panel b), this person should feel guilty, is the ratio lower (Figure 1.1, panel a), the person likely is frustrated or angry.

**Figure 1.1:** Schematic representation of experiences in inequality ((a) and (b)) and equity (c) according to Adams (1965, pp. 280-281). O = output, I = input, p = denoting person, a = other

\[
a) \frac{O_p}{I_p} < \frac{O_a}{I_a} \quad b) \frac{O_p}{I_p} > \frac{O_a}{I_a} \quad c) \frac{O_p}{I_p} = \frac{O_a}{I_a}
\]

According to the equity theory, people value fair treatment and get distressed by inequality and are therefore motivated to maintain justice (Figure 1.1, panel c). It further describes several strategies to restore the equality balance. For example, behavioural adjustment such as altering inputs and/or outcomes or leaving the relationship, or cognitive adjustments such as
cognitive distortion of inputs and outcomes or altering the perceived inputs or outcomes of the referent other, or changing the referent other.

Some shortcomings of this theory have been raised. For example, ambiguity of outcome input definitions, unclear selection criteria for referent others and testability (Colquitt et al., 2005). Theoretical refinements which partly repaired these shortcomings came from Leventhal (1976), who argued that people use three major allocation rules to judge distributive justice: 1) equality (i.e., each individual the same), 2) equity (i.e., in accordance with contributions), and 3) need (i.e., in accordance with the most urgency).

Perceived inequality of outcomes is thought to lead to distress, and the unequally distribution between input (effort) en outcomes (reward) forms the cornerstone of one of the best-established work stress models, i.e., the effort-reward imbalance model (Siegrist, 1996, 2001) (for further discussion see section on comparisons between organizational justice and other models of work stress).

Procedural justice: fairness of the decision making process

Back to John and Donny: John might be angry because Donny gets more money and he figured out that Donny gets a larger pay-check because Donny’s overtime is paid whereas John’s overtime is not. Donny has made this arrangement with their boss, Sam Sample. John will feel treated unfairly, not only because the reward is unfair, but also because of the procedures leading to this reward. This latter type of justice is called procedural justice.

The procedural justice wave has spanned from the mid-1970s to the mid-1990s. Procedural justice concerns perceived fairness of the procedures used in the decision making process (Folger & Greenberg, 1985). According to the instrumental control model of Thibaut and Walker (1975) employees judge their perceived procedural fairness on the basis of two types of control assessments: process control and decision control. The former refers to the control over the procedures in the decision-making process, i.e., having a ‘voice’. The latter one refers to the degree of control to influence the decision, i.e., having a ‘choice’. This theory was originally developed in legal settings which appears to be a rather specific organizational context (Blader & Tyler, 2005).

Leventhal (1980) applied procedural justice concepts to non-legal settings and identified six rules of perceived procedural fairness. These are: 1) the consistency rule (i.e., consistency of the
procedures across time and employees), 2) the bias-suppression rule (i.e., absence of personal bias and favouritism), 3) the accuracy rule (i.e., decisions based on good and as much as possible information), 4) the correctability rule (i.e., modification or reversibility of decisions), 5) the representativeness rule (i.e., consideration of the interests of those affected by decisions), and 6) the ethicality rule (i.e., allocation procedures should be compatible to ethical standards).

To apply these theoretical insights to the situation of John Doe: John observes that several procedural justice rules are violated (e.g., consistency of the procedures across time and employees, absence of personal bias and favouritism), however, he might hope for the correctability rule, and that his interest will be considered in the future. He might argue that procedural justice rules are violated and convince his boss that changes are needed to restore justice in the company. Or he might just say: “Hey boss, I want more money, Donny gets more and that’s unfair!” If his boss would reply: “C’mon, Johny, don’t be silly!” John would continue to feel unjustly treated. This time, however, because interactional justice principles are violated.

Interactional justice: fairness in interpersonal interactions

The last wave of theoretical development and refinement of justice, interactional justice, started in the mid-1980s and continues to today. The concept of interactional justice is based on four criteria for fair interpersonal treatment: 1) truthfulness (i.e., open, honest, and candid), 2) respect (i.e., treating individuals with sincerity and dignity), 3) justification (i.e., providing adequate explanations), and 4) propriety (i.e., not making prejudicial statements or improper questions) (Bies & Moag, 1986). Noteworthy, there is no final consensus on whether interactional justice consists of two sub elements, namely interpersonal justice (i.e., fairness associated with a supervisor’s interaction with an employee) and informational justice (i.e., amount of information that a supervisor shares with an employee) (Colquitt, 2001). Also, its has been proposed that interactional justice is included in the concept of procedural justice (Cropanzano & Greenberg, 1997).

