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## **A meta-analysis of the relationship between job satisfaction and employee health in Hong Kong**

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### **Summary**

*A meta-analysis was conducted of correlations between job satisfaction and measures of health for samples originating from Hong Kong. Using established procedures and a priori selection criteria, 22 samples were combined from published and unpublished sources, in a combined sample of 4492 workers from various industries and occupations. Results indicated relationships between job satisfaction and health for Hong Kong employees were high, and notably different from the larger sample in the HERMES study (Cass, Faragher, & Cooper, 2003). The moderator analysis revealed that samples comprising an approximately equal gender mix had larger correlations than samples of mostly women, or mostly men. Our comparison of studies with differential methodological rigour indicated that this had a minimal impact on combined effect size.*

### **Introduction**

In recent decades, the study of health at work has been increasingly concerned with the potential effect of employment practice and conditions on employee health. This research emphasis has resulted in a large and growing number of studies reporting relationships between work characteristics and employee health. The breadth of evidence was illustrated in the Health and Employment: A Review and Meta-Analysis (HERMES) study (Cass et al., 2003), in which over 500 studies were collated in a meta-analysis of the relationship between workplace characteristics and health. The studies included in the meta-analysis were conducted in various workplaces across a broad range of industries and countries. Low to moderate—sized relationships were found between a range of employee health measures and, job satisfaction, job control, job security, supervisor support and working hours.

Presented in this paper is a meta-analysis of the relationship between job satisfaction and health for the studies originating in Hong Kong. This analysis was undertaken for three main reasons.

Firstly, of the five workplace characteristics studied in the HERMES study, job satisfaction yielded the highest weighted average correlation with the health variables. This highlights job satisfaction as an important variable to consider in the field of workplace health (Furnham & Schaeffer, 1984). Secondly, Hong Kong has long been given attention as a country influenced by a unique combination of workplace practices and cultural norms (Aryee, Luk, Leung, & Lo, 1999). Indeed, Hong Kong is one of the only non-western countries to have had considerable research devoted to the prevalence and characteristics of stress in the workplace. The third reason is that, although these Hong Kong studies have explored health and job satisfaction in a wide range of organizations, occupations and industries, the majority utilized a small sample size and different samples to most studies. By combining the samples, the meta-analysis procedure yields a weighted average correlation which should estimate the true relationship between the dependent and independent variables with greater accuracy (Oswald & Johnson, 1998) due to reduced sampling error (Schmidt, 1992). Furthermore, compared to conventional reviews that use statistical significance vote counting, meta-analyses are more sensitive to findings of different magnitude across studies (Hunter & Schmidt, 1990).

The focus on job satisfaction and health outcomes within this study stems from the various models of stress in the workplace. These models are diverse, and often inconsistent (Edwards, 1992), however, they generally agree that stress is a complex process consisting of the dynamic interplay of many variables (Scheck, Kinicki, & Davy, 1995). The most dominant perspectives focus on sources of stress as they relate to indices of health and organizational outcomes and the moderators of this process (e.g. Karasek, Russell, & Theorell, 1982; Peter & Siegrist, 2000; see also Clark, Chandler & Barry, 1996; Scheck et al., 1995). Since job satisfaction is an integral part of most of these theories (Beehr, 2000; Edwards, Caplan, & Harrison, 2000), there is a considerable collection of research that links job satisfaction with various measures of health. However, before the relationship between these variables can be reviewed, it is important to give a working definition of both 'employee health' and 'job satisfaction'.

### **Employee health**

In 1948, the World Health Organization (see Cooper & Williams, 1994, p. 133) gave a broad definition of health as: '... complete physical, mental and social well-being and not merely the absence of disease'. According to Diener (1984), well-being refers to a person's subjective positive experience of life and is closely related to happiness, satisfaction, morale and positive affect. However, this broad definition of employee health does not necessarily reflect its measurement and use in empirical research. Three main types of measures of employee health and well-being are utilized in workplace stress research: mental health measures, physical health measures and measures comprising of a combination of the both. Mental ill-health is measured more specifically

using measures of general mental health (e.g. GHQ, Goldberg, 1972), anxiety (Warr, 1990), depression (CES-D: Radloff, 1977), emotional exhaustion (Maslach & Jackson, 1984) and self-esteem (Rosenberg, 1965). Physical health is generally measured with checklists of psychosomatic symptoms (Spector & Jex, 1991), musculo-skeletal pain (Kuorinka et al., 1987), and cardiovascular symptoms (Karasek et al., 1982).

### **Job satisfaction**

It is difficult to state an inclusive and conclusive definition of job satisfaction here, due to a range of conceptualizations of the construct in the literature. Some theorists view it as the broad positive emotional reactions and attitudes an individual has towards their job, brought about by a comparison between actual and desired or anticipated outcomes (Locke, 1978; Oshagbemi, 1999). Others have viewed it as a two-dimensional construct consisting of a 'satisfaction-lack of satisfaction' dimension and a 'dissatisfaction-lack of dissatisfaction' dimension (Winefield, Tiggemann, & Goldney, 1988); or as 'intrinsic satisfaction' and 'extrinsic satisfaction' dimensions (Warr, Cook, & Wall, 1979). More recently, the discussion has concerned whether job satisfaction is a global concept or composed of facets of satisfaction with various aspects of the job (Oshagbemi, 1999; Scarpello & Campbell, 1983; Wanous, Reichers, & Hudy, 1997). According to a recent study (Sousa-Poza & Sousa-Poza, 2000), the most likely workplace determinants of job satisfaction are whether the employee (1) finds the job interesting; (2) has good relationships with management; (3) has a high income (more important for males than females); (4) can work independently; (5) has good advancement opportunities and (6) good relations with colleagues.

