

Chapter 12

Failed Social Reciprocity Beyond the Work Role

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12.1 Introduction

12.1.1 *Quality Criteria of a Theoretical Model*

As mentioned above (see Chap. 1), a theoretical model is best understood as a heuristic device that selectively reduces complex reality to a set of components. Statements linking these components in terms of hypotheses are expected to explain or predict associations of real phenomena if tested empirically with appropriate methods. In almost every field of scientific inquiry several competing models have been developed, often reflecting concurrent theoretical paradigms of analysis. Competition between alternative or complementary theoretical models has been, and continues to be, part of the dynamics of scientific progress. It is nevertheless of interest to ask whether some criteria do exist that describe the quality of a theoretical model, thus providing ways of evaluating the relative strengths and weaknesses among competing models. In the context of social and behavioural sciences concerned with stressful experience and health at least the following four criteria can be applied.

First, the quality of a theoretical model is contingent on established quality criteria of its *measurement*, in particular its *reliability and validity*. Data derived from measurement approaches with limited validity or with an incomplete set of indicators provide a low degree of credibility. The difficulties of achieving valid

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measurements in the social and behavioural sciences in general, and in research on the effort-reward imbalance model in particular, were discussed in an earlier chapter of this book (see Chap. 2). Despite respective restrictions one can assume that applying the scales of the ERI questionnaire provides a satisfactory approach towards measuring the model, with satisfactory psychometric properties.

A *second* criterion concerns the *robustness of empirical evidence* in support of a model. Robustness depends on the level of evidence inherent in a respective study design as well as on the frequency and intensity of testing the model. Clearly, findings based on an experimental design are more convincing than those derived from observational investigations. Moreover, results of observational cohort studies are superior to those of case-control or cross-sectional studies, in particular if Bradford Hills criteria of causality in epidemiological research are met (Bradford Hill 1965). At least in biomedical and more general health-related research, there is a general agreement on this hierarchy of scientific evidence. Independent replication of findings supporting a model is a universal prerequisite of scientific credibility. More frequent replications go along with higher quality and acceptance of a model. The same holds true with respect to the quality of data. For instance, supplementing information restricted to statistical associations of work stress with health outcomes by data on psychobiological pathways explaining these associations augments the quality and utility of a theoretical model (see Chap. 7 for respective evidence). In all these cases it is important to observe the basic principle of falsification (Popper 1959). Accordingly, hypotheses have to be stated such that they can be refused by contradictory observations. Risky assumptions, if not falsified, have a higher probability of generating new knowledge than more conventional assumptions based on knowledge that is already available.

The *degree of generalization* of results attributable to a theoretical model can be considered as a *third* criterion of quality. For instance, the fact that the effort-reward imbalance model has been successfully applied to a range of stress-related disorders, rather than being limited to one health outcome (e.g. cardiovascular disease), is an argument in favour of its quality (see e.g. chapters in Part II of this book). In a similar vein, applying the model in working populations of different socio-demographic, socioeconomic, and socio-cultural background provides a strong case of its credibility (see e.g. chapters in Part III of this book). A different way of evaluating generalization refers to the type of outcomes predicted by the model. So far, indicators of health, functioning, well-being, and health behaviours were the exclusive outcomes. Yet, some findings demonstrate that distinct behavioural outcomes are predicted by the model's hypotheses as well. Short-spell episodes of absenteeism, not necessarily related to health (Peter and Siegrist 1997), scientific misbehaviour (Martinson et al. 2006), participation in voluntary work during retirement (Wahrendorf et al. 2015) or driving anger (Hoggan and Dollard 2007) are examples of such extensions.

A *fourth* criterion of quality of a theoretical model concerns the *parsimony of its statements*. Parsimony refers to the degree of abstraction inherent in the models' hypotheses. In case of the ERI model, its hypotheses so far were restricted to the context of employment contracts involving paid work. It is possible to conceptualize

this model in terms of a higher degree of abstraction, by extending its predictions to types of costly social transactions beyond paid work. Years ago, in an editorial to the *Journal of Psychosomatic Research*, this extension was proposed by asking whether “we find evidence of adverse effects on health produced by lack of reciprocity in other core social roles” (Siegrist 1998, 103). Meanwhile, several such extensions have been developed, and their description defines the content of this chapter as well as the content of the following chapter. If successfully applied these extensions document a higher degree of parsimony of the model as its predictions are defined at a higher level of abstraction. High effort in combination with low reward is expected to increase the risk of poor health not only in case of paid work, but also in role-based unpaid activities conferring some utility, such as voluntary work, care of a family member, informal help, or home making. This extension opens a window to study costly social transactions and their effects on health in a life course perspective, specifically beyond employment age, as will be documented in later parts of this chapter.

12.1.2 Wider Explorations of the Principle of Social Reciprocity

Social reciprocity must be considered a universal element of interpersonal exchange rooted in human evolution (Cosmides and Tooby 1992; Gouldner 1960). Some theories claim that it acts as a driving force in other living species, either as a strategy among genetically close individuals to perpetuate one’s genes (Hamilton 1964) or as a principle of natural selection, favouring cooperative behaviour among non kin group members with a high propensity of continued exchange (Trivers 1971). Yet, in human life, social reciprocity serves essential functions, such as building trust through altruistic action (Fehr and Fischbacher 2003), enforcing contracts (Fehr and Gächter 2000), or enhancing cooperation in the absence of direct control (Gouldner 1960). Given this far-reaching significance it is assumed that violation of this principle elicits strong negative emotions of anger and disappointment among those who invested their efforts without receiving the anticipated benefits in return. This is due to the frustration of basic expectations of equivalence of return in costly transactions. If experienced recurrently failed reciprocity in significant areas of social exchange may have a profound impact on human health and wellbeing, compromising one’s self-esteem and arousing sustained autonomic and neuroendocrine stress reactions within the organism (see above Chaps. 1 and 7).