Poor John might experience unfairness because of all three components of organizational justice. Table 1.1 presents an overview of the three justice dimensions with the corresponding rules.
Table 1.1: Overview of organizational justice components with rules for distributive 
(Leventhal, 1976), procedural (Leventhal, 1980), and interactional justice (Bies & Moag, 1986)

<table>
<thead>
<tr>
<th>Distributive justice: fairness of distribution of outcomes</th>
</tr>
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<tbody>
<tr>
<td>1. Equity: in accordance with contributions</td>
</tr>
<tr>
<td>2. Equality: each individual the same</td>
</tr>
<tr>
<td>3. Need: in accordance with the most urgency</td>
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<table>
<thead>
<tr>
<th>Procedural justice: fairness of the decision-making process leading to the allocation of outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Consistency: consistency of the procedures across time and employees</td>
</tr>
<tr>
<td>2. Bias-suppression: absence of personal bias and favouritism</td>
</tr>
<tr>
<td>3. Accuracy: decisions based on good and as much as possible information</td>
</tr>
<tr>
<td>4. Correctability: modification or reversibility of decisions</td>
</tr>
<tr>
<td>5. Representativeness: consideration of the interests of those affected by decisions</td>
</tr>
<tr>
<td>6. Ethicality: allocation procedures should be compatible to ethical standards</td>
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</tbody>
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<table>
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<tr>
<th>Interactional justice: fairness in interpersonal interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Truthfulness: open, honest, and candid</td>
</tr>
<tr>
<td>2. Respect: treat individuals with sincerity and dignity</td>
</tr>
<tr>
<td>3. Justification: providing adequate explanations</td>
</tr>
<tr>
<td>4. Propriety: no prejudicial statements or improper questions</td>
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Integration of organizational justice theories

The question, however, is how John arrives at the conclusion that he is treated unfairly. In the first years of the 21st century the integrative wave seeks to combine aspects of various organizational justice dimensions. There are three approaches to and conceptualizations of fairness judgments: 1) counterfactual, 2) group-oriented, and 3) heuristic conceptualizations (Colquitt et al., 2005).

Counterfactual conceptualizations

Counterfactual conceptualizations refer to a theoretical approach whereby persons are seen to judge a situation as fair or unfair depending on a hypothetical situation, which is contrary to the fact (i.e., counterfactual). Thus they might ask themselves: “what might have been“ (Colquitt et al., 2005; Folger & Cropanzano, 2001). The referent cognition theory is based on the assumption that ‘resentment over one’s treatment depends on the ‘story’ one can tell
him/herself, not only about what outcomes might have been (referent outcomes), but also about what other routes might have been taken to achieve the relevant outcomes (referent instrumentalities), and what possible futures lie in store (amelioration)” (Folger, 1987, p. 183). According to this theory people judge the fairness of a situation on basis of three points: first, how did it come to this situation (referent instrumentalities), second, did alternatives exist (referent instrumentalities), and, third, what can I expect from the future (amelioration). This theory was criticized for omitting accountability and has therefore been further developed into the fairness theory (Folger & Cropanzano, 2001). This theory comprises three evaluation processes to judge a situation as unfair. First, would there have been a better alternative. Second, could the responsible person (e.g., the supervisor) have acted differently, and, third, should this person have acted differently. This theory attempts to predict in which case an authority (e.g., the supervisor) is considered responsible for unfairness – like he would, should, and could act differently – and argues that unfairness can provoke an automatic emotional response, like anger or guilt.

Group-oriented conceptualizations

A second type of conceptualizations of fairness judgments, group-oriented conceptualizations, frame justice according to the importance of, acceptance by, and identification with an in-group. The group value model (Lind & Tyler, 1988) suggests that individuals seek a positive social identity as member of an in-group. Fair treatment signals that they are respected members of that community. Three uncontrollable values are expected to influence judgments of justice: 1) neutrality of the decision-making procedure (e.g., decisions are honest and free of prejudices), 2) benevolence or trust in the other party, and, 3) information about social standing (e.g., friendly and respectful treatment and consideration of opinion) (Lind & Tyler, 1988; Tyler, 1989). In general, group-oriented conceptualizations propose that fairness provides persons with information about their social relationship with a specific group. Thus, if people perceive fairness it implies that they feel valued by their group. In contrast, unfairness communicates a marginal social status (Tyler & Smith, 1998).