In as much as the definition of job satisfaction is difficult to resolve, so too is determining the antecedents of job satisfaction. The most significant debate in this area concerns whether differences in job satisfaction can be attributed to individual or situational variables (Arvey, Carter, & Buerkley, 1991). Some researchers contend that job satisfaction is caused by personal variables such as cognitive processes (Judge & Locke, 1993), personality characteristics (Judge & Hulin, 1993), or even biological characteristics (Arvey et al., 1999). Others argue that situational factors such as skill variety and autonomy are chiefly responsible for job satisfaction (e.g. Elovainio, Kivimaeki, Steen, & Kalliomaeki-Levanto, 2000). There is much research that provides evidence to support both, however, it appears that when measured together, situation variables tend to account for more variance than personal variables in job satisfaction (Colarelli, Dean, & Konstans, 1987). This has led to a third line of research which measures the interaction effect of both situational and person variables on job satisfaction (Kulik, Oldham, & Hackman, 1987), and of the role of moderators in these relationships (Beehr, 2000).

In addition to being studied as a variable influenced by differences in personality and situational variables, job satisfaction has been studied as a potential antecedent of worker health (Kavanagh,

Hurst & Rose, 1981; Williams, Pruitt, Doctor, et al., 1998) and other organizational outcomes such as absenteeism (Ulleberg, & Rundmo, 1997), life satisfaction (Judge & Watanabe, 1993), performance (Petty, McGee & Cavender, 1984), turnover intent (Hellman, 1997; Tett & Meyer, 1993; Lang, Wittig-Berman, & Rizkalla, 1992), and counterproductive behaviour (Chen & Spector, 1992; Spector, 1997). Although there is a considerable amount of cross-sectional research which establishes a strong link between job satisfaction and other work characteristics and health, the causal relationships between these variables are much more difficult to determine.

Longitudinal evidence generally suggests that increased job satisfaction does lead to increased well-being. For example, in a large longitudinal study of young people, Winefield et al. (1988) found that increased job satisfaction was related to psychological health over time. Interventions that increase job satisfaction over time are also associated with increased well-being (Barrios-Choplin, McCraty, & Cryer, 1997). However, other studies have not supported these results (Wall, Kemp, Jackson, & Clegg, 1986). Structural equation modelling analysis on both cross-sectional and longitudinal data has helped to improve the clarity of the issue. James and Tetrick (1986) tested three models of causality between job perceptions and job satisfaction. The only model not disproved suggested that job perceptions precede job satisfaction in a causal relationship, but they are reciprocally related. De Jonge, Dormann, Jannessen, et al. (2001) found support for the causal effect of job demands on job satisfaction, although conversely, exhaustion (burnout) weakly predicted job demands.

The presence of workplace stressors does not automatically result in adverse health outcomes and most models consider the influence of moderator variables between job satisfaction and employee health. The organizational and individual characteristics examined as moderators of the relationship between workplace characteristics and health, vary from study to study. For example, there is considerable evidence that experience of, and reactions to, stress, differ across occupations and industries (Narayanan, Menon, & Spector, 1999; Rees, 1995; Sparks & Cooper, 1999). Another important moderator is the level of seniority that an individual holds within a company. A recent meta-analysis study (Robie, Ryan, Schmieder, Parra, & Smith, 1998) found that job satisfaction is likely to increase as seniority increases. Further moderators include age (Clark, Oswald, & Warr, 1996; Siu, Spector, Cooper, & Donald, 2001), Type A personality (Spector & O'Connell, 1994), locus of control (Lu, Tseng, & Cooper, 1999), gender (Pugliesi, 1995; Roxburgh, 1996), ethnicity, culture, coping (Tyler & Cushway, 1995) and educational level (Lam, Zhang, & Baum, 2001). These moderators are all very important and ideally, a meta-analysis of stress studies will take many or all of them into consideration. However, assuming that all studies give this information, only minimal moderator variable analysis should be undertaken on a small number of studies in a meta-analysis (Lipsey & Wilson, 2000). Therefore, this paper will focus on the moderating effect of gender and compare the general findings of the HERMES study against a specific country and

ethnic group, namely Hong Kong Chinese.

### **Theoretical rationale for examination of moderator variables**

**Gender.** There is an abundance of literature illustrating gender differences in the stress process in general and job satisfaction in particular. Women have been found to experience differing levels of stress to men (Ho, 2000) and to be affected by different sources of stress (Clark et al., 1996; Narayanan et al., 1999). They have also been found to use different coping mechanisms in the workplace (Biggam, Power, & Macdonald, 1997; Lim & Teo, 1996) and respond differently to stress interventions (Melin, Lundberg, Soederlund, & Granquist, 1999). Gender differences have been highlighted as an important factor in several Hong Kong stress studies. These studies found that Hong Kong women value different aspects of their jobs compared to men. For example, women are more likely to value good relationships than men, whereas pay and job security are more important for men (Sousa-Poza & Sousa-Poza, 2000). Some studies have also found that Hong Kong women are more dissatisfied at work and suffer from poorer health (Bogg & Cooper, 1995). Other studies, however, have failed to confirm these findings (Kirkcaldy & Martin, 2000).

**Culture and ethnicity.** In addition to gender differences, there is considerable research evidence suggesting that different ethnic groups can experience, and react to, workplace stress in different ways (Frank, Rothenberg, Lewis & Belodoff, 2000; Weaver, 1998). Several studies have surveyed the sources and levels of stress and coping strategies for Hong Kong workers, and compared them against workers from other countries.