The *imbalance between effort spent* (‘high cost’) and *reward received in turn* (‘low gain’), experienced recurrently in a core social role of adult life, the *work role*, defines the core assumption of the ERI model. It has been described in more detail in Chap. 1 of this book. In keeping with the proposition that this model can be applied to other types of costly social transactions one has to take into account the strengths and weaknesses of such an extension. As mentioned, in terms of scientific

inquiry, a higher level of abstraction is achieved, thus allowing a parsimonious explanation of a broader spectrum of interpersonal exchange and its effects on health and wellbeing. This must be considered a particular strength. However, effort-reward imbalance at work contains some unique features that compromise its strict comparability with other types of costly transactions (Knesebeck and Siegrist 2003).

First, in *role-based exchange other than contractual employment*, the constraints of demands are often less pervasive and less explicitly defined, and the same holds true for sanctions provided in case of deviant behaviour. Second, the nature of reward differs as there is usually no place for salaries, wages or other types of financial incentives in non-economic productive activity and exchange. This is important as wages and salaries define an essential prerequisite of decent living conditions for major parts of a population. Third, the life time of most types of recurrent costly transactions in a non-economic context is significantly shorter than in case of paid work which usually covers several decades of a person's life course. Despite these differences, there is substantial communality of *social reward deficiency* shared by those who incurred high 'costs' with no or low 'gain' in return, whether experienced within paid work or in other types of costly social transaction. To answer the question of whether adverse effects on health are expected to result from experienced lack of reciprocity in other core social roles, several *extensions of the original ERI model* were developed more recently.

A *first development* concerns *close social relationships*, suggesting that non-reciprocity of exchange between couples, whether married or co-habiting, contributes to reduced mental health and wellbeing. A similar association is expected if efforts and rewards between parents and children are unbalanced. The following *section* summarizes the findings from five studies conducted so far to test this association. The first investigation was conducted in two elderly samples of men and women in Germany and in the United States of America (Knesebeck and Siegrist 2003), and the second one in a middle-aged occupational group in Germany (Knesebeck and Siegrist 2004). Importantly, these associations were further explored in the frame of the British Whitehall II study (Chandola et al. 2007), and in the baseline survey of a cohort study of an early old age urban population in the Ruhr area of Germany (Knesebeck et al. 2009). Finally, the French Gazel study offered an opportunity to analyse the research question in a different socio-cultural context (Wahrendorf et al. 2010).

A *second extension* relates to the notion of failed reciprocity in major types of *socially productive activities*, excluding paid work. These types include *voluntary work, caregiving, and providing informal help*. The authors of this chapter have taken the lead of this development, and several reports on associations with mental health and wellbeing were produced in the frame of longitudinal ageing studies in Europe, specifically the Survey of Health, Ageing and Retirement in Europe (SHARE) (Wahrendorf et al. 2006; Wahrendorf 2009; Siegrist and Wahrendorf 2009; Siegrist and Wahrendorf 2010), the English Longitudinal Study on Ageing (ELSA) (Wahrendorf 2009; McMunn et al. 2009), and the French Gazel Study (Wahrendorf et al. 2008). Major findings are presented and discussed below,

preceded by an outline of the conceptual framework of social productivity (Siegrist et al. 2004).

Third, a major type of unpaid work, *household and family work*, has been studied in terms of the ERI model, where a psychometrically validated questionnaire was developed by a team at Hannover Medical School (Sperlich et al. 2012). This important area of recent research is described and discussed in more detail in the following chapter, addressing the specific burden of women's engagement in household and family not only as an additional social role beyond work, but also as a specific type of labour (Sperlich et al. 2013).

Finally, the ERI model has been applied to the context of *school work of adolescents*, suggesting that perceptions of social reward deficiency are frequent in psychosocial school environments where students' efforts may not be adequately appreciated by teachers and where unfair exchange among class mates may occur. Again, a specific questionnaire has been developed and applied in a variety of investigations (Li et al. 2010), and respective information is provided below. The chapter ends with a discussion of these theoretical extensions and some concluding remarks.

12.2 Socially Productive Activities

12.2.1 *The Concept of Social Productivity*

In modern societies, the work role is considered the leading model of social activity, given its crucial significance for maintaining employment and economic growth and for securing the working person's continuous income and social status. Yet, other types of role-based social activities do exist, such as volunteering or charity work, caring for a sick or disabled person, informal help, or civic engagement. Although these types of activity are less often embedded in formal contracts and are characterized by lack of monetary rewards they share some communality with paid work and employment that is best defined with reference to the notion of social productivity. 'Productivity' is mainly used in economics to describe the value and utility of goods or services generated on the basis of paid work, where optimal cost-benefit relations are of interest. By extending the term to include non-economic costly transactions, *social productivity* was defined as "any agreed-upon continued activity that generates goods or services that are socially or economically valued by the recipient(s), whether or not based upon a formal contract" (Siegrist et al. 2004, pp. 3f). Inherent in all types of social productivity is the fact that they provide *dual utility*. For individuals acting in these role-based activities utility manifests itself in the experience of material or non-material rewards (being 'valued' for goods or services), and for the partners of persons acting in these roles, or for the broader society, the utility consists in sharing the outcomes of respective activities. Socially productive transactions between providers and recipients are based on the norm of social reciprocity, where any action or service provided by person A to person B that

has some utility to B is expected to be returned by person B to A, meeting some agreed-upon standard of equivalence (Gouldner 1960).

