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# Unfair exchange and health: Social bases of stress-related diseases

Johannes Siegrist

Department of Medical Sociology, Heinrich-Heine-University Duesseldorf,  
PO Box 101007, 40225 Duesseldorf, Germany.  
E-mail: siegrist@uni-duesseldorf.de

**Abstract** In this contribution it is argued that the analysis of exchange characteristics of core social roles in adult life offers a promising approach towards studying the social bases of stress-related diseases. More specifically, the theoretical model of effort-reward imbalance claims that the violation of a core principle of social exchange, reciprocity, elicits sustained stress reactions with adverse long-term effects on health. This model has been extensively tested with regard to the work role, and a brief review of empirical evidence is given, based on findings from prospective epidemiological studies. Taken together, results demonstrate that the risk of incident stress-related disease, such as coronary heart disease or depression, is about twice as high in men and women scoring high on effort-reward imbalance at work compared to non-exposed people. Finally, recent extensions of the theoretical model beyond the work role and beyond health as the main study outcome are discussed, illustrating the utility of this concept for general sociology.

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**Keywords:** social reciprocity; effort-reward imbalance; prospective studies; stress-related diseases; sociological theory

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## Introduction

As indicated in its title, the journal 'Social Theory and Health' is committed to a scientific discourse on the contribution of sociological theories towards understanding or improving health and health care in its broadest sense. Currently, there is no consensus of opinion on what constitutes a sociological theory. Rather, a broad spectrum of epistemological positions is obvious from ongoing debates, ranging from empirical-analytical methodology with its claim of inter-subjectively shared explanatory knowledge to postmodernism that rejects any notion of validity in interpreting the social reality. Moreover, there is

no consensus of opinion on what constitutes the core object of sociological theory, whether it concerns the macro-level of societal structures and processes, the meso-level of societal institutions, organisations, settings and social roles, the micro-level of interpersonal exchange, or a synthesis of these different levels. Thus, sociologists working in the field of health or medicine are facing a heavy burden of choice and inconsistency if they aim to apply sociological theory to their research topics.

However, in a historical perspective, the relationship of the sub-discipline of health or medical sociology, with main or general sociology has never been unidirectional, as the early examples of Emile Durkheim (Durkheim, 1951) and Talcott Parsons (Parsons, 1951) demonstrate. Therefore, one may ask whether the scientific study of one of the core topics in medical sociology – the study of social bases of stress-related diseases – provides an opportunity to generate theoretical insights that are of interest to the discipline of sociology at large. In this contribution a theoretical approach towards analysing stress-inducing patterns of social exchange is outlined, and a brief summary of empirical evidence supporting this approach is given. The final part illustrates how this new knowledge can be relevant to sociological analysis of topics that reach beyond the limited field of health and disease.

It may be useful to clarify the epistemological position on which the following analysis is based. According to my understanding, a theory is best understood as a set of interrelated explanatory statements. Explanatory statements connect single observations in a causal way by referring them to a general rule or principle. The choice of explanatory statements is an arbitrary, risky intellectual activity given the fact that it reduces the complex reality to a few selective, meaningful components. The choice is risky because the theory may fail if subjected to an empirical test. The more often a theory is supported by empirical tests the higher is its utility for science and practice. Thus, measuring theoretical statements with appropriate indicators and testing them with appropriate study designs are the main challenges of theory-based sociological research (Popper, 1959).

## **A Theoretical Model of Unfair Social Exchange: Effort-reward Imbalance**

In an attempt to identify those critical features of social exchange that increase the risk of stress-related disorders in exposed people my choice was directed towards core social roles in adult life, such as the work role, marital and parental roles or civic roles. Social roles define an important interface among individual motivations, cognitions, emotions and the structure of societal



opportunities because they act as 'hinges' that connect the individual person with his or her proximate social environments. By acquiring and maintaining core social roles in adult life and by acting successfully through them important human needs are fulfilled, such as the needs of striving for security, control, reward and belonging. To a significant extent, individual experience of self-esteem and self-efficacy is contingent on social role-related activities, and strong positive emotions with relevance to health and well-being are triggered by them. Conversely, lack of access to, or loss of these social roles, and unsuccessful role-related activities are associated with threats to security and stability, with lack of control and reward, and with social isolation. These conditions weaken self-esteem and self-efficacy, and they are likely to trigger strong negative emotions and associated stress reactions within the organism (Weiner, 1992).