Of a broad range of potential sources of pressure, 'relationships between others', 'organizational structure and climate' (Siu, Cooper, & Donald, 1997) and 'environmental conditions' (Donald & Siu, 2001) have all been identified as sources specific to Hong Kong workers. These and other sources of pressure have been found to differ between Hong Kong workers and workers in Britain, China and Taiwan (Lu, Kao, Cooper, & Spector, 2000; Siu et al., 1997; Siu, Lu, & Cooper, 1999; Yu, Sparks, & Cooper, 1998). For instance, in a study of managerial stress in Greater China, Siu, Spector, Cooper, Lu and Yu (2003) found that Hong Kong and Taiwanese managers reported significantly more sources of stress than managers in China and that these sources of stress were negatively related to job satisfaction for Hong Kong and Taiwanese managers, but not for Chinese managers. Similarly, in another study comparing job stress in Hong Kong and Taiwanese managers, Siu et al. (1999) remarked that although sources of stress significantly and negatively correlated with job satisfaction in Hong Kong managers, this was not the case in Taiwanese managers.

The level or severity of stress experienced by workers and specifically managers, has consistently been found to vary between Hong Kong and other countries, including the United Kingdom, Taiwan, and China (Lu et al., 1999; Yu et al., 1998). In the Collaborative International Study of

Managerial Stress (CISMS) (Hong Kong iMail, 7 August, 2000, p.A4; Spector et al., 2001), Hong Kong managers were found to be the most stressed, unhealthy and dissatisfied white-collar workers in the world. These findings were reflected in another study where Hong Kong workers tended to have significantly higher scores on sources of stress and lower levels of health and job satisfaction than Taiwanese and Chinese workers (Lu, Kao, Chow, & Siu, 2001). However, in a separate comparison, Spector (1997) found that although workers in the USA, Singapore and Hong Kong had similar total job satisfaction scores, workers in each country had different levels of satisfaction for the various aspects of their work.

The relationship between sources of stress and job satisfaction and health are often found to be mediated by individual coping methods (Lu et al., 1999). In a recent study (Siu et al., 2003), Hong Kong managers who reported more frequent use of a variety of coping methods were found to also report higher job satisfaction, however, this was not the case in managers in Taiwan and China. Cultural norms in coping responses may also be important when considering stress in Hong Kong employees. Studies of Chinese employees have highlighted 'control coping' (e.g. plan ahead) and 'logic' (a kind of problem-focused coping) as predictors of job satisfaction (Siu, 1999).

These differences in sources, levels and coping methods may have a basis in economic and cultural differences between the countries being examined. In a study of cultural values (using the Chinese Values Survey), Chiu and Kosinski (1999) found that Singaporean and Hong Kong nurses scored higher on 'collectivism' over 'individualism', 'Confucian work dynamism' (acceptance of legitimacy of hierarchy) and 'moral discipline' (self control, self-restraint, moderation) compared to American and Australian nurses. These variables moderated the relationship between negative and positive affectivity and job satisfaction. Furthermore, collectivists scored higher in job satisfaction than individualists.

### **Rationale for the use of meta-analysis**

Despite the advantages of using meta-analysis over other forms of qualitative review, there are some disadvantages and criticisms to using this approach. An initial problem is that metaanalysis methods can only be used to summarize empirical research studies with certain statistical information, and cannot be used with other types of study reports such as theoretical papers and qualitative research. In addition, without a priori selection criteria, meta-analysis is vulnerable to numerous forms of bias (Egger, Dickersin, & Smith, 2001), for example, language bias, publication bias, multiple publication bias, citation bias, outcome reporting bias and time lag bias (Sterne, Egger & Smith, 2001).

Another common criticism of meta-analysis relates to the process of combining results from disparate research into a single analysis (the apples and oranges problem) as well as combining the results from studies with varying levels of methodological quality (Hunter & Schmidt, 1990). Two ways of addressing the problem of methodological quality have been suggested. Some meta-

analysis practitioners recommend that only studies of the highest methodological rigour should be used—the ‘best evidence synthesis’ approach (Slavin, 1986). Others opt to prospectively code the individual studies according to their degree of methodological rigour, using a measure constructed for that purpose (Glass, McGaw, & Smith, 1981). Lowly rated or inadequate studies can then be removed from the analysis if the researcher deems that they significantly affect the results. For this meta-analysis, we have used the second approach, in order to utilize a broader sample of the population effect size.

Clearly, meta-analysis is not a flawless statistical tool, although many of its problems stem from inadequate reporting of study findings by the authors of scientific papers and reports (Wolf, 1990). Indeed, much of the criticism levelled at meta-analysis can be equally applied to other forms of review (Rosenthal & Di Matteo, 2001). Despite considerable scope for bias to occur, evidence exists that overestimation is not as great a problem in meta-analysis as is often suggested (Lipsey & Wilson, 2001). Furthermore, as Glass and colleagues (1981) point out, meta-analysis has the advantage of combining the results from both significant and non-significant studies, thereby tending to minimize selection effects. In addition, reviews using quantitative meta-analysis methods allow for a more objective appraisal of research evidence than traditional narrative reviews and can contribute significantly to resolving uncertainty when the available evidence is confusing and apparently contradictory (Beaman, 1991).

In summary, the present meta-analysis has been conducted in order to address the following research questions:

- (1) Is the relationship between job satisfaction and health different for Hong Kong workers compared to the worldwide sample in the HERMES study?
- (2) Is the relationship different for males and females?
- (3) Are any of these relationships affected by methodological rigour?

## **Methods**

The procedures used to complete the systematic review and meta-analysis were based on established best practice, as described by Lipsey and Wilson (2001), and incorporating the relevant elements of the QUORUM statement and the guidelines produced by the Cochrane Collaboration (Egger, Smith, & Altman, 2001) for reviewing randomized clinical trials (Shea, Dube, & Moher, 2001).

## **Inclusion criteria**

To be eligible for inclusion into the meta-analysis, studies were required to involve a statistical comparison of any measure of job satisfaction with any health measure and contain a sample of a Hong Kong working population. Studies needed to be published after 1970. Studies consisted of any of several designs: cross-sectional/correlational; longitudinal; case-control; random allocation



to groups; group differences based on existing criteria. Studies from all types of publication method were surveyed, including published and unpublished studies, refereed and unrefereed journals, dissertations, government reports, and technical reports.