Obviously, in non-economic productive transactions *non-material rewards* are prevailing. To better describe these non-material rewards a reference to theories of *personal need satisfaction* may be helpful. According to Maslow (1943), Doyal and Gough (1991), and others (Bowlby 1969; Lindenberg and Frey 1993; WHO 2008), some fundamental, widely prevalent personal needs cannot be met without a continued exchange of individuals with their proximal social environment. Beyond biological reproduction and social affiliation, these needs include the development and reinforcement of personal autonomy through goal-oriented activities of an agentic self and an associated striving for recognition and appreciation from significant others. Need satisfaction in terms of autonomy is experienced as self-efficacy (Bandura 1997), whereas need-satisfaction in terms of recognition is experienced as self-esteem (Pearlin 1989). In accordance with these theoretical assumptions, we expect that non-material rewards in unpaid socially productive activities are mainly experienced in terms of enhanced self-efficacy and self-esteem, although distinct motivations, such as altruism or sense of obligation may matter as well. The recurrent co-manifestation of these two types of personal benefit resulting from providers' productive activity, i.e. feelings of mastery and personal control and feelings of appreciation and self-worth, exerts positive effects on health and wellbeing as these feelings are paralleled by neuroendocrine and immune responses that preserve and protect health and that activate reward-sensitive structures in the brain (Henry and Stephens 1977; Rolls 1999). Conversely, being confined to provide productive activities which offer little or no experience of autonomy/personal control, and which prevent the experience of reward/recognition due to failed reciprocity result in the providers' poor wellbeing.

In consequence, our *hypothesis* maintains that experienced reciprocity in socially productive activities is associated with enhanced wellbeing and mental health, whereas a reverse effect is expected in cases where providers' exchange expectancies are not met. This hypothesis has been tested in several studies addressing voluntary work, caring and informal help, as demonstrated in the next section.

12.2.2 Voluntary Work, Caregiving, and Informal Help

A large European study, the Survey of Health, Ageing and Retirement in Europe (SHARE) (Börsch-Supan et al. 2013), offered an excellent opportunity of testing this hypothesis among people in early old age. Among these *older people*, the socio-emotional consequences of *socially productive activities* may be particularly relevant, because options of agency, control and reward resulting from core social roles, such as the work role, are becoming less frequent and less pronounced. If this *loss* is *replaced (or compensated)* by some *non-economic productive activity*, the socio-emotional consequences may be preserved to some extent.

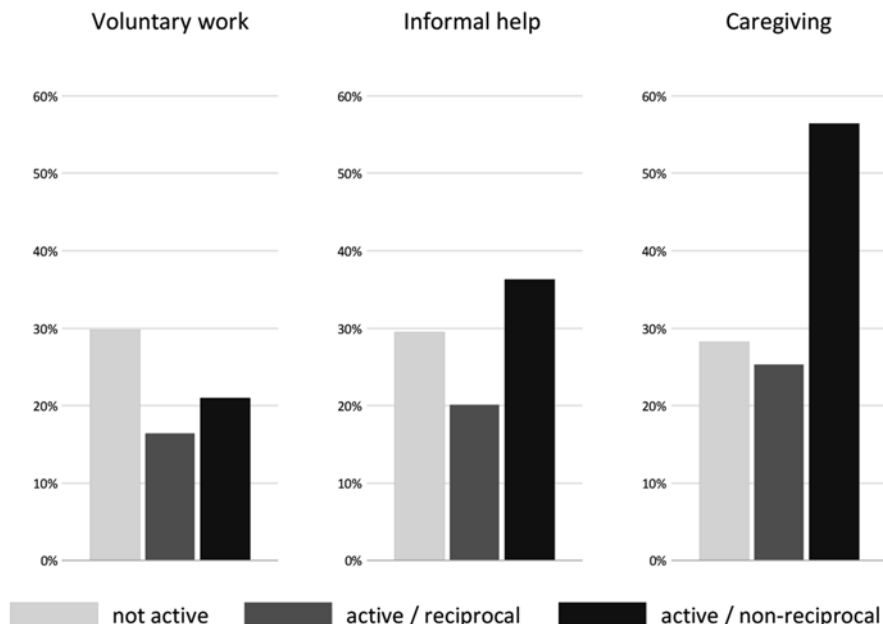


Fig. 12.1 Percentage of persons with high depressive symptoms by participation in three socially productive activities and their quality (Based on SHARE wave 2, n=33,210, own calculations)

As part of the first wave of data collection in SHARE (conducted 2004 in ten European countries) more than 22,000 participants aged 50 and older were asked about their participation in these three activities. Importantly, in addition to information about whether or not people participated in each one of these activities, the *quality of the engagement* in terms of *experienced reciprocity* was assessed. Several findings are worth noting from this study (Wahrendorf et al. 2006). First, results show that in a majority of cases, being socially productive is characterized by experienced reciprocity of exchange, whereas failed reciprocity is still experienced by a sizeable minority of providers. Second, with the exception of caregiving, mean level of wellbeing is higher among those who are socially productive than among those who are not engaged. However, in case of volunteering and informal help, only those who felt rewarded exhibited significantly higher levels of wellbeing (in terms of quality of life or absence of depressive symptoms (as measured by the CESD scale) compared to those who were not active.

Similar findings were observed in a replication study based on cross-sectional data from the second wave of SHARE, collected in 2006. Figure 12.1 demonstrates that the prevalence of depressive symptoms (assessed by the EURO-D scale in this wave) is higher among those who are not engaged in a socially productive activity than those who are engaged while being rewarded for their activity (i.e. the majority). However, the minority of older men and women whose engagement is not

reciprocated (black columns) suffer from depressive symptoms more often than the majority. This difference is particularly striking in case of caregiving.

