The effects of emotional intelligence on job performance and life satisfaction for the research and development scientists in China

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Published in:
Asia Pacific Journal of Management

DOI:
10.1007/s10490-007-9062-3

Published: 01/03/2008

Document Version:
Peer reviewed version

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Abstract

To demonstrate the utility of the emotional intelligence (EI) construct in organizational studies, this study focuses on the effect of EI on job performance among research and development scientists in China. We argue that EI is a significant predictor of job performance beyond the effect of the General Mental Ability (GMA) battery on performance. This predictor effect is supported by results on a study of research and development scientists working for a large computer company in China. Our results also show that a self-reported EI scale developed for Chinese respondents, the WLEIS, is a better predictor of job performance than the scale developed in the U.S., the MSCEIT. Implications of the findings are discussed.

The Effects of Emotional Intelligence on Job Performance and Life Satisfaction among Research and Development Scientists in China

One of the most controversial concepts introduced in popular and academic psychology and management in the last decade is Emotional Intelligence (EI; Mayer, Salovey & Caruso, 2000). Proponents of EI in the psychology, education and management disciplines have boosted the value of EI through abundant efforts (e.g. Goleman, 1995, 1998; Mayer & Salovey, 1997; Wong & Law, 2002). However, up to now, scientifically solid evidence of the usefulness of EI as a psychological construct is still far from sufficient and there is still enormous debate about the meaning and usefulness of the construct. For example, Davies, Stankov and Roberts (1998) concluded that EI was an "elusive" construct, which overlapped extensively with well-established personality factors. In contrast, Law, Wong and Song (2004) demonstrated that when defined and measured properly, EI was distinct from personality dimensions, and was a significant predictor of a bundle of desired outcomes, such as life satisfaction and supervisory ratings of job performance.

Irrespective of this heated debate, various models on the relationship between EI and a variety of outcomes, such as creativity, career success, mental and physical health, are rapidly appearing in the literature (Bar-On & Parker, 1997) and some recent efforts have presented encouraging results. For example, EI was found to be positively related to leadership effectiveness, employee job satisfaction, and job performance (see, e.g., Rosete & Ciarrochi, 2005; Wong & Law, 2002). Although there is some evidence that EI is related to job

satisfaction in Chinese samples (e.g., Wong, Wong & Law, 2007), there is little evidence concerning the effect of EI on job performance among Chinese employees. Traditionally, another means of measuring intelligence, the general mental ability (GMA) battery, has been found to be important for job performance, especially in complex jobs that require high educational qualifications (Landy & Shankster, 1994; Ferris, Witt & Hochwarter, 2001). Is EI less important in succeeding in such jobs? This may be a crucial question to answer in relation to recruiting, training and managing research and development scientists in the high-tech industries.

This paper investigates two important issues related to EI. First, we examine the validity of EI in predicting job performance among research and development scientists working in a large computer company in China. Second, EI was measured here by a self-reported scale called the WLEIS developed for Chinese respondents (Wong & Law, 2002). In an effort to respond to Law et al.'s (2004) call for a comparison of different EI tests, we compare the incremental validity of the WLEIS with another EI test developed in the U.S., i.e., the Mayer, Salovey and Caruso Emotional Intelligence Test (MSCEIT; Mayer, Salovey & Caruso, 1999). Given our twofold purpose, we organize this paper as follows. We start with a review of the nature and domain of EI and its development in academic areas. Then, we develop the hypotheses of this study, i.e., on the validity of EI to predict job performance beyond the effect of GMA, and the comparability of the two EI measures in predicting job performance. We then report an empirical study. Implications and limitations of this empirical study are also discussed.

A REVIEW OF EMOTIONAL INTELLIGENCE: ITS NATURE, DOMAIN AND DEVELOPMENT

The concept of EI has roots that reach deep into the study of psychology in the past century (Goleman, 1997). Thorndike (1920), who introduced the concept of "social intelligence" and defined it as "the ability to understand and manage men and women, boys and girls—to act wisely in human relations" germinated the seed of the EI concept. Following this, Gardner included "personal intelligence" in his seminal work on the theory of multiple intelligences (1983: 238). Specifically, personal intelligence is comprised of *intrapersonal intelligence*, which refers to the "knowledge of the internal aspects of a person: access to one's own feeling life, one's range of emotions, the capacity to effect discriminations among these emotions and eventually to label them and to draw upon them as a means of understanding and guiding one's own behavior," and *interpersonal intelligence*, which "builds on a core capacity to notice the distinctions among others; in particular, contrast in their moods, temperaments, motivations and intentions" (Gardner, 1993: 23).