### **Searching**

In the first instance, a comprehensive electronic search for relevant literature was conducted using established databases, specifically: PsychInfo, PubMed, Social Sciences Citation Index, Arts & Humanities Citation Index, and ERIC. Search terms included, but were not confined to: 'Hong Kong' or 'Asia' or 'China' and 'job' or 'work' or 'organisation' or 'occupation' or 'career' and 'satisfaction' or 'dissatisfaction' or 'job diagnostic survey' (and other specific job satisfaction measures). To ensure that the keywords used in the electronic search were comprehensive, several journals were then hand-searched for relevant articles, including: Stress Medicine, Work and Stress and the Journal of Occupational and Organisational Psychology. Studies published in more than one source were identified, and only used once. Lastly, each of the included articles were hand searched to find further relevant articles.

As previously indicated, not all research studies are published in mainstream journals, but may only be presented at conferences or confined to the pages of a thesis or dissertation. This 'grey literature' was thus searched by accessing various internet-based databases. Several Hong Kong academics were contacted to request any unpublished dissertations or technical reports.

### **Coding and data entry**

Each article was assessed to establish the methodological rigour score according to the method developed by Cass et al. (2003) for the HERMES study. A score was given out of 10, based on whether the study met each of 10 specific methodological criteria, which included, a representative sample; separate means and standard deviations for subgroups; giving a full range of descriptive information about the sample; a response rate greater than 35 per cent; an appropriate sample size for the analysis; analysis of moderator variables; and for longitudinal studies, less than 20 per cent attrition. The percentages of males and females in each sample were recorded, then placed into one of three categories, which were: greater than 60 per cent male (mostly male); greater than 60 per cent female (mostly female); and no more than 60 per cent female or 60 per cent male participants (mixed gender). The sample size, type of job satisfaction measure, type of health measure, rigour score, and gender distribution was recorded, as well as the correlation between job satisfaction and employee health. A second person read each of the articles and coded them. Any discrepancies were resolved by discussion. This information was then entered into the Comprehensive MetaAnalysis computer program, produced by Biostat Inc. (USA).

### **Results**

The research collated in this study were of three types: articles published in refereed journals, technical reports and student dissertations. Several measures of health and job satisfaction were identified, however, the majority of the studies utilized a short version of the Occupational Stress Indicator (OSI2; Cooper, Sloan, & Williams, 1988). Studies which used differing measures (e.g. Brayfield & Rothe, 1951; Goldberg, 1972) were combined into the same analysis. The details of the individual studies are presented in Appendix A.

Twenty-two samples from 20 studies were evaluated in total, with a combined sample size of 4492 individuals. Some studies contained samples which were used both for the physical health metaanalysis and for the mental health meta-analysis. The relationships between job satisfaction and each of mental and physical health and general health were examined separately. Initially, all eligible studies were entered into the analysis. For each analysis, the Forrest plot was produced and examined visually for the possible presence of outlier studies (see Figure 1).

This process was then formalized using a significance test for heterogeneity (i.e. to test the dispersion of the individual outcomes). Significant heterogeneity was detected for all of the analyses, however careful examination of the Forrest plot found only one study with a particularly large estimated correlation ( $r = 0.737$ ) which was subsequently removed from the analysis. The results were re-analysed and heterogeneity was reduced, although still significant. Since no other outliers were obvious, this level of heterogeneity was considered acceptable. A mixed effects model was used for the analysis since it was possible that the variance between the studies could be explained both by random and systematic components. To conduct this, it was necessary to conduct the analysis using a random effects model, and investigate two sources of variation as per the study aims: methodological rigour and gender. The results of the meta-analysis and heterogeneity analysis are contained in Table I.

Finally, the Hunter-Schmidt correction for reliability of measures artefacts was applied to the main analyses. Correlations in studies tend to be biased towards zero due to artefacts (Hunter & Schmidt, 1990). In particular, both variables in a correlation are invariably measured with imperfect reliability, which serves to attenuate the magnitude of the estimated correlation value. In addition, measures are often range restricted, further attenuating the correlation estimate. The Hunter-Schmidt correction corrects the observed correlation values by removing the effects of artefacts. The Forrest plot containing the adjusted correlations between job satisfaction and each of the health outcome measures is shown in Figure 1. All effect size statistics were converted in such a way that positive correlation coefficients reflected the expectation that an increase in job satisfaction would be associated with improved health. The correlation coefficients shown in the Forrest plot in Figure 1 represent the correlations adjusted using the Hunter-Schmidt formulae for the reliabilities of the job satisfaction and employee health measures.