Concordant results were found on the basis of longitudinal data from the first two waves of SHARE, where participation in the three activities was associated with changes in quality of life over time (Siegrist and Wahrendorf 2009). Here we observed that participants with reciprocated engagement in volunteering and informal help at baseline exhibited significant improvements in their quality of life at follow up, after adjusting for the effects of baseline quality of life. A replication of main findings of SHARE was conducted in the frame of another study on ageing, the English Longitudinal Study of Ageing (ELSA), using cross-sectional (McMunn et al. 2009) and longitudinal data (Zaninotto et al. 2013). In both instances analyses focussed on voluntary work and caregiving in relation to different measures of well-being. In the case of cross-sectional analysis, those who felt adequately rewarded for volunteering or caregiving had better wellbeing (in terms of quality of life, life satisfaction and low depressive symptoms) than those who were not participating, while those who did not feel rewarded did not differ from non-participants. Similar results were also found in the longitudinal analysis. As this latter analysis was conducted for men and women separately, the study also revealed that longitudinal associations may differ between men and women. For example, in this study experienced non-reciprocity in caring was linked to lower prospective well-being among men, but not among women, thus pointing to gender-role differences in coping with failed reciprocity in caregiving.

In sum, the studies exploring socially productive activities among older persons and their association with wellbeing enrich the current state of the art in this field in at least two important ways. First, they demonstrate that the model of effort-reward imbalance contributes to an elucidation of the pathways linking socially productive activities with health and well-being, specifically by focusing on the *socio-emotional benefits resulting from reciprocated engagement*. Second, by distinguishing between three types of productive activities and the level of reciprocity, the studies underlined that some activities (in particular caregiving) are more likely to be stressful due to an increased probability of experiencing a continued unrewarding social exchange. In this latter case, interventions may be needed to strengthen the experience of recognition and reward.

12.3 Close Social Relationships

Close social relationships in marriage, partnership, friendship, and between parents and their children are characterised by a distinct quality and intensity of emotional exchange, trust, and cooperative engagement. Weighing ‘costs’ against ‘gains’, a dominant principle of rational choice in economic life, has no major role in these types of exchange that are defined by affection, appreciation, and altruism. Yet, as far as these relationships are manifest as social roles with mutual obligations in daily life, lack of symmetry between ‘give’ and ‘take’ in dyadic relationships may

matter as well. It is therefore of interest to explore *non-symmetric dyadic exchange* in the social roles of *marital couples or partners*, of *parents and their children*, and eventually of further *trusting relationships*.

Again, as mentioned before, there is no external party to exert control over demands or to reward accomplished tasks, and the informal, private nature of exchange prevents public visibility and social comparability of these types of exchange. Despite these limitations subjective experiences of unfair, unbalanced exchange, of recurrent disappointment, or even of severe life events, such as broken promise, deception, or unfaithful behaviour, may exert sustained negative emotions and stress responses among disadvantaged partners. In an attempt to grasp some of this perceived unbalanced exchange the measurement approach of the original ERI model was modified to be applicable to these types of dyadic exchange. In more detail, a questionnaire representing a three-factorial structure was developed, based on eight Likert-scaled items. A first scale, composed by three items, relates to marital or partnership life, a second scale measures some aspects of exchange between parents and children (three items), and a third scale addresses severe relational life events in other, non-specified close social relationships (two items). This questionnaire was included in four different studies, and a fifth investigation applied an even shorter version of this questionnaire. Main findings of these studies are summarized in the following sections.

It is important to mention that former social epidemiological research on close social relationships has largely focused on the concept of social support (Berkman and Glass 2000). Is lack of reciprocal exchange adequately represented in established measures of negative social support? If so, any additional measurement development would seem useless. To answer this question, studies linking reciprocity in close social relationships with health and wellbeing included validated instruments of social support as confounding factors. In three studies, a scale assessing the availability of a close confidant and the perceived adequacy of received emotional support was applied (Seeman and Berkman 1988), and in one study, negative social support was measured by four items from the Close Person's Questionnaire (Stansfeld and Marmot 1992).

12.3.1 Associations with Depressive Symptoms

Given their less pervasive, less intense nature of demanding efforts, compared to those related to paid work, efforts spent in close relationships are commonly expected to activate the organism's stress axes less extensively than is the case in employment contracts, perhaps with the exception of a heavy burden of homemaking and family work. As a consequence, a limited amount of 'wear and tear' of the organism's peripheral physiological systems may occur, and the 'allostatic load' resulting from continued stress in these systems is assumed to result in less severe impact on end organ damage, such as coronary artery disease or metabolic disease (McEwen 1998). Rather, social reward deficiency in close social relationships is

expected to affect brain reward circuits with direct impact on mood, energy, and functioning. Therefore, as depressive symptoms and impaired cognitive, emotional and interpersonal functioning are expected to result from these negative experiences, *indicators of reduced mental health* have been selected as health outcomes in respective studies.

The first investigation studying associations of failed reciprocity in close relationships was conducted in two elderly samples of men and women in Germany and in the United States of America (Knesebeck and Siegrist 2003). One aim of this study was to test the newly developed questionnaire by confirming its three-factorial structure in the two samples of several hundred German and American participants. As a second aim, associations of effort-reward imbalance in these relationships with depressive symptoms were analysed in a cross-sectional design. It turned out that significantly elevated levels of depressive symptoms were observed in almost all analyses, after taking into account gender, age, socioeconomic position, and negative social support.

Whether this result obtained from old age samples can be generalized to adults in midlife was subsequently explored in two investigations in Germany, a cross-sectional survey of employees of a public transport company (Knesebeck and Siegrist 2004), and the baseline survey of a large cohort study on cardiovascular health in urban populations (Knesebeck et al. 2009). Both studies replicated the three-factorial structure of the questionnaire and found significant associations with *elevated risks of depressive symptoms* with regard to *partnership and severe disappointment in other close relationships*, but less consistent results with regard to children. Interestingly, in gender-stratified analyses, the associations with failed reciprocity in partnership were much stronger in women than in men. Again, all findings persisted after adjusting for the confounders mentioned, including negative social support and negative affectivity.