The work role is particularly relevant for human need fulfilment and its effects on health and well-being. This is because of the fact that work is a major prerequisite for continuous income and that employment characteristics determine adult socio-economic status. Beyond economic livelihood, work provides opportunities for personal growth, development and participation in social networks beyond primary groups. Therefore, the work role was chosen as a frame of reference in developing our theoretical model, effort-reward imbalance.

This model is concerned with stressful features of the work contract rather than the profile of job tasks. Developed by this author and his group (Siegrist, 1996), it builds on the notion of social reciprocity, a fundamental principle rooted in an 'evolutionary old' grammar of interpersonal exchange. Social reciprocity lies at the core of the employment (or work) contract, which defines distinct obligations or tasks to be performed in exchange with adequate rewards. These rewards include money, esteem and career opportunities, including job security. Contractual reciprocity operates through norms of return expectancy where efforts spent by employees are reciprocated by equitable rewards from employers. The effort-reward imbalance model claims that lack of reciprocity occurs frequently under specific conditions and that failed reciprocity in terms of high-cost and low-gain elicits strong negative emotions with special propensity to sustained autonomic and neuroendocrine activation and their adverse long-term consequences for health. According to the theory, contractual non-reciprocity is expected if one or several of the following conditions are given: 'dependency', 'strategic choice' and 'overcommitment' (Siegrist, 1996; Siegrist and Theorell, 2006).

'Dependency' reflects the structural constraints observed in certain types of employment contracts, especially so in unskilled or semi-skilled workers, in elderly employees, in employees with restricted mobility or limited work ability,

and in workers with short-term contracts. In all these instances, incentives of paying non-equitable rewards are high for employers, while the risks of rejecting an unfair contractual transaction by employees are low because they have no alternative choice. 'Dependency' is relatively frequent in modern economies that are characterised by a globalised labour market, mergers and organisational downsizing, rapid technological change, and a high level of job instability. 'Strategic choice' is a second condition of non-symmetrical exchange. Here, people accept high-cost/low-gain conditions of their employment for a certain time, often without being forced to do so, because they tend to improve their chances of career promotion and related rewards at a later stage. This pattern is frequently observed in early stages of professional careers and in jobs that are characterised by heavy competition. As anticipatory investments are made on the basis of insecure return expectancy, the risk of failed success after long-lasting efforts is considerable. Third, there are psychological reasons for a recurrent mismatch between efforts and rewards at work. People characterised by a motivational pattern of excessive work-related 'overcommitment' may strive towards continuously high achievement because of their underlying need for approval and esteem at work. Although these excessive efforts often are not met by adequate rewards, overcommitted people tend to maintain their level of involvement. Work-related overcommitment may also be triggered by informal social pressure at work, specifically in a highly competitive professional environment. Thus, it is elicited and reinforced by a variety of job environments, and is often experienced as self-rewarding over a period of years in occupational trajectories. However, in the long run, overcommitted people are susceptible to exhaustion and adaptive breakdown.

In summary, the model of effort-reward imbalance at work maintains that people experiencing dependency, strategic choice and overcommitment, either separately or in combination, are often exposed to failed contractual reciprocity at work and its health-adverse consequences. In stress-theoretical terms, this model is focused on the afflictions of self-esteem resulting from failed social reciprocity, that is the frustration of rewards following appropriate efforts spent. The model combines organisational features with personal coping characteristics.

Effort-reward imbalance is measured by a standardised, psychometrically validated self-report questionnaire containing the three scales 'effort' (6 items), 'reward' (11 items that represent the three dimensions of financial and career-related rewards, of esteem and job security in respective subscales), and 'overcommitment' (6 items representing the intrinsic model component). Psychometric properties of these original scales (Siegrist *et al*, 2004a) and of a shorter version of the questionnaire (Siegrist *et al*, 2008) were extensively tested, and the measure is available in a variety of languages. Despite the fact



that standardised quantitative measures suffer from methodological limitations this approach has proven to be a reliable, robust operational definition of the underlying theoretical model of effort-reward imbalance at work (De Jonge *et al.*, 2008).