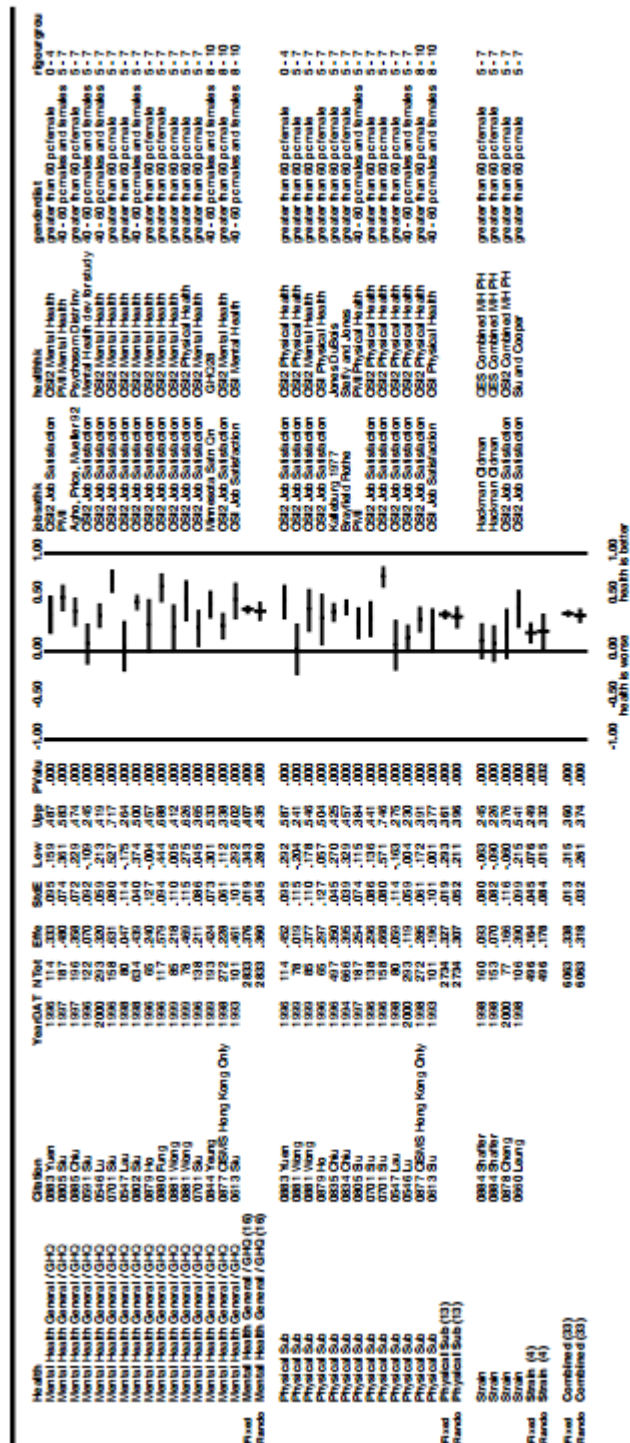


Table I. Random effect sizes of all studies separated by health corrected and uncorrected.

Health outcome	Hong Kong Analysis $k(N)$ , $r$ (95% confidence interval)	HERMES Analysis $k(N)$ , $r$ (95% confidence interval)
<b>Mental health</b>		
Corrected correlation	16 (2833), $r = 0.360$ (0.280–0.435)	142 (95 814), $r = 0.376$ (0.353–0.397)
Heterogeneity test	$Q(15) = 74.96, p < 0.01$	*
Uncorrected correlation	16 (2833), $r = 0.296$ (0.231–0.358)	142 (95 814), $r = 0.318$ (0.299–0.336)
Heterogeneity test	$Q(15) = 45.44, p < 0.01$	
<b>Physical health</b>		
Corrected correlation	13 (2734), $r = 0.307$ (0.211–0.396)	119 (58 762), $r = 0.287$ (0.255–0.319)
Heterogeneity test	$Q(12) = 72.68, p < 0.01$	
Uncorrected correlation	13 (2734), $r = 0.257$ (0.174–0.336)	119 (58 762), $r = 0.235$ (0.211–0.259)
Heterogeneity test	$Q(12) = 51.58, p < 0.01$	
<b>Mental and physical health</b>		
Corrected correlation	4 (496), $r = 0.178$ (0.015–0.332)	23 (5693), $r = 0.341$ (0.250–0.426)
Heterogeneity test	$Q(3) = 8.43, p < 0.05$	
Uncorrected correlation	4 (496), $r = 0.167$ (–0.002–0.327)	23 (5693), $r = 0.310$ (0.230–0.385)
Heterogeneity test	$Q(3) = 9.04, p < 0.05$	
<b>Combined†</b>		
Corrected correlation	33 (6063), $r = 0.318$ (0.261–0.374)	‡
Heterogeneity test	$Q(32) = 178.54, p < 0.01$	
Uncorrected correlation	33 (6063), $r = 0.266$ (0.217–0.313)	
Heterogeneity test	$Q(32) = 117.75, p < 0.01$	

\* Heterogeneity tests for the HERMES sample are not included.

† This combined estimate includes some studies which were counted twice due to there being correlations between job satisfaction and both mental health and physical health. It is meant as a guide only.

‡ Combined correlation estimates are not given for the HERMES sample as the larger meta-analysis was based on a broader sample of health measures that are incomparable to the Hong Kong sample.

The unadjusted and Hunter–Schmidt combined correlations, both overall and broken down by health measure, are summarized in Table I. Mental health, physical health and combined mental and physical health are presented separately alongside the combined estimate. This combined estimate should be interpreted with caution as some studies used more than one health measure for each sample.

### Analysis of methodological rigour

A sensitivity analysis was carried out on the general mental health and the physical health studies to investigate the influence on the correlation estimates of the ‘rigour’ rating given to each study. Studies were grouped according to whether they scored high (between 8 and 10), medium (between 5 and 7) or low (between 0 and 4) on rigorousness. This involved a chi-square ( $Q$ ) test of whether differences in weighted correlations were due to the level of methodological rigour, or due to variation in artefacts or to sampling error. The studies reporting combined mental and physical health measures contained too few studies and so sensitivity analysis was not undertaken due to the potential that small numbers would produce misleading results. The unadjusted, random-effects correlations for mental health and physical health, considered separately for the effects of rigour and are displayed in Table II along with the results of the chi-square test.

### Analysis of gender

A sensitivity analysis was carried out on the general mental health and the physical health studies to investigate the influence on the correlation estimates of the gender distribution of the sample in each. This involved a chi square analysis of studies rated as mostly men, mostly women and

mixed gender. The studies reporting combined mental and physical health measures again contained too few studies and so a sensitivity analysis was not undertaken due to the potential that small numbers would produce misleading results. The unadjusted, random-effects correlations for mental health and physical health, considered separately for the effects of gender are displayed in Table III.

Table II. Table of random effect sizes separated by methodological rigour.