12.3.2 Associations with Other Health Indicators

Two further studies tested this hypothesis with additional indicators of reduced health, the first one being the British Whitehall II study (Chandola et al. 2007) and the second one the French Gazel study (Wahrendorf et al. 2010). In phase 7 of the longitudinal British study on civil servants (2002–2004), the three scales measuring reciprocal exchange in close relationships were applied together with a set of self-reported health measures. These latter were defined as physical and mental functioning, sleep disturbances, self-rated health, depressive symptoms, and angina pectoris. Data on age, sex, socioeconomic position, social network, negative social support, prior health, and health-damaging behaviours were included in multivariable analyses as confounding factors. In final analyses, associations with indicators of mental health and sleep disturbance were more consistent than with the remaining health indicators. It also turned out that non-reciprocal exchange and negative

social support were moderately correlated, suggesting that part of the former association was mediated by negative social support (Chandola et al. 2007).

Mental and physical health functioning and self-rated health were also selected as indicators in analyses performed in the frame of a further cohort study, the French Gazel study. For the first time, the hypothesis of an association of perceived reciprocity in social exchange with health functioning was tested in a prospective study design as data on social relationships were collected in 2005 and data on health 2 years later, adjusting for self-rated health in 2005 (Wahrendorf et al. 2010). In this investigation, a short version of the questionnaire was applied, measuring reciprocity in participants' main activity, in partnership, and in other close social relationships with five Likert-scaled items. The Gazel cohort consists of a large sample of employees of the French National Electricity and Gas Company followed since 1989 (Goldberg et al. 2007). In 2005, a majority of the 8679 men and 2742 women participating in this study were retired. The frequencies of reported non-reciprocal exchange in respondents' main activity, in partnership and in other trusting relationships were 31,2 %, 18,5 %, and 26,8 % respectively, with a higher prevalence among women and among people with lower socioeconomic positions. After adjusting for age, sex, socioeconomic position and self-rated health at baseline significant effects of all three types of non-reciprocal exchange on mental functioning and self-rated health were observed, with no noticeable differences between men and women. Associations with physical functioning were somewhat less strong and less consistent (Wahrendorf et al. 2010). Despite some limitations the findings of this study support the notion that perceived non-reciprocity in three different types of social exchange in early old age goes along with prospectively observed reduced mental health functioning and self-reported health.

In summarizing the results of all five studies conducted so far, we can conclude that *balanced exchange between efforts and rewards in cooperative close social relationships is important for mental health and wellbeing*. So far, this aspect of social exchange has not been elucidated to a sufficient extent in mainstream research on social support and social networks. This conclusion results from the observation that significant associations of non-reciprocity with health were maintained in multivariate analyses after controlling for measures of social support. The consistency of findings across different age groups and populations from four different countries is remarkable in view of the modest operational measurement of quality of exchange in close social relationships, as well as in view of the inclusion of a comprehensive set of confounding factors. Therefore, this line of research offers opportunities for more in-depth exploration in future analyses.

12.4 Perceived Non-reciprocity in School Work

A most recent extension of the theoretical model of effort-reward imbalance concerns school work. Several studies documented unfavourable effects of adverse material and psychosocial school environments on the performance and wellbeing

of children and adolescents in both Western and Asian countries (Torsheim and Wold 2001; Verma et al. 2002). Despite obvious differences between school and work settings it is of interest to explore to what extent work-related models of an adverse psychosocial environment can be applied to the school context. One such extension was conducted with the demand-control model in a cross-sectional study in Sweden (Gådin and Hammarström 2000). In 2010, a first test based on the ERI model was conducted in a sample of several hundred male and female adolescents (mean age 15,8 years) in the Chinese city of Kunming (Li et al. 2010).

To this end, the original questionnaire was adapted to the school setting where 5 items measured 'effort', 11 items assessed 'reward', and 3 items represented the intrinsic component 'over-commitment'. Scales means were computed, and sex- and grade level-differences were explored. Item-total correlations and Cronbach's alpha were calculated, and the factorial structure of the questionnaire was analysed, using exploratory and confirmatory factor analysis with calculation of goodness of fit indices. The psychometric properties of these scales were satisfactory rather than excellent, but were confirmed in an independent larger sample (Guo et al. 2014). In this first study it was of interest to demonstrate *associations of a perceived imbalance* between efforts spent and recognition or esteem received from significant others (teachers, school mates) *with a measure of self-reported health*. Although vulnerable to common method variance, the findings revealed strong associations with poor self-rated health, more so among girls than boys, and more so in high school than in middle school. Effects persisted after controlling for age, grade level, health behaviours and family wealth.

In a second publication based on the same sample associations of a stressful psychosocial school environment, as measured by this questionnaire, with the frequency of suicidal ideation were analysed (Shang et al. 2014). It was assumed that recurrent experience of failed reciprocity at school may impair the students' self-esteem, thus rendering them more susceptible to thoughts of engaging in suicide – related behaviour. Studying this question in a Chinese school population is of special interest as China turned out to be one of the countries with highest levels of pressure and competition with regard to academic success (Sun et al. 2012). This is not surprising given the high expectations raised about their children's academic success by parents in the context of a national one-child policy. In this survey, about 11% of adolescents reported that they thought about suicide every month or more often during the last 6 months. *Odds ratios of suicidal ideation* were significantly *elevated among those reporting high effort or low reward at school*, and were highest among those suffering from the imbalance, as measured by the effort-reward ratio (Shang et al. 2014).