## Brief Summary of Empirical Evidence on Health-adverse Effects

The prospective epidemiological observational study is considered a gold standard approach in this field because of its temporal sequence (exposure assessment precedes disease onset), its sample size (based on statistical power calculation and allowing for adjustment for confounding variables in multivariate analysis) and the quantification of subsequent disease risk following exposure (odds ratio of disease in exposed versus non-exposed individuals). Therefore, a short summary of main findings given here is mainly based on prospective studies, whereas reviews that include cross-sectional studies and other study designs were published previously (Tsutsumi and Kawakami, 2004; Van Vegchel *et al.*, 2005).

The majority of prospective investigations studied unfair exchange at work (in terms of the effort-reward imbalance model) in relation to cardiovascular diseases and affective disorders. This choice is well justified in view of their contribution to the global burden of disease. By the year 2020 depression and coronary heart disease will be the leading causes of premature death and of life years defined by disability worldwide (Murray and Lopez, 1996).

Table 1 displays the results of 16 reports from 12 different prospective epidemiological studies. Five reports concern cardiovascular disease, five reports analyse depression and five reports are concerned with other health outcomes, such as poor self-rated health, poor physical and mental functioning, alcohol dependence, type 2 diabetes and sleep disturbances. The table gives the relative risk or odds ratio of effort-reward imbalance (exposure group) for the respective disease, together with the 95 per cent confidence intervals, compared with the non-exposed reference group where the odds ratio is 1.0. The higher the odds ratio, the higher is the probability of disease occurrence within the exposed group. Most, but not all reports document significantly elevated risks of disease or ill health among those who score high on the respective scales of the questionnaire. In order to compare results across studies a standardised summary measure was proposed, the effort-reward ratio. It is composed by the sum score of 'effort' in the nominator and the sum score of 'reward' in the denominator, adjusted for equal number of items. Ratios beyond a threshold of 1.0 or scores ranging in the upper tertile or quartile of distribution are considered critical for health (Siegrist *et al.*, 2004a). A majority of findings reported

**Table 1:** Overview of results from prospective epidemiological studies: Adverse health effects produced by effort-reward imbalance at work

<i>First author (year)</i>	<i>Sample</i>	<i>Health outcome</i>	<i>Odds ratio/hazard ratio (95% CI)</i>
Siegrist <i>et al</i> (1990)	m n=416	Coronary heart disease (CHD)	4.5 (1.4–14.3)
Lynch <i>et al</i> (1997)	m n=2297	Coronary heart disease	1.6 (0.8–3.2) <sup>a</sup>
Bosma <i>et al</i> (1998)	m, f n=10 308	CHD and/or angina pectoris	2.2 (1.1–4.0)
Stansfeld <i>et al</i> (1998)	m, f n=10 308	Poor physical functioning	m 1.44 (1.07–1.94) f 2.01 (1.15–3.52)
Stansfeld <i>et al</i> (1998)	m, f n=10 308	Poor mental functioning	m 1.78 (1.34–2.37) f 2.33 (1.36–3.98)
Stansfeld <i>et al</i> (1999)	m, f n=10 308	Depressive symptoms	m 3.6 (2.8–4.8) f 1.9 (1.2–2.9)
Kivimäki <i>et al</i> (2002)	m, f n=812	Cardiovascular mortality	2.4 (1.0–5.7)
Kuper <i>et al</i> (2002)	m, f n=10 308	Coronary heart disease	1.3 (1.0–1.5)
Head <i>et al</i> (2004)	m, f n=10 308	Alcohol dependence	m 1.59 (1.1–2.3) f 1.15 (0.6–2.3)
Kumari <i>et al</i> (2004)	m, f n=8067	Type 2 diabetes	m 1.65 (1.0–2.8) f 0.93 (0.4–2.0)
Niedhammer <i>et al</i> (2004)	m, f n=6286	Poor self-rated health	m 1.8 (1.1–2.8) f 2.2 (1.2–3.9)
Godin <i>et al</i> (2005)	m, f n=1986	Depressive symptoms	m 2.8 (1.3–5.7) f 4.6 (2.3–9.0)
Kivimäki <i>et al</i> (2007)	m, f n=47 351	Diagnosed depression	1.5 (1.2–1.8)
Kivimäki <i>et al</i> (2007)	m, f n=21 938	Diagnosed depression	1.6 (0.9–2.7)
Rugulies <i>et al</i> (2009)	m, f n=2351	Sleep disturbances	m 2.1 (1.1–3.7) f 0.9 (0.7–1.2)
Siegrist <i>et al</i> (2008)	m, f n=4824	Depressive symptoms	1.4 (1.2–1.7)

<sup>a</sup>High demands and low economic reward.  
Abbreviations: m=male; f=female.

in Table 1 is based on this type of summary measure. As can be seen people scoring high on effort-reward imbalance overall are two times more likely to suffer from a stress-related disorder than those with low or no stressful exposure at work. Risks are higher for depression than for coronary heart disease, and men seem to be more vulnerable to adverse effects of unfair exchange at work than women.