The notion of "emotional intelligence" originally appeared in two 1990 academic journal articles (Mayer, Dipaolo & Salovey, 1990; Salovey & Mayer, 1990). Salovey and Mayer gave their first definition of EI as "the subset of social intelligence that involves the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions" (1990: 189). Based on this, a more recent and widely adopted definition is "the ability to perceive accurately, appraise, and express emotion; the ability to access and/or generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge; and the ability to regulate emotions to

promote emotional and intellectual growth" (Mayer & Salovey, 1997: 10).

After its introduction, EI has been defined and used by researchers in various ways, but these definitions and uses "tend to be complementary rather than contradictory" (Ciarrochi, Chan and Caputi, 2000). In this study, we adopted the integrated four-dimensional definition of EI proposed by Davies et al. (1998), which was developed based on Mayer and Salovey's (1997) definition. We chose this definition of EI because it was proposed by Davies et al. after their comprehensive review and synthesis of the EI literature. The four EI dimensions proposed by Davies et al. are:

1. *Appraisal and expression of emotion in one's self,* which relates to an individual's ability to understand his/her deep emotions and to be able to express emotions naturally. People who have good ability in this area will sense and acknowledge their emotions better than others will.
2. *Appraisal and recognition of emotion in others,* which relates to an individual's ability to perceive and understand the emotions of the people around them. People who rate highly in this ability are very sensitive to the emotions of others as well as able to predict others' emotional responses.
3. *Regulation of emotion in one's self,* which relates to the ability of a person to regulate his/her emotions, enabling a more rapid recovery from psychological distress. A person with high ability in this area would be able to return quickly to normal psychological states after rejoicing or being upset. Such a person would also have better control of his/her emotions and would be less likely to lose his/her temper.
4. *Use of emotion to facilitate performance,* which relates to the ability of a person to make use

of emotions by directing them towards constructive activities and personal performance. A person who is competent in this EI dimension would be able to encourage him/herself to do better continuously and to direct his/her emotions in positive and productive directions.

Wong and Law (2002) developed a self-reported scale based on this definition by multiple samples and labeled the instrument the Wong and Law Emotional Intelligence Scale (WLEIS). Together with another multi-sample cross-validation study, this instrument was found to have good convergent and discriminant validity (Law et al., 2004). This four-dimensional ability view of EI also makes it distinct from many other related constructs, such as personality factors and other kinds of cognitive intelligence. In a rigorous effort to legitimatize EI as a broad human intelligence dimension, Mayer, Caruso and Salovey (2000a) developed a 12-subscale ability test of EI, the Multifactor Emotional Intelligence Scale (MEIS), and demonstrated that EI, as measured by MEIS, meets the traditional standards for a type of intelligence, including the conceptual, correlational, and developmental criteria. They also demonstrated the distinction between EI and social intelligence in that EI has a broader domain and is more focused on emotional aspects than is social intelligence (cf. Wong, Wong & Law, 2005).

Since EI is defined as a set of interpersonally and intrapersonally related human abilities, it should have the ability to predict various personal and social outcomes. Both Wong and Law (2002) and Wong et al. (2005) argued that *life satisfaction* was one important outcome of people with high EI. The reason is that a person with high EI is able to understand his/her own and others' emotions and to draw upon this understanding to improve behaviors and attitudes for positive results. As a result, she would be more able to deal with the emotions generated from within and would be generally happier in and more satisfied with life. Wong and Law

(2002) and Law et al. (2004) found repeated empirical support from multiple samples for this predicted relation. Although life satisfaction is good indicator of the importance of EI to individuals, EI would be of interest to organizational researchers only if it could be associated with organizational outcomes, such as employee attitudes, behaviors and job performance. To date, researchers have found that an employee's EI is positively related to his/her job satisfaction and performance (Law et al., 2004). In addition, a leader's EI was found to affect leadership effectiveness and followers' satisfaction and extra-role behaviors (Rosete & Ciarrochi, 2005; Wong & Law, 2002). Given its great potential to lead to insights on organization behaviors, it is regrettable that studies on EI-organizational outcome relations are rare. In the following section, we discuss EI as a predictor of employees' performance in organizational settings beyond the effect of GMA, the traditional performance predictor.

EI, GMA, AND JOB PERFORMANCE

Among other things/purposes, organizations are places where individuals are "organized" to work. To the extent that the work requires interactions among individuals, emotions such as excitement, anger and fear are indispensable in facilitating cooperation. In some workplaces, certain emotions are required in employees. Typical examples are enthusiasm in sales persons, perseverance in bill collectors, and empathy in social workers (e.g., Hochschild, 1983; Sutton, 1991; Pugh, 2001). Employees who are "intelligent" about their emotions will, therefore, be more efficient and effective in their interactions with the work environment and with their co-workers. This EI-performance link has been proposed in a few previous studies. For example, Lam and Kirby (2002), using a student sample, found that EI contributed to

cognitive-based performance. Wong and Law (2002) studied the link in workplaces and found a positive relationship between EI and job performance.