Social inequalities in health are not only a major challenge in adult life, but also among adolescents (Viner et al. 2015). In an even larger survey of Chinese adolescents conducted in the city of Zhengzhou Guo et al. analysed a moderating role of family socioeconomic position (SEP) in associations between a stressful psychosocial school environment and depressive symptoms (Guo et al. 2014). The main finding of this study is illustrated in Fig. 12.2. A significant interaction term was observed between school-related stress and family SEP. When joint effects of

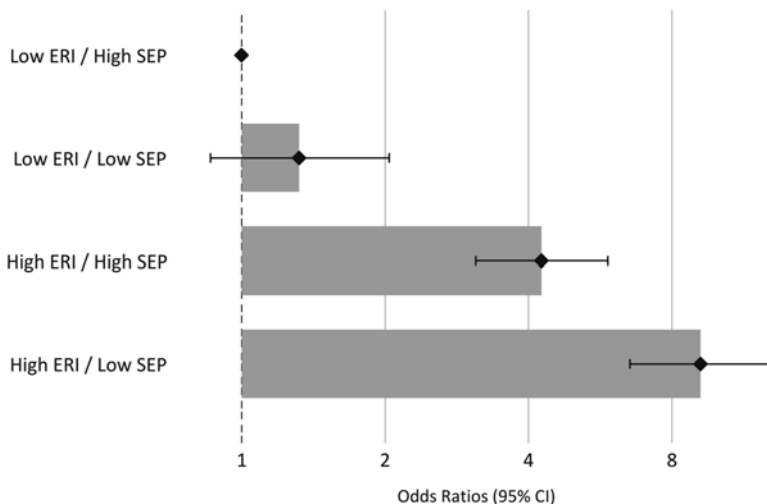


Fig. 12.2 Associations of school-related stress and family SEP with depressive symptoms. ORs and 95% CIs, adjusted for age, sex, educational grade and health behaviour, $n = 1774$ (Based on (Guo et al. 2014), own visualization)

school-related stress and family SEP on depressive symptoms were estimated the odds of experiencing depressive symptoms in the most disadvantaged group (high school stress and low SEP) were about nine times as high as the odds of the most privileged group (no school stress, high SEP).

The finding that associations of school-related stress in terms of the ERI model were particularly strong among disadvantaged adolescents in this large urban sample of Chinese students deserves further consideration. It is likely that parents in socioeconomic disadvantaged circumstances are less capable of providing the material and psychosocial means for their children to develop efficacious resources of coping with challenges and threats at school, thus rendering them more vulnerable towards developing depressive symptoms. If the notion of a social gradient of reduced mental health in adolescents within a rapidly developing country of considerable global significance is further supported preventive efforts of strengthening mental health at school should be developed, directed primarily towards socioeconomic disadvantaged groups.

In summary, preliminary evidence demonstrates that the ERI model is successfully applied among adolescents in the context of school work and is associated with relevant indicators of mental health. Meanwhile, applications in other countries were conducted as well (Laftman et al. 2015; Fukuda et al. 2010). More recently, an attempt was made to measure effort-reward imbalance among university students, and psychometric properties of a respective questionnaire were analysed in a sample of first year medical students in Germany.

12.5 Concluding Remarks

In this chapter, we described possible quality criteria of a theoretical model and explored one of the criteria, parsimony. According to this criterion the strength of a theory is contingent on the breath of explanations or predictions derived from a minimal set of statements. We observed that the same small set of hypotheses that predicted work-related stress and disorders are associated with poor health in non-economic productive activities, in costly transactions occurring in close social relationships, and in effortful school work. While this evidence supports the generalization of the ERI model beyond paid work, some *limitations* become obvious as well.

First, the range of predicted health outcomes was more narrowly defined, bound to indicators of mental health and wellbeing. Moreover, few findings only are derived from prospective observational cohort studies, thus preventing the analysis of causal relationships, and additional experimental or naturalistic studies exploring potential pathways were not performed. A further limitation concerns the measurement of the model's components. For instance, reciprocity in socially productive activities was assessed by a summary indicator rather than by a psychometrically validated questionnaire. Therefore comparisons across studies are limited, and the full set of hypotheses could not be tested in all cases. Yet, the fact that the proposed extension of a theoretical model was supported by significant associations with reduced mental health in almost all cases is considered a particular strength. Furthermore, results were obtained from populations representing different age groups, including the periods of adolescence, midlife, and early old age. Finally, rather than being derived from a sample of respondents recruited from one country, the findings resulted from a variety of socio-cultural contexts in different parts of the world (USA, China, and various European countries).

Social inequalities in health and wellbeing define a cross-cutting issue of concern that has only partly been analysed in these non-economic transactions. However, in case of volunteering, we observed a social gradient of participation, with higher frequency among people in more privileged socioeconomic positions. Quality of life was significantly worse among those with lower educations and income, in addition to the adverse effect resulting from perceived non-reciprocity when performing voluntary work (Siegrist and Wahrendorf 2009). Similarly, perceived effort-reward imbalance at school was more frequent among adolescents with disadvantaged socioeconomic background in China, and associations with depressive symptoms were particularly strong in this group. As a consequence, the findings reported in this chapter call for distinct policy interventions. These implications will be discussed in the three final chapters of this book.

