The Model of Effort-Reward Imbalance at Work


Purpose

Siegrist’s model attributes chronic work stress, and consequent morbidity, to an imbalance between the amount of effort a person devotes to their work and the rewards they receive. This may be modified by personal dispositions, such as over-commitment to work.

Conceptual Basis

Whereas Karasek’s earlier model of work strain focused on the external work characteristics of demands and the worker’s level of control over them, Siegrist shifted the focus to the personal factors of effort and reward: a type of cost-benefit formulation. Siegrist approached effort at work as an exchange: the individual provides effort while society grants rewards in terms of money, esteem and status control (1, Figure 1). A perception of imbalance arises when a high effort is not matched by commensurate rewards, and this “effort-reward imbalance” (ERI) causes emotional distress, autonomic arousal and strain reactions (1, p30).

Exerting high effort in a job is driven by a combination of the extrinsic demands and obligations of the job, plus the worker’s intrinsic motivation to succeed in a demanding situation (1). Extrinsic circumstances, such as the state of the economy and resulting job insecurity, may stimulate a person to work hard despite low rewards: people may accept low wages if they have no choice; this reflects a low level of “occupational status control” (1, p31). Intrinsic motivation includes a desire to succeed, the enjoyment of rising to a challenge; less positively it may also include over-commitment, in which people underestimate work demands and over-estimate their capacities (2). Here, Siegrist refers both to Lazarus’s theory of cognitive coping, and also to a more direct affective processing of the strain response. The negative emotions of job strain result in part from a multistage appraisal of the perceived stress, balanced against the person’s assessment of their ability to cope with it, and in part more directly via unconscious pathways (1, p31).

The notion of status control refers to a sense of being in control of one’s social standing, and is linked to internal feelings of mastery, self-efficacy and esteem. Various job characteristics may lead to low status control: job insecurity, changes that are made contrary to the wishes of the employee, low prospects for promotion, or when the worker is under-qualified for their job. Low status control threatens the worker’s trust in being rewarded for his effort, leading to the sense of unfairness termed ‘imbalance’ and to feelings of stress. Compared to Karasek’s model of job control, Siegrist argues that low status control is more stressful because it represents a fundamental psychic threat. It also captures situations in which a person may have some control over their work (which he terms ‘task control’) and yet, if this concerns a short-term position, the instability produces low status control. Jobs
that require high effort for low gain commonly coincide with low levels of occupational status control.

**Description**

Siegrist’s original model considered structural characteristics of work hypothesized to lead to an imbalance between efforts and rewards received. The efforts included work obligations and physical demands of the job; rewards included financial compensation, personal and social recognition, and other forms of personal satisfaction (1, Figure 1). A lack of balance between these typically occurs when market conditions create job instability or forced occupational change, and may lead to chronic stress. More recent presentations of the model have added intrinsic personal characteristics and coping strategies that act as effect modifiers. After considering a range of coping styles, by 2004 Siegrist narrowed his focus to over-commitment to work. Thus, ERI may be felt more strongly by people who are over-committed. Such people tend to underestimate work demands and to exaggerate their ability to cope; this profile of perceptions may form a risk factor on its own, even in the absence of structural imbalance at work (3, p1485). Hence, the final model predicts job stress in terms of effort-reward imbalance and of over-commitment; generally presented separately.

**Measurement.** Information is collected via a questionnaire for the worker, supplemented by contextual information on extrinsic effort factors collected via objective measurements and from administrative sources. The standard ERI questionnaire comprises three components. Effort is recorded by five or six items (the sixth covers physical demands of the job, which is not included for white-collar positions); reward is measured by 11 items (five on esteem, four on job promotion and salary, and two on job security); and six items cover over-commitment (see Siegrist et al. (3, p1496). The effort and reward items use the following response scale: (1) the item does not apply; (2) it applies but causes no distress; (3) it causes some distress; (4) the subject considers him- or herself distressed by this item, and (5) it causes great distress. These responses are summed for each scale, and the ERI ratio is calculated using the same weighting for effort and reward:

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\text{Effort} = \frac{\text{Reward} \times \text{correction factor}}{\text{Effort}}
\]

The correction factor compensates for the differing number of items in the two scales it is 0.4545 when the five-item effort scale is used (3, p1487). The result can be presented as a categorical score (values above or below 1.0), or as a continuous score. The continuous score may be logarithmically transformed which means that the range of scores above and below 1.0 become equivalent (2; 4).

The coping score was initially derived from an extended scale that covered the need for control, need for approval, competitiveness, latent hostility, impatience, and inability to withdraw from work obligations (3; 5). Empirical studies found that these loaded on a single factor and could be simplified into a six-item measure of over-commitment to work (3, p1488). This includes items such as “As soon as I get up in the morning I start thinking about work problems”, and “People close to me say that I sacrifice too much for my job.” These are scored on a four-point response scale, giving a range from 6 to 24; this scale is often divided into the upper third of the distribution versus the rest (3).
The questionnaire is available in many translations; analyses of data sets from five European countries confirmed the existence of a single factor underlying each of the three scales; alpha values ranged from 0.68 to 0.79 for the effort scale; from 0.79 to 0.86 for reward, and from 0.73 to 0.82 for over-commitment (3, Table 3).