Health measure Methodological rigour	<i>k</i>	<i>N</i>	Uncorrected correlation	Chi-square test
Mental health				
High	3	566	0.295 (0.166–0.414)	$Q(2) = 4.16, p > 0.05$
Medium	13	2525	0.292 (0.217–0.364)	$Q(12) = 41.28, p < 0.01$
Low	1	114	0.300 (0.123–0.459)	
Between groups				$Q(2) = 0.8080, p > 0.05$
Physical health				
High	2	373	0.239 (0.141–0.333)	$Q(1) = 0.70, p > 0.05$
Medium	10	2247	0.249 (0.144–0.348)	$Q(9) = 48.07, p < 0.01$
Low	1	114	0.400 (0.253–0.544)	
Between groups				$Q(2) = 2.81, p > 0.05$

Table III. Table of random effect sizes separated by gender distribution.

Health measure Gender distribution	<i>k</i>	<i>N</i>	Uncorrected correlation	Chi-square test
Mental health				
Mostly men	7	1183	0.267 (0.135–0.389)	$Q(6) = 27.40, p < 0.01$
Mostly women	4	492	0.308 (0.225–0.387)	$Q(3) = 2.02, p > 0.05$
Mixed gender	6	1530	0.316 (0.227–0.399)	$Q(5) = 13.81, p < 0.05$
Between groups				$Q(2) = 2.21, p > 0.05$
Physical health				
Mostly men	6	811	0.262 (0.061–0.443)	$Q(5) = 36.13, p > 0.01$
Mostly women	4	1342	0.304 (0.254–0.352)	$Q(3) = 1.91, p > 0.05$
Mixed gender	3	581	0.144 (0.063–0.224)	$Q(2) = 1.26, p > 0.05$
Between groups				$Q(2) = 12.27, p < 0.01$

## Discussion

The meta-analysis reported here has attempted to accumulate and summarize the existing evidence on the strength of the mathematical relationships between job satisfaction and three types of measures of employee health and well-being, namely, general mental health, physical health and a combination of the two. We compared the results of the Hong Kong meta-analysis with the meta-analysis of the larger sample in the HERMES study and conducted analyses for the moderating variable of gender and the effects of methodological rigour.

## Main analysis

When different types of employee health measures are compared, the results are very informative. It must be emphasized again here that no statistical significance test was conducted of the difference between the Hong Kong studies and the HERMES studies. At  $r = 0.360$ , the corrected correlation between general mental health and job satisfaction was quite high (see Semmer, Zapf,

& Greif (1996) for an explanation of correlations in organizational research), yet lower than the combined HERMES result. This contrasted with the corrected correlation between general physical health and job satisfaction, which at 0.307 was much higher than the correlation found in the HERMES study. The relationship between combined mental and physical health and job satisfaction at  $r = 0.178$  was again lower than the HERMES result. In general, mental health had a higher correlation with job satisfaction than physical health, which in turn was higher than the correlation between job satisfaction and combined mental and physical health.

These results indicate that for Hong Kong workers, the influence of job satisfaction on physical health is greater than in most countries. However, the influence of job satisfaction on mental health is less pronounced for Hong Kong workers. Even so, for Hong Kong workers, mental health was correlated with job satisfaction more highly than physical health and combined mental and physical health. The reasons for this are difficult to determine due to small numbers of studies, particularly in the combined mental and physical health analysis. However, they may well be a reflection of the current work situation in Hong Kong.

The nature of work for white collar workers in Hong Kong has been undergoing tremendous changes recently. With the globalization of the world economy and the rapid development of the South East Asia economies, Western enterprises are investing more heavily into the area. Simultaneously, there have been rapid structural and economic changes in Hong Kong, with the service industry expanding to account for about 85.5 per cent of total employment. However, the Asian financial crisis in 1997 created considerable problems for Hong Kong. The rise in unemployment rate and the fall in stocks and property values have affected workers' confidence and job security. Many managers and executives need to work long hours, both in the evening and at weekends, in temporary jobs, short-term contracts, and in downsized departments. All of these factors lower the commitment of workers and affect their job satisfaction and well-being.

In all, the average weighted correlation for job satisfaction with mental health was quite high. While it is possible that this relationship simply reflects the direct influence of job satisfaction on health, there are several alternative explanations for this finding, which must be considered. Firstly, job satisfaction is generally viewed as a composite measure that incorporate elements of various aspects of the job. For example, one of the most common measures of job satisfaction, the Job Descriptive Index (Smith, Kendall, & Hulin, 1969) measures five facets of job satisfaction, specifically, satisfaction with, the work itself, pay, promotion, supervision and co-workers. Changes in levels of job control, working hours, job security and/or supervisor support have all been related to individual job satisfaction levels (e.g. Burke, 1998; Noblet, Rodwell, & McWilliams, 2001). Therefore, since the job satisfaction measures often incorporate satisfaction with other work characteristics, some elements of the measurement of those characteristics may overlap with that of job satisfaction.

Another potential explanation for these findings is that many organizational stress studies consider job satisfaction as an organizational outcome measure in itself (Pettersson, Arnetz, &

Arnetz, 1995; Terry, Neilson & Perchard, 1993). If this is a true reflection of the causal relationship between these variables, it may be the case that the job satisfaction construct is being influenced by the same work characteristics or moderator variables that act to create mental health problems. For most individuals, work occupies a larger proportion of time than any other single activity, and many people define themselves largely by their occupation. It is perhaps not surprising, therefore, that dissatisfaction with this aspect of their life appears to impact adversely in particular on mental health.

Lastly, as noted by Spector (1997), many factors can influence levels of job satisfaction. Strong correlations were found in most of the individual studies evaluated, suggesting that at least some of these factors are likely to be related to the specific tasks demanded of an individual employee (i.e. are job specific). However, the considerable heterogeneity found between studies, suggests that other factors may be more directly related to factors such as occupation. A more detailed examination of the difference between identifiable groups of workers is merited to determine whether some occupations are more prone to the problems of job dissatisfaction than others.