Heuristic conceptualizations

A third type of conceptualizations of fairness judgments can be summarized under the term heuristic conceptualizations. The fairness heuristic theory highlights the fundamental social
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dilemma that employees face when lacking information to deduce if the authority (e.g., their supervisor) can be trusted. Therefore, “perceptions of fairness will be used as a shortcut to deciding whether to accept the authority's decision or reject it” (Lind, Kulik, Ambrose, & de Vera Park, 1993, p. 226). Justice perceptions are used heuristically – as a proxy for trust – and this fairness heuristic should be formed quickly on the basis of whatever information is available, as “individuals form fairness heuristics based on their first few encounters with the authority, then rely on them to serve as proxies for trust in negotiating dilemma-related decisions” (Colquitt et al., 2005, p. 44).

The uncertainty management theory views fairness heuristics as basis to deal with uncertainty. For example, an employee might be unsure whether he can trust his supervisor. As this might be difficult to assess, he might use fairness as heuristic to judge whether he can trust the supervisor – if he feels treated fair, or not – if he feels treated unfairly. Lind and van den Bos (2002) recapitulate, that they “have advanced a rather radical proposition: That fairness is important to people because it gives them a means of managing uncertainty" and "what appears to happening is that people use fairness to manage their reactions to uncertainty, finding comfort in related or even unrelated fair experiences and finding additional distress in unfair experiences” (Lind & van den Bos, 2002, p. 216, emphasis in original). Thus, in this approach perceived justice is used to reduce uncertainty. Interestingly, lack of controllability and predictability are also key elements in most conceptualizations of stress (Koolhaas et al., 2011). The connection of justice with stress might provide and explanation of the ill-health effects of injustice.

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“If it is true, as the great thinkers have suggested, that justice is important to people and that health is key to happiness, then given the hedonists’ assumption that people are interested in promoting their own happiness, denying justice may jeopardize health. Despite some liberties with logic, there is considerable truth to this conclusion.”

(Greenberg, 2004, p. 352)

A recent systematic review of prospective studies showed procedural and interactional justice to predict mental health, and to be different and complementary to established models of
work stress, such as effort-reward-imbalance and the job-demand-control model (Ndjaboue, Brisson, & Vezina, 2012). Likewise, ample evidence indicates that perceived unfairness predicts cardiovascular health (e.g., incident coronary heart disease, coronary event, deaths from cardiovascular disease, and the metabolic syndrome) independent of lifestyle factors, conventional risk factors, and also independent of the job-demand-control and effort-reward imbalance concepts (De Vogli, Brunner, & Marmot, 2007; De Vogli, Ferrie, Chandola, Kivimäki, & Marmot, 2007; Elovainio, Leino-Arjas, Vahtera, & Kivimäki, 2006; Gimeno et al., 2010; Kivimäki et al., 2005; Kivimäki et al., 2008). These findings raise the question what links perceived unfairness at the workplace with adverse health. A plausible explanation refers to the idea that injustice functions as a stressor.

Organizational injustice as a stressor: empirical evidence

A consistent evidence for an association of injustice with stress-related symptoms exists. Organizational justice has been associated with sleep problems (Elovainio et al., 2009; Greenberg, 2006; Hietapakka et al., 2013), excessive alcohol consumption (Kouvonen et al., 2008), smoking (Kouvonen et al., 2007), sickness absence (Chênevert, Jourdain, Cole, & Banville, 2013; Elovainio, Kivimäki, et al., 2010; Elovainio et al., 2013; Head et al., 2007; Hjarsbech et al., 2013; Väänänen, Kalimo, et al., 2004; Ybema & van den Bos, 2010), psychiatric morbidity (Ferrie et al., 2006; Grynderup et al., 2013; Helkavaara, Saastamoinen, & Lahelma, 2011; Inoue, Kawakami, Tsuno, Tomioka, & Nakanishi, 2013; Kivimäki, Elovainio, Vahtera, & Ferrie, 2003; Kivimäki, Elovainio, Vahtera, Virtanen, & Stansfeld, 2003; Liljegren & Ekberg, 2009; Loerbroks et al., 2013; Moliner, Martinez-Tur, Ramos, & Peiro, 2005; Ylipaavalniemi et al., 2005), and reports of distress (Elovainio, Kivimäki, Eccles, & Sinervo, 2002; Elovainio, Kivimäki, & Helkama, 2001; Hayashi, Odagiri, Ohya, Tanaka, & Shimomitsu, 2011; Inoue et al., 2010; Nakagawa et al., 2014; Tepper, 2001). As all these are known concomitants of stress it thus stands to reason that “as for many other psychosocial factors at work, a plausible mechanism through which perceived organizational injustice may affect health is prolonged stress“ (Elovainio, Heponiemi, Sinervo, & Magnavita, 2010, p. B6).