The burden of stress-related disease is unequally distributed across society. In several of the studies displayed in Table 1, the prevalence of unfair social exchange at work was higher in people with lower socio-economic status, and effects on health were often found to be more pronounced in these groups



(Wege *et al.*, 2008). Moreover, it is important to observe that the results presented in Table 1 are based on a variety of occupational groups, white and blue collars, and employees from different economic sectors, and that study populations were recruited from different modern Western countries in Europe and Northern America. Even if the reported odds ratios are not large, their effects in absolute terms are considerable, given the fact that between 10 and 25 per cent of the sample were exposed to work stress in terms of this model.

Despite their methodological strengths prospective epidemiological studies provide little insight into the mechanisms underlying the observed statistical associations. Two such mechanisms are generally considered: the mediation by health-adverse behaviours, such as smoking, poor diet or lack of physical exercise (Siegrist and Rödel, 2006), and the mediation by chronic stress reactions that contribute to the development of disease *via* psychobiological mechanisms (McEwen, 1999; Steptoe, 2006). Psychobiological processes are the pathways through which a health-adverse psychosocial work environment activates autonomic, neuroendocrine, immune and inflammatory responses *via* the organism's stress axes. Recent experimental studies demonstrate associations of unfair exchange at work with elevated heart rate and blood pressure, with reduced heart rate variability, with altered patterns of release of stress hormones into blood or saliva and with increased inflammatory markers (Vrijkotte *et al.*, 2000; Hamer *et al.*, 2006; Steptoe, 2006; Wirtz *et al.*, 2008). These findings supplement epidemiological evidence by demonstrating psychobiological processes that possibly mediate the observed statistical associations of measures of effort-reward imbalance at work with stress-related disorders.

Taken together, this short summary illustrates how a theoretical model focusing on the meso-social level of analysis of a core social role in adult life, the work role, has met the challenge of recurrent and independent empirical tests. Overall, the data confirm the model's predictions by demonstrating elevated risks of incident stress-related disorders. In addition, some evidence points to psychobiological processes underlying these statistical associations.

## **Failed Reciprocity in Social Exchange: Significance for General Sociology?**

We set out to study the social bases of stress-related diseases by testing explanatory statements derived from a theoretical model that is based on the notion of reciprocity of role-related social exchange. I demonstrated that failed reciprocity between efforts spent and rewards received at work matters for human health and disease in significant ways. Yet, the question has not

been answered whether this scientific work developed in the context of a sub-discipline of sociology – health or medical sociology – is of interest or relevance to general sociology, in other words, to what extent the theoretical notion may be extended beyond the specific conditions studied so far. Here, three lines of extending the scope of this model are discussed, implying that the usefulness of a theory is contingent on the degree of generalisation of its explanatory statements. The first line concerns the extension of outcome measures beyond health and well-being. Deviant social behaviour is considered an important outcome in general sociological research. Thus, we discuss the promises of applying the model of effort-reward imbalance at work to the study of deviant behaviour. Second, it may be that the work role defines a rather specific aspect of human behaviour and that the model's predictions are not useful in studying associations of non-reciprocal exchange in other social roles with people's health. Therefore, findings from studies dealing with failed reciprocity in marital and parental roles or in a non-economic work role, voluntary work, are of interest. Third, in keeping with Robert Merton's claim that generalisation of sociological knowledge is limited to 'middle-range' theories, given the powerful impact of socio-cultural and socio-economic variations across societies (Merton, 1967), we consider whether a theoretical model that was developed and applied in the context of modern Western societies can be successfully applied to other socio-cultural and socio-economic contexts, such as rapidly developing countries with different cultural background.