### **Analysis for the effects of gender**

The results of our tests of gender differences were also remarkable. As indicated by the extant literature, women were more likely to have poorer health in combination with decreased job satisfaction. When mostly men and mostly women samples were compared, the mostly women samples yielded higher but non-significant correlations. This replicates the general conclusions of the stress literature, which consistently demonstrates that women have a higher level of job-related stress than men and that work characteristics only explain a minor portion of this variance (Roxburgh, 1996). However, for the mental health measures, mixed gender samples yielded an even larger average correlation than the mostly women sample. This finding was not replicated for physical health, where the mixed gender samples correlation was significantly much lower than the mostly men samples.

The significantly lower correlation for mixed gender samples in the physical health analysis, and the higher (but not significant) correlation for mixed gender samples for the mental health analysis is an interesting phenomenon that needs to be explored further. One explanation for these finding is that the traditional segregation of work by gender in Hong Kong occurs alongside strong western influences (Shaffer, Joplin, Bell, Lau, & Oguz, 2000). This could indicate that gender mix in an organization can itself form a basis of conflict. Even assuming that the gender distribution of the samples are representative of the population, it is difficult to determine from this analysis whether men or women are most likely to suffer in this working environment, but the literature gives several suggestions. Firstly that gender discrimination is associated with increased stress at work. Secondly, where a perception that gender bias exists in organizational employment decisions, adverse job-related outcomes such as health and job satisfaction are likely to increase (Shaffer et al., 2000). Conversely, Harlan and Jansen (1987) found that women who worked in

traditionally female-dominated occupations were more likely to suffer from reduced health and job satisfaction than women who worked in male-dominated, or neither sex-dominated workplaces. A closer, visual inspection of the data indicated that the mixed gender studies were mostly comprised of 'managers' samples. This was not analysed statistically, however, it suggests that the level of seniority in the workplace may constitute a further moderating effect of the relationship between job satisfaction and health. If women are more stressed than men due to the use of gender in employment decisions, this can only be compounded in workplaces where women are lower in the employment hierarchy.

It was not possible to perform a series of subanalyses on other moderator variables such as age, industry, level of seniority, as multiple comparisons increase the likelihood of Type II errors. However, a visual inspection of the data and samples indicated that the differences in gender and rigour did not appear to be due to alternative explanations, other than, perhaps, level of seniority.

### **Analysis of methodological rigour**

When we viewed the correlations between health and job satisfaction across different levels of rigour, no consistent pattern emerged. In contrast with the extant meta-analysis literature (Terpstra, 1981), but reflecting the findings of Bullock and Syvanteke (1985), our findings indicated that decreased methodological rigour was not associated with inflated, or deflated correlations. The chi-square examining the differences between high and low rigour studies was not significant for either physical health and mental health. However, the 'medium' rigour group of studies yielded the highest job satisfaction-mental health correlation, indicating a slight U-shaped curve.

### **Caveats and limitations**

The research reported in this document attempts only to accumulate and summarize the existing evidence on the strength of the mathematical relationships between job satisfaction and three measures of health/well-being. The inference underpinning this paper is that a statistically significant correlation between job satisfaction and ill health implies a causal relationship. Correlation statistics simply indicate the strength of a mathematical relationship between two measures and a cross-sectional study cannot provide definitive evidence of such a causal relationship, which can only be examined fully using a longitudinal study design. However, based on existing research, a causal, but perhaps partially reciprocal, relationship can be assumed.

Some limitations of this study must be considered together with the results and discussion above. A meta-analysis study is only as rigorous as the studies that it is based on (Wolf, 1990). Several problems were inherent in the studies included in this meta-analysis. Firstly, all of the studies were based on self-report questionnaires. Some academics suggest that such questionnaires are only a reflection of subjective health and work conditions and may not be an accurate reflection of their 'true' values. Secondly, some of the studies used a snowballing technique to obtain a sample



of specific occupational groups. While this may have been the only or best way to obtain such a sample, these techniques are not considered as valid as random sampling. Where random sampling was used, some of the studies obtained quite low response rates, which also reduces the likelihood that the sample was random, and therefore representative of the population being studied. Lastly, since all of these studies used selfreport questionnaires, the results may have been affected by common method variance (Spector, 1987).

### **Conclusions and recommendations**

The results of the meta-analysis give rise to several implications for future research, and for organizational practice. Firstly, we suggest that further cross-sectional research that does not add to the investigation of important moderator variables, would not add to the current body of research, and so would be ineffectual. Longitudinal and intervention studies that consider the effects of workplace characteristics on employee health would be more beneficial. Furthermore, to rule out method effects, a broader range of stress measures needs to be used in Hong Kong, as the current research mainly uses the Occupational Stress Indicator 2. Lastly, based on the results of the gender analysis, we recommend a more detailed look at the effect of the gender distribution in organizations, and whether this affects the experienced stress of men and women in the workplace. It is important to investigate whether these findings are a result of gender discrimination, as suggested by Shaffer et al. (2000).

The results of this study are particularly useful for managers and occupational health staff in Hong Kong, and international companies hoping to conduct business in Hong Kong. The correlations suggest that efforts to increase job satisfaction would have a meaningful impact on the health of the Hong Kong worker. Previous research suggests that interventions that improve job satisfaction are associated with improved worker health, as well as improved performance and reduced employee turnover.

Based on the results of this meta-analysis, we can conclude that there is a slightly stronger link between job satisfaction and employee health in Hong Kong. This relationship is stronger for women than for men, however, mixed gender workplaces yield different results than samples of mostly men or mostly women. Our analysis of studies of differential methodological rigour indicates that this has a minimal impact on the combined effect size. However, these results need to be considered alongside the other general methodological limitations inherent in meta-analysis. Future research that identifies further moderators of these relationships could greatly improve our understanding of how job satisfaction influences employee health in Hong Kong depending on the gender distribution of the organization.