Organizational injustice as a stressor: theoretical foundation

One of the most widely accepted and used definition of stress was offered by Lazarus and Folkman (1984): “Psychological stress is a particular relationship between the person and the environment
that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being” (Lazarus & Folkman, 1984, p. 19, emphasis in original).

In the historical overview of the justice literature as presented above it was argued that people seek for a positive social identity. Justice indicates people to be respected and esteemed members of a group and informs about their social status/standing within the group (Lind & Tyler, 1988; Tyler & Blader, 2000, 2003). In consequence, injustice might constitute a social stressor as it indicates an adverse relation between the person and the environment by exclusion of a social group (Dickerson & Kemeny, 2004; Gruenewald, Kemeny, Aziz, & Fahey, 2004). Another suggestion focuses on justice as a proxy for trust (Lind et al., 1993), and justice as removing uncertainty (Lind & van den Bos, 2002). Indeed, uncontrollability and unpredictability are key aspects of stress conceptualisations (Koolhaas et al., 2011).

Theoretical overlaps of organizational justice and stress considerations are not only restricted to theories discussed in this chapter so far. Some researchers refer to fairness as a social norm, which means that organizational justice is valued in its own right (Folger, 2001). From this moral, ethical standpoint everyone should be treated fairly. Consequently, injustice might constitute a violation of a social norm. Opposite to this, a different view conceptualizes fairness as a source to reach personal goals. Justice allows people to predict and control desired outcomes and satisfy therefore their self-interests (Gillespie & Greenberg, 2005; Thibaut & Walker, 1975). Also, it is proposed that injustice might indicate a lack of social support as it is thought to activate mechanisms of social support (Greenberg, 2006). Finally, other explanations focus more directly on organizational justice and stress conceptualizations. For example, injustice might act as stressors as it might leave employees in doubt about their ability to cope with work demands and injustice therefore signals missing coping resources (Fischer, Abubakar, & Arasa, 2014; Vermunt & Steensma, 2001). Referring to the person-environment fit model injustice might also indicate a misfit of the person with the environment, as the latter cannot meet the persons’ needs (Howard & Cordes, 2010).

There seems a clear association between justice and the original definition of stress from Lazarus and Folkman (1984), and justice at work can be linked to a broader framework of distress. The injustice stress theory (Vermunt & Steensma, 2003) postulates that stress is mainly caused by a discrepancy between the capacities or possibilities of a person and the demands of the environment. Vermunt and Steensma (2003) argue that people seek certain gratifications in their work life and if these are not met then dissatisfaction and stress will arise – the larger
the gap between what is desired and what is obtained (Cropanzano et al., 2005). In their words: “receiving insufficient resources, but more so unfair treatment is a stressor because it makes salient the discrepancy between ones capacities and the requirements of the environment” (Vermunt & Steensma, 2003, p. 146). Injustice is determined by three types of evaluation references: 1) social comparison (i.e., resources others have received), 2) temporal comparison (i.e., resources received in the past), and 3) comparison to an internalized norm (e.g., believing that people will get what they deserve) (Vermunt & Steensma, 2001). “Injustice may be conceived as a stress factor, as well as a factor in which the discrepancy between the actual situation and a comparison standard is emphasized. The main difference between injustice as a stress factor and other stress factors is that the discrepancy is attributed to the allocator’s decision toward the subordinate, and as such, reflects the relationship between supervisor and subordinate” (Vermunt & Steensma, 2001, p. 41). Thus, the authors provide a direct link between perceived injustice and stress through conceptualizing injustice as a gap between ones capacities and the requirements at work and by emphasizing the social component of injustice; in terms of the relationship with the supervisor, which are both related to stress.