References

- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Berkman, L. F., & Glass, T. A. (2000). Social integration, social networks, social support, and health. In L. F. Berkman & I. Kawachi (Eds.), *Social epidemiology* (pp. 137–173). Oxford: University Press.
- Börsch-Supan, A., Brandt, M., Hunkler, C., Kneip, T., Korbmacher, J., Malter, F., Schaan, B., Stuck, S., Zuber, S., & SHARE Central Coordination Team. (2013). Data resource profile: The survey of health, ageing and retirement in Europe (SHARE). *International Journal of Epidemiology*, 42(4), 992–1001. doi:[10.1093/ije/dyt088](https://doi.org/10.1093/ije/dyt088).
- Bowlby, J. (1969). *Attachment and loss*. London: Hogarth P.
- Bradford Hill, A. (1965). The environment and disease: Association or causation? *Proceedings of the Royal Society of Medicine*, 58, 295–300.
- Chandola, T., Marmot, M., & Siegrist, J. (2007). Failed reciprocity in close social relationships and health: Findings from the Whitehall II study. *Journal of Psychosomatic Research*, 63(4), 403–411.
- Cosmides, L., & Tooby, J. (1992). Cognitive adaptation for social exchange. In J. H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture* (pp. 163–228). New York: Oxford University Press.
- Doyal, L., & Gough, I. (1991). *A theory of human need*. Basingstoke: Palgrave Macmillan.
- Fehr, E., & Fischbacher, U. (2003). The nature of human altruism. *Nature*, 425(6960), 785–791.
- Fehr, E., & Gächter, S. (2000). Fairness and retaliation: The economics of reciprocity. *Journal of Economic Perspectives*, 14(3), 159–181.
- Fukuda, S., Yamano, E., Joudoi, T., Mizuno, K., Tanaka, M., Kawatani, J., Takano, M., Tomoda, A., Imai-Matsumura, K., Miike, T., & Watanabe, Y. (2010). Effort-reward imbalance for learning is associated with fatigue in school children. *Behavioral Medicine*, 36(2), 53–62. doi:[10.1080/08964281003774919](https://doi.org/10.1080/08964281003774919).
- Gådin, K. G., & Hammarström, A. (2000). School-related health – A cross-sectional study among young boys and girls. *International Journal of Health Services*, 30(4), 797–820.
- Goldberg, M., Leclerc, A., Bonenfant, S., Chastang, J. F., Schmaus, A., Kaniewski, N., & Zins, M. (2007). Cohort profile: The GAZEL cohort study. *International Journal of Epidemiology*, 36(1), 32–39.
- Gouldner, A. W. (1960). The norm of reciprocity: A preliminary statement. *American Sociological Review*, 25(2), 161–178.
- Guo, H. X., Yang, W. J., Cao, Y., Li, J., & Siegrist, J. (2014). Effort-reward imbalance at school and depressive symptoms in Chinese adolescents: The role of family socioeconomic status. *International Journal of Environmental Research and Public Health*, 11(6), 6085–6098. doi:[10.3390/ijerph110606085](https://doi.org/10.3390/ijerph110606085).
- Hamilton, W. D. (1964). The genetical evolution of social behaviour. I. *Journal of Theoretical Biology*, 7(1), 1–16. doi:[http://dx.doi.org/10.1016/0022-5193\(64\)90038-4](http://dx.doi.org/10.1016/0022-5193(64)90038-4).
- Henry, J. P., & Stephens, P. M. (1977). *Stress, health, and the social environment: A sociobiologic approach to medicine*. New York: Springer.
- Hoggan, B. L., & Dollard, M. F. (2007). Effort–reward imbalance at work and driving anger in an Australian community sample: Is there a link between work stress and road rage? *Accident Analysis & Prevention*, 39(6), 1286–1295. doi:<http://dx.doi.org/10.1016/j.aap.2007.03.014>
- Knesebeck, O., & Siegrist, J. (2003). Reported nonreciprocity of social exchange and depressive symptoms. Extending the model of effort-reward imbalance beyond work. *Journal of Psychosomatic Research*, 55(3), 209–214.
- Knesebeck, O., & Siegrist, J. (2004). Mangelnde Reziprozität in engen sozialen Beziehungen, Depressivität und eingeschränkte subjektive Gesundheit. *Social and Preventive Medicine*, 49(5), 336–343.

- Knesebeck, O. v. d., Dragano, N., Moebus, S., K. H., J., Erbel, R., & Siegrist, J. (2009). Psychosoziale Belastungen in sozialen Beziehungen und gesundheitliche Einschränkungen. *Psychotherapie, Psychosomatik, Medizinische Psychologie*, 59(5), 186–193.
- Laftman, S. B., Modin, B., Ostberg, V., Hoven, H., & Plenty, S. (2015). Effort-reward imbalance in the school setting: Associations with somatic pain and self-rated health. *Scandinavian Journal of Public Health*, 43(2), 123–129. doi:10.1177/1403494814561818.
- Li, J., Shang, L., Wang, T., & Siegrist, J. (2010). Measuring effort-reward imbalance in school settings: A novel approach and its association with self-rated health. *Journal of Epidemiology*, 20(2), 111–118. doi:10.2188/jea.JE20090057.
- Lindenberg, S., & Frey, B. S. (1993). Alternatives, frames, and relative prices – A broader view of rational choice theory. *Acta Sociologica*, 36(3), 191–205.
- Martinson, B. C., Anderson, M. S., Crain, A. L., & De Vries, R. (2006). Scientists' perceptions of organizational justice and self-reported misbehaviors. *Journal of Empirical Research on Human Research Ethics: JERHRE*, 1(1), 51–66. doi:10.1525/jer.2006.1.1.51.
- Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*, 50(4), 370–396. doi:10.1037/h0054346.
- McEwen, B. S. (1998). Protective and damaging effects of stress mediators. *The New England Journal of Medicine*, 338(3), 171–179. doi:10.1056/NEJM199801153380307.
- McMunn, A., Nazroo, J., Wahrendorf, M., Breeze, E., & Zaninotto, P. (2009). Participation in socially-productive activities, reciprocity and wellbeing in later life: Baseline results in England. *Ageing & Society*, 29, 765–782. doi:10.1017/S0144686x08008350.
- Pearlin, L. I. (1989). The sociological-study of stress. *Journal of Health and Social Behavior*, 30(3), 241–256. doi:10.2307/2136956.
- Peter, R., & Siegrist, J. (1997). Chronic work stress, sickness absence, and hypertension in middle managers: General or specific sociological explanations? *Social Science & Medicine*, 45(7), 1111–1120. doi:10.1016/S0277-9536(97)00039-7.
- Popper, K. (1959). *The logic of scientific discovery*. London: Hutchinson & Co.
- Rolls, E. T. (1999). *The brain and emotion*. Oxford: Oxford University Press.
- Seeman, T. E., & Berkman, L. F. (1988). Structural characteristics of social networks and their relationship with social support in the elderly: Who provides support. *Social Science & Medicine*, 26(7), 737–749.
- Shang, L., Li, J., Li, Y., Wang, T., & Siegrist, J. (2014). Stressful psychosocial school environment and suicidal ideation in Chinese adolescents. *Social Psychiatry and Psychiatric Epidemiology*, 49(2), 205–210. doi:10.1007/s00127-013-0728-5.
- Siegrist, J. (1998). Reciprocity in basic social exchange and health: Can we reconcile person-based with population-based psychosomatic research? *Journal of Psychosomatic Research*, 45(2), 99–105.
- Siegrist, J., & Wahrendorf, M. (2009). Participation in socially productive activities and quality of life in early old age: Findings from SHARE. *Journal of European Social Policy*, 19(4), 317–326. doi:10.1177/1350506809341513.
- Siegrist, J., & Wahrendorf, M. (2010). Socioeconomic and psychosocial determinants of well being in early old age. In A. L. Bovenberg, A. Soest, & M. A. Zaidi (Eds.), *Aging, health and pensions in Europe: An economic and social policy perspective* (pp. 107–133). Basingstoke: Palgrave Macmillan.
- Siegrist, J., von dem Knesebeck, O., & Pollack, C. E. (2004). Social productivity and well-being of older people: A sociological exploration. *Social Theory & Health*, 2(1), 1–17.
- Sperlich, S., Peter, R., & Geyer, S. (2012). Applying the effort-reward imbalance model to household and family work: A population-based study of German mothers. *BMC Public Health*, 12, 12. doi:10.1186/1471-2458-12-12.
- Sperlich, S., Arnold-Kerri, S., Siegrist, J., & Geyer, S. (2013). The mismatch between high effort and low reward in household and family work predicts impaired health among mothers. *European Journal of Public Health*, 23(5), 893–898. doi:10.1093/eurpub/cks134.