Validity

Cardiovascular outcomes. In a six-year prospective study of 416 male blue-collar employees, Siegrist recorded incident circulatory disease (sudden cardiac deaths, myocardial infarctions, strokes and other forms of coronary artery disease). After adjustment for age, sex, smoking, blood pressure and cholesterol levels, odds ratios for the effort-reward imbalance score ranged from 6.2 to 8.2 for predicting these various outcomes (1, Table 1). The imbalance score proved a stronger predictor than any of the components alone, although some results varied by occupational category: high effort with low reward predicted hypertension with an odds ratio of 3.3 for blue collar workers, and 6.8 for middle managers (1, Table 2). Using the data from the study of middle managers, Siegrist reported a reduced cardiovascular reactivity to a mental challenge test among those who scored highly on the high effort but low reward scale (2520, p37).

Siegrist has also summarized indirect evidence for the model, drawn from studies that did not formally test his model, but that did include indicators of effort and of job insecurity. Shipyard workers under threat of job loss showed elevated lipid levels; bank clerks who were working hard to retain their jobs experiences more heart disease (1, p37).

Bosma et al. reported a head-to-head comparison of the predictive validity of the effort-reward imbalance model with Karasek’s job strain model using the Whitehall II cohort (6). The effort-reward imbalance model showed the stronger association with cardiovascular disease (whether angina or diagnosed ischemia): odds ratios ranged from 2.6 to 3.6 for different outcomes among men and women, compared to ORs ranging from 1.0 to 1.9 for the job control component of the Karasek model. Both models appeared to provide independent predictive ability (6, Table 4). Bosma et al. noted that “more specifically, competitive, hostile, and overcommitted subjects experiencing poor promotion prospects and blocked careers had the highest risks.” (6, p71).

Self-reported health. A French study of a cohort of 10,175 employees undertook both cross-sectional and one-year prospective analyses using a single-item self-report health measure as the outcome (2). In the cross-sectional analysis, effort-reward imbalance yielded statistically significant odds ratios of 2.6 (men) and 2.8 (women). Adjustment for a wide range of demographic, behavioral factors and chronic health conditions reduced these to 1.8 and 1.9, suggesting that the effect of imbalance is partially mediated by these conventional risk factors (2, Table 3). However, the prospective analysis for the same cohort failed to showed a significant association between imbalance and self-rated health, although there was an association between high over-commitment and health, for males (2, Table 4). The authors commented that reverse causality may have underlain this pattern of findings; they also suggested that over-commitment may act as an effect modifier (2, pp1538-39). A subsequent report replicates these findings for samples from the UK, Belgium and Germany. Odds ratios (apparently not adjusted for any other risk factors or health conditions) ranged from 16. to 3.5
for the effort-reward ratio, and from 1.5 to 3.5 for over-commitment; all were significant. There were no consistent contrasts in the results between the sexes (3, Table 4).

Other Outcomes. In the Whitehall II cohort, ERI predicted alcohol dependence in men, after adjustment for employment grade and common risk factors for alcohol consumption, measured at baseline. The association was only partially mediated by chronic illness, mental well-being and social support. For women, alcohol dependence was more common in higher occupational grades, so was only partially related to low decision latitude (7).

A three country study of depression in showed an association with ERI; depression increased by about 2 points on the Center for Epidemiologic Studies Depression scale for a one standard deviation increase in the log(ERI) (4, Table 3). The association was stronger among those experiencing material deprivation (p1479). By contrast, the association between depression and Karasek’s model of job control only held for Poland and the Czech Republic (not in Russia), and even then was no longer significant after controlling for education, deprivation or any of a range of other socio-demographic variables (Table 3). A cross-sectional Belgian study reported associations between ERI and depression (OR 2.1) and anxiety (OR 1.8). Over-commitment showed a stronger association: OR 3.5 for depression and 3.8 for anxiety (8, Table 4). The same study also reported significant associations between ERI and poor self-rated health and absences from work. Over-commitment was related to self-perceived health, but not to work absences (8, Table 5). This study also included the Karasek job control model, and for all of the associations the Siegrist model produced higher odds ratios than the Karasek.

Commentary

Siegrist’s model offers a broad-ranging conceptual approach to studying job strain; it blends psychological motivations with social circumstances and basic economic realities, and it can be applied to a wide variety of occupational situations. It extends, and appears to have superior predictive power than, Karasek’s job control model. As Kasl noted, it offers “a broader formulation than the context of occupational status can provide; it also addresses, in part, the health impact of the work role itself, not just the dimensions of the work environment.” (9, p51). Siegrist argued that it is better to ask about individual features of the work experience and then combine these to form an overall ERI rating (3, p1487). This approach avoids having the person make an overall judgment, which might produce a biased estimate based on conscious reasoning.

A number of limitations of the ERI model have been noted, some by Siegrist himself. First, the relative importance of extrinsic versus intrinsic effort, and the relative importance of the reward components, are not specified (although threats to status control are perceived as very important) (1, p38). Kasl commented on the clarity of the concepts: how does status control relate to the earlier concept of need for control? (9, p52). Second, there have been relatively few empirical tests of the model, mostly in industrial societies (although a study of blue-collar workers in China has been reported). Third, most of the studies have used cardiovascular disease as the end point, while the model was intended to be generally applicable. Fourth, Bosma’s analyses of the Whitehall data suggested that both Siegrist’s effort-reward imbalance and Karasek’s perceived job control may
provide independent predictions of cardiovascular disease. Hence, the effort-reward model might potentially be modified to include perceived job control (6, p72).

References.