Altogether, theoretical and empirical evidence points to organizational justice as being a potential stressor at work. Noteworthy, organizational justice seems to touch manifold issues related to stress. In consequence, organizational justice might transmit its adverse health effects (e.g., cardiovascular disease risk) by psychophysiological stress systems. Although perceived unfairness might affect health by adverse health behaviour (i.e., alcohol and smoking) (e.g., (Kouvonen et al., 2008; Kouvonen et al., 2007) it might also do so through biological pathways. However, before discussing potential biological pathways, the next chapters examine, first, the assessment of organizational justice, second, compares organizational justice to other job stress conceptualizations, and, third, discusses contextual determinants.

**Excursus: measurement of organizational justice**

If a person perceives injustice within his organisation, it might affect several justice dimensions (cf., Table 1.1) and the question rises: how can this be measured? In their review entitled “how should organizational justice be measured?” Colquitt and Shaw (2005) discussed and classified organizational justice scales according to four characteristics; 1) the type of justice measured
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(i.e., distributive, procedural, interpersonal, informational), 2) the source of justice (human decision-making agent vs. formal organizational system), 3) the context of justice (a discrete event, or an enduring context characterized by multiple events), and, 4) the measurement approach (direct assessment of perceptions [“how fair“ items] or indirect assessment e.g., by items focusing on justice rules).

Two scales have been used most often, one of which was developed by Colquitt (2001) and the other by Moorman (1991). The great majority of studies used modified versions of the Moorman’s Organizational Justice Scale (Moorman, 1991). This scale measures a procedural and an interactional justice component. Regarding the source of justice, procedural justice focuses on the formal system (i.e., fairness rules in the company), and on the human agent (i.e., the supervisor) for interactional justice. Both sub-scales have a general context (i.e., entity), apply an indirect measurement approach and make use of the Leventhal rules for procedural justice, and of the Bies and Moag rules for interactional justice (see Table 1.1) (Colquitt & Shaw, 2005). As a German organizational justice scale based on Moorman is currently lacking the first aim of this thesis is to validate a German version (Chapter 2).

Comparisons between organizational justice and other models of work stress

In addition to organizational justice other stressful psychosocial work characteristics have been associated with impaired health (Chandola et al., 2008; Kivimäki et al., 2006). Most research in this area has been done with two models of work stress, which emphasize work place features distinct from organizational justice: the effort-reward-imbalance and the job-demand control model. The section below provides a short overview of these models, and subsequently discusses shared and unique features of these constructs and their relation to organizational justice.

The effort-reward imbalance model conceptualizes work stress as the perceived mismatch between efforts and rewards. Work efforts comprise elements such as time pressure, interruption, responsibility, overtime, and demanding work. Rewards are distributed in the form of money (i.e., salary), esteem (e.g., respect and support), and job opportunities (e.g., job security, status control, and promotion) (Siegrist, 1996; Siegrist et al., 2004). High effort at work while receiving low rewards violates core expectations about reciprocity resulting in stress, and in this respect, effort-reward imbalance overlaps with organizational justice, as further discussed below (Siegrist, 2001).
While the effort-reward-imbalance model mainly emphasis reciprocity, the job-demand-control model focuses on work content (Hayashi et al., 2011). This model conceptualizes job stress (termed ‘job strain’ in this model) as the combination of low job control (decision latitude) and high psychological job demands (e.g., intensity of work) (Chênevert et al., 2013; Theorell & Karasek, 1996).

Several theoretical differences between organizational justice, the job-demand-control model, and the effort-reward-imbalance are proposed. There is a conceptual overlap between effort-reward-imbalance and distributive justice (as both refer to an equitable distribution of inputs and outputs). However, important distinctions can be made as well. For example, distributive justice focuses on interpersonal comparison while effort-reward-imbalance focuses on intrapersonal comparison (Ndjaboue et al., 2012). Also, while effort-reward-imbalance is concerned with the reciprocity of exchange within the formal employment contract, organizational justice is more strongly related to the managerial and interpersonal climate within the organization and the interpersonal relationships in hierarchies (Kivimäki, Vahtera, Elovainio, Virtanen, & Siegrist, 2007). This implies that organizational justice also pertains to perceptions of justice by which the person is not directly and personally affected, while effort-reward-imbalance and job-demand control assess the perception of the individual situation (Ndjaboue et al., 2012). This idea is consistent with empirical findings showing collective perceptions of justice, also called justice climate (e.g., measured by averaging individual justice perceptions and assigning that value to all group members), to be significantly related to individual depression and anxiety symptoms, and sickness absence due to anxiety disorders (Elovainio et al., 2013; Grynderup et al., 2013; Spell & Arnold, 2007).