- Stansfeld, S., & Marmot, M. (1992). Deriving a survey measure of social support – The reliability and validity of the close persons questionnaire. *Social Science & Medicine*, *35*(8), 1027–1035. doi:[10.1016/0277-9536\(92\)90242-I](https://doi.org/10.1016/0277-9536(92)90242-I).
- Sun, P., Unger, J. B., Palmer, P., Ma, H. Y., Xie, B., Sussman, S., & Johnson, C. A. (2012). Relative income inequality and selected health outcomes in urban Chinese youth. *Social Science & Medicine*, *74*(1), 84–91. doi:[10.1016/j.socscimed.2011.10.010](https://doi.org/10.1016/j.socscimed.2011.10.010).
- Torsheim, T., & Wold, B. (2001). School-related stress, school support, and somatic complaints: A general population study. *Journal of Adolescent Research*, *16*(3), 293–303. doi:[10.1177/0743558401163003](https://doi.org/10.1177/0743558401163003).
- Trivers, R. L. (1971). The evolution of reciprocal altruism. *The Quarterly Review of Biology*, *46*(1), 35–57. doi:[10.2307/2822435](https://doi.org/10.2307/2822435).
- Verma, S., Sharma, D., & Larson, R. W. (2002). School stress in India: Effects on time and daily emotions. *International Journal of Behavioral Development*, *26*(6), 500–508. doi:[10.1080/01650250143000454](https://doi.org/10.1080/01650250143000454).
- Viner, R. M., Ross, D., Hardy, R., Kuh, D., Power, C., Johnson, A., Wellings, K., McCambridge, J., Cole, T. J., Kelly, Y., & Batty, G. D. (2015). Life course epidemiology: Recognising the importance of adolescence. *Journal of Epidemiology and Community Health*, *69*(8), 719–720. doi:[10.1136/jech-2014-205300](https://doi.org/10.1136/jech-2014-205300).
- Wahrendorf, M. (2009). *Soziale Produktivität und Gesundheit im höheren Lebensalter*. Berlin: Lit Verlag.
- Wahrendorf, M., Knesebeck, O., & Siegrist, J. (2006). Social productivity and well-being of older people: Baseline results from the SHARE study. *European Journal of Ageing*, *3*(2), 67–73.
- Wahrendorf, M., Ribet, C., Zins, M., & Siegrist, J. (2008). Social productivity and depressive symptoms in early old age – Results from the GAZEL study. *Ageing & Mental Health*, *12*(3), 310–316.
- Wahrendorf, M., Ribet, C., Zins, M., Goldberg, M., & Siegrist, J. (2010). Perceived reciprocity in social exchange and health functioning in early old age: Prospective findings from the GAZEL study. *Ageing & Mental Health*, *14*(4), 425–432.
- Wahrendorf, M., Blane, D., Matthews, K., & Siegrist, J. (2015). Linking quality of work in midlife to volunteering during retirement: A European study. *Population Ageing*, *9*, 1–18. doi:[10.1007/s12062-015-9129-8](https://doi.org/10.1007/s12062-015-9129-8).
- WHO. (2008). *Closing the gap in a generation: Health equity through action on the social determinants of health*. Geneva: World health Organization.
- Zaninotto, P., Breeze, E., McMunn, A., & Nazroo, J. (2013). Socially productive activities, reciprocity and well-being in early old age: Gender-specific results from the english longitudinal study of ageing (ELSA). *Population Ageing*, *6*(1–2), 47–57. doi:[10.1007/s12062-012-9079-3](https://doi.org/10.1007/s12062-012-9079-3).