So far, three proximate indicators of deviant social behaviour were studied using the model of effort-reward imbalance at work, short-term sickness absence, intention to leave one's job prematurely and norm-breaking behaviour. Short-term sickness absence is a complex measure that captures experiences of ill health as well as signs of frustration or dissatisfaction with one's job. Two studies explored associations of effort-reward imbalance at work with sickness absence and found some supporting evidence (Ala-Mursula *et al*, 2005; Head *et al*, 2007). Two more studies analysed effects of experienced non-reciprocity at work on intentions to leave one's job prematurely and observed strong, consistent associations (Hasselhorn *et al*, 2004; Siegrist *et al*, 2007). The question of whether the frustration of work-related rewards increases the risk of norm-breaking behaviour has been studied in the context of a large anonymous survey of several thousand early-career and mid-career researchers in the United States (Martinson *et al*, 2006). It was found that a high effort-reward imbalance ratio was related to an increased probability of scientific misbehaviour in early-career, but not in mid-career scientists. Moreover, over-committed researchers were more likely to report misbehaviour, in particular if they additionally perceived a high degree of procedural injustice within their organisation. Another indicator of deviant social behaviour relates to





obstructive behaviour in motor vehicle traffic. A recent study from Australia reported elevated probability of obstructive behaviour in car drivers characterised by effort-reward imbalance and overcommitment at work (Hoggan and Dollard, 2007). Thus, there is preliminary evidence of utility in applying the model to domains of human behaviour other than health and well-being.

Second, several investigations demonstrate that recurrent experience of failed reciprocity in marital and parental roles matters for health and well-being in middle-aged and early old-age men and women. Health complaints include depressive symptoms, sleep disturbances, poor physical and mental functioning and symptoms of coronary heart disease (angina pectoris) (Knesebeck and Siegrist, 2003; Chandola *et al*, 2007; Knesebeck *et al*, 2009). Voluntary work is another relevant social role in adult life, specifically among retired people in early old life (Siegrist *et al*, 2004b). Again, several reports are now available highlighting beneficial effects of experienced reciprocity in productive social activities (mainly volunteering), whereas reduced health and well-being is experienced among those who report a lack of reciprocity in exchange (Wahrendorf *et al*, 2006; Wahrendorf *et al*, 2008). There is also preliminary, currently unpublished information on the usefulness of applying the model of effort-reward imbalance to the school setting of pupils and young students (J. Li, personal communication). It can be concluded that applying the theoretical concept of failed reciprocity of exchange to other core social roles defines a promising strategy towards extending the scope of generalisation of the model's predictions.

Finally, as the notions of centrality of the work role in adult life and of importance of reciprocity in work-related achievements and rewards for health and well-being emanated from the process of modernisation in Western European societies over the past few centuries, one may ask to what extent these notions are relevant for people with different socio-cultural background, such as Asian cultures (for example Japan, China), and for people living and working in rapidly developing countries (for example Brazil, South Korea, Thailand). Observing associations with health of similar strength would provide a strong argument in favour of the universal significance of work-role-related reciprocity/non-reciprocity for human health and well-being. Such findings would underline the evolutionary old 'grammar' of social exchange that may be rooted in distinct structures of the human brain (Cosmides and Tooby, 1992). Currently, a number of findings from observational studies confirm that effort-reward imbalance at work is associated with elevated risks of stress-related disorders in Japanese (Tsutsumi *et al*, 2001), Chinese (Xu *et al*, 2004; Li *et al*, 2005), South Korean (Eum *et al*, 2007), Thai (Buapetch *et al*, 2008) and Brazilian (Chor *et al*, 2007) working populations, thus lending support to the idea that the experience of unfair exchange results in negative emotions and



adverse well-being cross-culturally in similar ways. This discovery is of interest in view of the process of economic globalisation and associated trans-national labour market mobility.

In conclusion, unfair exchange in core social roles matters for health and well-being, as the violation of a basic social norm, reciprocity, elicits strong negative emotions and stress responses in the organism with adverse long-term consequences for physical and mental health. The findings reviewed in this contribution demonstrate that the predictions derived from the theoretical model of effort-reward imbalance hold true for different occupational and age groups, for men and women, and for working populations with diverse socio-cultural background. In addition, results underline the utility of this model in studying well-being in people acting through social roles other than the work role. Furthermore, the model's utility for general sociology is strengthened by the fact that it equally applies to outcomes other than health and well-being, outcomes that are more proximate to general sociological inquiry, in particular deviant social behaviour. Providing new explanations and new empirical evidence with regard to a prominent social problem, such as the association of unfair exchange with adverse health, is a primary task of sociology as science. Equally important is the task of reducing the gap between knowledge and action, between science and policy, by attempts towards building a fairer, healthier and more equal society.

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