The processes and procedures determining the distribution of work and resources (i.e., procedural justice) are features not assessed by the other models (Ndjaboue et al., 2012) and is therefore another unique aspect of organizational justice. The instrumental control model (Thibaut & Walker, 1975) states that employees judge procedural fairness on the basis of to process control (i.e., having a ‘voice’) and decision control (i.e., having a ‘choice’). Theorell (2003) suggested that procedural justice is intimately related to decision authority in the original demand control model, but the organizational justice questions deal with procedures used at the work site and the extent to which they create clarity and consistency for employees regarding decisions at work.
In general, organizational justice is thought to capture the basic elements of social structure more than the other models do (Kivimäki, Elovainio, Vahtera, & Ferrie, 2003). One of the aims of this thesis is to explore independent effects of organizational justice (Chapter 5 and 6), as well as combined effects with effort-reward-imbalance and job-demand-control model (Chapter 4) on health outcomes and biological pathways.

**Contextual determinants of the impact of organizational justice**

The impact of different aspects of organizational justice may vary with occupations. Justice perceptions have been proposed to be more important in high status occupations than in low status occupations (Elovainio, Kivimäki, et al., 2006; Elovainio, Kivimäki, & Vahtera, 2002; van Prooijen, van den Bos, & Wilke, 2004). This idea is further explored in Chapter 6.

That impact of work stressors may vary by occupational group is not unique to organizational justice. For example, a different impact of job strain, and to a lesser extent of effort-reward-imbalance, has been proposed for white-collar and blue-collar workers (Siegrist et al., 2004; Toren et al., 2014; Tsutsumi, Kayaba, & Ishikawa, 2011). The white-collar blue-collar distinction is used to distinguish between production workers vs. non-manual office workers. Generally, blue-collar workers, compared to white-collar employees, have lower levels of autonomy and the job content is characterized by lower intellectual discretion and poorer task variety (Toppinen-Tanner, Kalimo, & Mutanen, 2002). White-collar workers have a stronger social exchange with their supervisor and the company compared to blue-collar workers (Littek & Heisig, 1989). This implies that their relation involves obligations and expectations beyond the formal contract, and is accompanied by high levels of commitment and trust. These factors are linked to organizational justice (De Cuyper, Rigotti, De Witte, & Mohr, 2008; DeConinck, 2010; Holtz, 2013) and so it may be postulated that the impact organizational justice is likewise varies across the white- versus blue-collar distinction. Moreover, because work tasks are more independent and work processes and outcomes are more uncertain, violations of justice standards may have a greater impact on white-collar workers than on blue-collar workers (Hopp, Iravani, & Liu, 2009). This prediction is investigated in Chapter 4, 5, and 6. Chapter 4 also considers the interaction of organizational justice with the other work stress concepts.
Biological pathways linking injustice and health

Perceived stress due to injustice is thought to exert health effects through activation of three interrelated physiological systems: the autonomic nervous system (ANS), the hypothalamic-pituitary-adrenal (HPA) axis and the immune system, although it seems likely that other biological response systems may play a role as well (Lane, Waldstein, Chesney, et al., 2009).

Autonomic nervous system

The autonomic nervous system (ANS) is part of the peripheral nervous system, whose main purpose is to exchange information between the brain and the periphery of the body. Activity within the ANS is largely involuntary and a main function is to adapt bodily homeostasis (i.e., physiological stability under varying internal and external demands). The active process to maintaining homeostasis is called allostasis, “meaning literally 'maintaining stability (or homeostasis) through change’” (McEwen & Seeman, 1999, p. 32). The ANS consists of two branches: the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS). In generic terms, the SNS is associated with energy mobilization, e.g., to prepare for fight or flight, while the PNS shows enhanced activity in the context of vegetative and restorative functions (e.g., relaxation, vegetation), although exact physiological functions may vary between different organs and are context dependent.