In addition to EI as a general construct, each of the four dimensions of EI may be related to job performance. First, ability in the *appraisal and expression of emotion* has been found by psychologists and sociologists to be crucial to an individual's mental and even physical health (House, Umberson & Landis, 1988; Lin, Ye & Ensel, 1999; Butler et al., 2003). Accurate appraisal and expression of one's emotions is necessary for people to develop beneficial interpersonal relationships, to communicate with others about their needs and thus to fulfill their goals through high-level job performance (George, 2000). Second, ability in the *appraisal and recognition of emotion in others* enables people to understand other's emotions and to respond accordingly by showing appropriate attitudes and behaviors. They would then have a higher chance of being accepted by others, earning their trust and gaining their cooperation. This is crucial for good performance in organizational settings, especially when employees are highly interdependent, such as those in work teams. Third, ability in *regulating emotions* allows a person to alter his/her own emotions to decrease undesired emotional impacts on the work environment. Such employees can rise above sometimes unavoidable negative emotional impacts (from, for example, impolite behaviors from customers, excessive and stressful demands from the boss, and uncooperative behaviors from peers, etc.) quickly and therefore their performance would suffer less from the adverse situation. Finally, it is obvious that one's ability to *use one's emotions to improve performance* will have a positive impact on one's performance. Individuals with high ability in this dimension are always active in directing their emotions toward good outcomes. In organizational settings, such employees

cheer themselves and others up when they know that a good mood will help them to complete the job.

Although it seems clear that EI can affect job performance, it is important to establish its unique contribution to job performance when compared with other established constructs, especially traditional intelligence measures, such as the General Mental Ability (GMA) battery, which has been shown to be a valid predictor of performance. In the personnel psychology literature, research over the last two decades has shown that the variability of performance among workers is very large (Schmidt & Hunter, 1998). Considerable efforts have been expended on studying the individual differences that may predict important job outcomes. Although controversies exist, some stable individual differences, such as those determined by GMA, have been found to have good general predictive power for performance. GMA, also called general cognitive ability and general intelligence or the *g*-factor, is a well-researched construct for which impressive evidence has been collected on its capacity to predict important outcomes, such as job performance, training success and career success across jobs, settings, and careers (e.g., O'Reilly III & Chatman, 1994; Ree, Earles & Teachout, 1994; Ferris, Witt & Hochwarter, 2001). In their review of 85 years of research findings in the validity and utility of selection methods in personnel psychology, Schmidt and Hunter confirmed that the evidence from research for the validity of GMA measures in predicting job performance is stronger than for any other construct. Other researchers have concluded that "*g*" is "the single most useful worker attribute for predicting job performance, as a valid predictor in all types of jobs" (Gottfredson, 1986).

This special position of GMA, however, has been met with criticism and skepticism. For

instance, researchers in psychology and education have criticized the view that what matters for success is intellect alone as creating a false "IQ-mystique" (e.g., Goleman, 1998). In Goleman's view, given the emphasis that schools and admissions tests put on it, IQ alone "explains surprisingly little of achievement at work or in life". While he noted that when IQ test scores were correlated with people's career success, IQ accounts for at most about 25 percent, and therefore the rest of job success was left unexplained (Goleman, 1998: 19). Other researchers give an even lower number, stating that GMA accounts for between 10% to 20% of such success with 80% to 90% explained by other factors (Gardner, 1995; Mayer & Salovey, 1997). We echo this view and argue that EI is an additional factor that makes an incremental contribution to predicting job performance and work success on top of GMA.

There are two related arguments that help explain why EI has incremental predictive power for job performance. First, the predictive validity of EI over GMA may be understood from the study of the human mind. Based on early work by Mendelssohn (1755/1971) and historical reviews by Hilgard (1980) and Mayer (1995), Mayer and Salovey pointed out that "Since the eighteenth century, psychologists have recognized an influential three-part division of the mind into *cognition* (or thought), *affect* (including emotion), and *motivation* (or conation). Specifically, the cognitive sphere includes such functions as human memory, reasoning, judgment, and abstract thought and intelligence is typically used to characterize how well the *cognitive* sphere functions; the *affective* sphere of mental functioning includes the emotions, moods, evaluations, and other feeling states, including fatigue or energy; the last sphere, *motivation,* refers to biological urges or learned goal-seeking behaviors" (1997: p. 4).