Appendix A. Studies included in the meta-analysis

Citation	Sample	Study	Health	Job satisfaction	Male (%)	Rigour
Lu <i>et al.</i> (2001)	258 Taiwanese, 189 Chinese, and 293 Hong Kong managers from various industries	Examined job stress in these populations	OSI2 Mental and Physical Health (Cooper <i>et al.</i> , 1988; shortened version)	OSI2 Job Satisfaction (Cooper <i>et al.</i> , 1988; shortened version)	56	7
Lau (1996)	80 managers from Hong Kong, from the banking, computing and consultancy industries	Examined job stress in this population	OSI2 Mental and Physical Health (Cooper <i>et al.</i> , 1988)	OSI2 Job Satisfaction (Cooper <i>et al.</i> , 1988)	61	6
Siu & Cooper (1998)	122 Hong Kong workers of mixed occupations and industries	Investigated stress among this sample	General Mental Health: in house (10 items, 6 point)	Job Satisfaction: OSI2 (12 items, 6 point) (Cooper <i>et al.</i> 1988)	54.1	6
Siu <i>et al.</i> , (1997)	101 workers in a Hong Kong television station	Examined the effects of company acquisition in this sample	OSI Mental and Physical Health (Cooper <i>et al.</i> , 1988)	OSI Job Satisfaction (Cooper <i>et al.</i> , 1988)	40.6	8
Leung (1997) Leung, Siu, & Spector (2000)	106 Hong Kong teachers	Examined stress in this sample	General health (13 items, 5 items, +physical health; 3 items, depression; 5 items, mental health; Siu & Cooper, 1998)	Job Satisfaction: OSI 2 (Cooper <i>et al.</i> , 1988)	81.9	7
Siu (2003)	Three samples 158 Hong Kong white collar workers, 138 Hong Kong blue collar workers, and 372 Chinese blue collar workers	Examined stress and organizational commitment in this sample	Mental Health Physical Health: both from OSI2 (Cooper <i>et al.</i> , 1988)	Job Satisfaction: OSI2 (Cooper <i>et al.</i> , 1988)	'mostly men' (51—99)	6
Siu <i>et al.</i> , (2001)	280, 192 and 162 managers from Hong Kong	Examined stress in this sample	Mental Health OSI2 (Cooper <i>et al.</i> , 1988)	Job Satisfaction: OSI2 (Cooper <i>et al.</i> , 1988)	59	7
Siu <i>et al.</i> , (2003)	249 Chinese, 280 Hong Kong and 347 Taiwanese managers from various industries	Examined the direct and moderating effects of coping and LOC on these samples	Mental Health Physical Health: both from OSI2 (Cooper <i>et al.</i> , 1988)	Job Satisfaction OSI2 (Cooper <i>et al.</i> , 1988)	57	8
Chiu & Kosinski (1997)	666 Hong Kong nurses and teachers	Examined the effects of personality in the job stress model	Physical Health (Steffy & Jones, 1988)	Job Satisfaction: (Brayfield & Rothe, 1951) (6 items, 5 point)	33.5	7

Chiu, Man, & Thayer (1998)	497 social workers and other workers in Hong Kong	Examined role conflict and satisfaction in this sample	Physical Health (Steffy & Jones 1986) (9 items, 5 point)	Job Satisfaction Kalleberg (1974) (5 items, 5 point)	32	6
Yeung & Tang (2001)	193 single, full-time working Hong Kong women of mixed occupation and industry	Examined examples of job characteristics on health	GHQ28 (28 items, 4 point)	Minnesota Satisfaction Questionnaire (12 items)	53	8
Spector <i>et al.</i> (2003)	272 Hong Kong managers	Examined stress in this sample	OSI 2 (Cooper <i>et al.</i> , 1988)	OSI 2 (Cooper <i>et al.</i> , 1988)	mostly men	8
Cheng & Siu (2000)	77 Hong Kong university teachers	Examined stress in this sample	OSI2 modified (Cooper <i>et al.</i> , 1988)	OSI 2 modified (Cooper <i>et al.</i> , 1988)	65	5
Ho (1996)	65 Hong Kong teachers	Examined stress in this sample	OSI 2 (Cooper <i>et al.</i> , 1988)	OSI 2 (Cooper <i>et al.</i> , 1988)	27	6
Fung (1997)	117 Garment merchandisers	Examined stress in this sample	OSI 2 (Cooper <i>et al.</i> , 1988)	OSI2 (Cooper <i>et al.</i> , 1988)	24	6
Wong (1998)	85 police and 78 office workers	Examined stress in this sample	OSI 2 (Cooper <i>et al.</i> , 1988)	OSI2 (Cooper <i>et al.</i> , 1988)	87	5
Li (1996)	65 property managers	Examined stress in this sample	OSI 2 (Cooper <i>et al.</i> , 1988)	OSI 2 (Cooper <i>et al.</i> , 1988)	86	5
Yuen (1996)	114 Hong Kong librarians	Examined stress in this sample	OSI 2 (Cooper <i>et al.</i> , 1988)	OSI 2 (Cooper <i>et al.</i> , 1988)	32	4
Shaffer <i>et al.</i> (2000)	160 Chinese Hong Kong and 153 English Hong Kong women	Examined cultural differences in women from the US, China and Hong Kong	QES (7 items, 5 point)	Hackman and Oldman Global Job Satisfaction (5 items, 5 point)	0	7
Chiu & Kosinski (1999)	130 USA nurses, 196 Hong Kong nurses, 181 Australian nurses and 119 Singaporean nurses	Examined the effect of cultural differences on health and work characteristics	Psychosomatic Distress Inventory (Steffy & Jones, 1988) (9 items, 5 point)	Agho, Price, & Mueller (1992)	33	6

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