Acute stress triggers the ANS by activating the SNS and reducing activity within the PNS. One of the hallmarks of SNS activation is secretion of the hormone epinephrine (also known as adrenaline) and to a lesser extent norepinephrine by the adrenal medulla, and release of the transmitter norepinephrine by sympathetic nerve endings, collectively denoted as the sympathomedullary (SAM) system. This bodily reaction underlies the so-called 'flight or fight response' (Cannon, 1963) by activating various target organs, such as the heart and vasculature, liver, muscle and fat cells, which prepares the organism for action. If the stressor vanishes allostasis returns the body to resting homeostasis (McEwen, 1998; Sapolsky, 2007). Repeated allostasis is thought to result in the wear-and-tear of the body, leading to non-optimal organ function (e.g., high blood pressure, metabolic dysregulation, immune activation). Further, allostatic load may further amplify these processes by dysregulating effects on normal stress responses, for example, resulting in hypo- or hyper-responsiveness to stress or a failure to terminate physiological stress responses (McEwen, 1998; McEwen & Gianaros, 2011; McEwen & Seeman, 1999).
Activity within the PNS can be assessed by heart rate variability (HRV), although strictly speaking this physiological outcome captures activity within a (major) subdivision of the PNS, i.e., the vagal nerve. The vagal nerve innervates visceral thoracal and most visceral abdominal organs (Ernst, 2014) and is purposed to play a central role in regulation of allostatic systems (Thayer & Sternberg, 2006).

Decreased cardiac vagal tone has been proposed be a potential candidate mechanism linking organizational justice to adverse health. However, only two studies have investigated the relation of perceived justice and HRV. In an observational study conducted among 57 Finnish female health care workers Elovainio, Kivimäki, et al. (2006) report that low procedural justice was related to an 80% excess risk of a reduced HRV indicator, however association was not statistically significant, which may partly be due to low statistical power. Relational justice (also called interactional justice) was not related to HRV. Falk, Menrath, Verde, and Siegrist (2011) showed in a simple principal-agent experiment² among 30 German university students that experienced unfairness (i.e., unfair payment) was linked to lower HRV.

Research in Chapter 5 of this dissertation investigated the association of organizational justice with several HRV indices in a large working cohort. Based on predictions resting upon social exchange theory it is further proposed that organizational justice does not constitute a threat equally to all employee groups, and relevant distinctions between groups can be made therefore (see also chapter on contextual determinants of the impact of organizational justice).

The HPA system

Stress due to perceived unfairness may also trigger the hypothalamic-pituitary-adrenal (HPA) axis. Activation of the HPA axis involves sequential steps starting with release of corticotrophin releasing hormone (CRH) by the hypothalamus, which in turn enhances the release of adrenocorticotropic hormone (ACTH) from the anterior pituitary. ACTH, in turn, stimulates the secretion of cortisol from the adrenal cortex. Cortisol has multiple targets throughout the body and regulates the functions of nearly every life-support system, including

² In this experiment an agent produce revenue by working on a task. The principal decides how to allocate the revenue between the agent and himself. Unfairness arises when payment for the agent is unfairly low (Falk et al., 2011).
the immune system (causing immune suppression), metabolic systems (effects on glucose and fatty acid metabolism), and the cardiovascular system (like causing higher heart rate, blood pressure, and cardiac output).

Two laboratory studies have assessed cortisol responses to manipulated justice. Yang, Bauer, Johnson, Groer, and Salomon (2014) manipulated interactional justice in an experiment among 68 undergraduate students. In the unfair condition the experimenter violated three interactional justice criteria (i.e., respect, propriety, and justification), while these criteria were not violated in the fair condition. The authors report an effect of interactional unfairness on increasing cortisol level.

In a Swedish experiment fairness was manipulated by giving the students process control (fair condition) versus no control (unfair condition). Fair treatment was associated with reduced cortisol levels in high type-A behavior persons\(^3\) under a low stress condition, while low type-A persons behavior had lower cortisol levels when high stress was induced (Vermunt et al., 2007). While these experimental studies demonstrate that perceived unfairness could elicit acute responses, indications that such reactivity has long-term consequences are lacking. In chapter 6 of this dissertation, one possible long-term effect is investigated, i.e., the effect of perceived injustice on the capacity of cortisol to regulate the immune system.

**The immune system**

Systemic inflammation is proposed as a key mechanism translating chronic distress into disease (Glaser & Kiecolt-Glaser, 2005). The purpose of the immune system is to protect the body from harm by external (e.g., infections, toxins) and internal threats (e.g., tissue damage, cancerous cells). When the body is injured or invaded by toxins or bacteria, a series of responses are triggered by cells of the immune system (denoted leukocytes or white blood cells) aiming to eliminate the cause of injury and initiate the healing process. This constellation of responses is collectively denoted as inflammation, with a hallmark features the release of a specific set of messenger substances, the so-called inflammatory cytokines. The inflammatory response from local infections and tissue damage (often observable as local swelling, redness

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\(^3\) High type-A behavior persons are “characterized as having an easily aroused hostility, a sense of time urgency and competitive achievement strivings. This hostility might make them more responsive to stress and less responsive to palliative treatment in response to stress” (Vermunt, Peeters, & Berggren, 2007, p. 549).
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and pain) should be distinguished from a systemic inflammatory response. The former is often quick and vigorous, accompanied by noticeable physical symptoms. The latter is mostly protracted and of low intensity (‘low grade’) with the exception of severe pathological states such as inflammatory diseases or infections that affect large or multiple tissues (e.g., flu, food poisoning). It has been found that low grade systemic inflammation is not only stimulated by infection or injury, but also by behavioral and psychosocial factors, such as stress. While the mechanisms for such stress-induced inflammatory activity have not been fully elucidated, it is proposed to play a key role in the pathophysiology of some diseases, such as cardiovascular disease (Rohleder, 2014).

Two studies provide evidence for the association of injustice with low grade inflammation. In a prospective study among 3,204 men of the Whitehall II study, Elovainio, Ferrie, et al. (2010) found interactional justice to predict higher levels of the inflammatory markers C-reactive protein (CRP) and interleukin (IL)-6 approximately 2.5 and 13.5 years later. These associations were not found in women (n = 1,204). In a Chinese study, distributive justice was negatively related to Immunoglobulin M (IgM) and Immunoglobulin A (IgA) at baseline. The predictive effect of distributive justice on IgM and IgA approximately two years later was moderated by traditionality (i.e., the extent to which individuals adhere to traditional cultural values) (Xie, Schaubroeck, & Lam, 2008).

Inflammation is in part regulated neuroendocrine systems, whereby the HPA axis acts as a counter-regulatory system dampening inflammatory activity. Accordingly, cortisol release is thought to buffer or decrease inflammatory activity. Paradoxically, however, during stress both inflammatory activity and HPA activation are found to be elevated; an observation that would seem mutually exclusive. Possibly explaining this paradox is that repeated exposure to stress-induced elevations of cortisol eventually decreases sensitivity of leukocytes to the regulatory effects of cortisol, a phenomenon denoted as glucocorticoid insensitivity or glucocorticoid resistance. This may, for example, be a result of down regulation or altered expression of glucocorticoid receptors (Quax et al., 2013). On this basis Cole (2008) and Cohen et al. (2012) developed a method that can be used to determine if circulating glucocorticoids (i.e., cortisol) are able to regulate the traffic of leukocyte subsets in and out of the blood, using the correlation between cortisol levels and circulating leukocyte numbers (a detailed description can be found in Chapter 6). To test the idea that organizational injustice
might be associated with reduced glucocorticoid sensitivity was another aim of this thesis (Chapter 6).

**General aim and outline of this thesis**

Evidence shows that perceived organizational injustice constitutes a health risk, but also that significant knowledge gaps exists. This thesis therefore pursues three general objectives. First, a German instrument to measure organizational justice is developed. Second, the role of organizational injustice compared to established job stress conceptualizations and contextual determinates is investigated. The third aim refers to potential psychobiological pathways. Analyses focuses on novel or rarely investigated pathways (e.g., vagal tone, glucocorticoid sensitivity) and little investigate health outcomes (e.g., musculoskeletal pain, tinnitus) that significantly contribute to workplace absenteeism and presenteeism. These investigations were based on data from two cross-sectional occupational cohorts.

This thesis comprises five empirical chapters (Figure 1.2). The second chapter validates a modified German version of Moorman’s (1991) organizational justice scale, comprising a procedural an interactional sub-dimension. The next chapter (Chapter 3) examines the association of organizational justice with tinnitus and the mediation of burnout and/or depression. Chapter 4 concerns the combined and independent associations of organizational justice with effort-reward-imbalance and job-demand control with musculoskeletal symptoms. Chapter 5 and 6 address psychobiological vulnerability to injustice of specific occupational groups. Chapter 5 investigates the associations of organizational justice components with different HRV indices for white- and blue-collar workers separately. Findings will be replicated in the following Chapter (Chapter 6) that aims to identify a novel biological component in the injustice-health relationship: glucocorticoid insensitivity. Chapter 7 summarizes and discusses the results of the empirical chapters in light of existing literatures and addresses implications for research and practice. Moreover, further research directions are identified.
**Figure 1.2:** Graphical outline of this thesis. Numbers in brackets represent chapters.