The *affective* component of the human mind is clearly related to EI. A person's ability to

understand and to regulate his/her emotions would influence his/her affect, moods and feelings. The *motivation* part of the human mind is related to the EI dimension of "use of emotion to improve performance". People with strong learned goal-seeking behaviors would make use of their emotions to direct their behaviors towards their goals. EI is, therefore, more related to the affective and motivational spheres of the human mind whereas GMA is mainly related to the cognition sphere of the mind. Since all three parts of the human mind are related to human performance, it is logical that both GMA and EI make their own unique contributions to job performance.

Second, a related but somewhat different perspective that supports the unique contribution of EI to performance above and beyond GMA is the theoretical framework of performance. Interestingly, although one of the most important dependent variables in management studies, performance has itself been the subject of very little theory building. Campbell (1990) and Campbell, McCloy, Oppler, and Sager (1993) highlighted this lack of a common understanding and theory of "performance" and proposed a model that specifies the content of performance, its direct determinants and its critical dynamic properties. We choose Campbell's (1990) job performance model in our discussion of the effects of EI and GMA on performance for two reasons. First, it is the most prominent job performance model in the literature, compared with a few other relevant performance theories (e.g., Hunter, 1983; Pritchard & Roth, 1991). Second, it matches with the aforementioned three-part division of the human mind and provides a good theoretical framework with which to study how EI affects job performance.

Campbell's (1990) model makes clear distinctions among performance components, performance determinants, and the predictors of performance determinants. Performance

components are performance dimensions that constitute various parts of the overall job performance. In Campbell's model of performance, eight performance components are identified such that they are "sufficient to describe the top of the latent hierarchy in all jobs in the *Dictionary of Occupational Titles*" (Campbell et al., 1993: 46). Three major types of individual differences determine the success of each performance component. These individual differences are labeled as the "performance determinants". The three major performance determinants are "declarative knowledge, procedural knowledge and skill, and motivation" (Campbell, 1990: 705; Campbell et al., 1993: 43). Declarative knowledge (DK) includes knowledge about facts, principles, goals and self-knowledge, which represents an understanding of a given task's requirements. Procedural knowledge and skill (PKS) includes cognitive skills, psychomotor skills, physical skills, self-management skills, and interpersonal skills. Motivation (MOT) is a combined effect from three choice behaviors: the choice to perform, the level of effort, and the persistence of the effort. Campbell posited that each of the eight performance components is a function of the product of the three performance determinants; that is, $PC_i = f(DK \times PKS \times MOT)$, where PC_i is the *i*th performance component. Finally, performance predictors are variables that will lead to individual differences in performance determinants. We argue that GMA is related to DK and PKS, while EI is related to MOT and part of PKS. Since GMA and EI are related to different components of the performance determinants, EI predicts performance above and beyond that of GMA.

GMA is a reasonable predictor of "declarative knowledge" (DK) and part of "procedural knowledge and skills" (PKS) because DK refers mainly to an individual's cognition and understanding of his/her external worlds in the job environment. GMA predicts PKS because

part of PKS consists of cognitive and psychomotor skills, which are important components of GMA. On the contrary, EI is a reasonable predictor of "motivation" (MOT) because individuals with high EI are able to regulate their emotions and use their emotions to improve their performance. They should then be able to focus their efforts and maintain their motivation level. Furthermore, EI predicts PKS because part of PKS consists of self-management and interpersonal skills, which are highly related to EI.

Our conceptualization of GMA and EI as predictors of Campbell's three performance determinants also matches well with the three-part division of the human mind mentioned above. The relationships are diagrammatically represented in Figure 1. First, GMA is closely related to the cognition domain of the human mind and it is primarily related to DK and part of PKS in the job context. Specifically, individuals with strong cognitive skills or who have high GMA have a higher ability to master DK and some parts of PKS. This, in turn, will have favorable effects on their performance levels. Second, EI is closely related to the affective and motivation domains of the human mind and it is primarily related to MOT and part of PKS in the job context. Specifically, individuals with high ability in the motivation and affective domains or with high EI have higher ability to master the MOT job determinant and some parts of PKS in the job context. This will then result in favorable effects on their job performance levels.

Insert Figure 1 about here

From the above discussion, it seems clear that even for jobs that require high GMA, EI

may still play an important role so far as the MOT job determinant is important for job performance. For jobs that require high GMA such as research and development positions, there may be a lot of uncertainties. Various negative emotions such as fear and anxiety could be aroused. Employees need to maintain an optimistic view to overcome the negative impact of emotions due to failure, frustrations and pressures to get results. Instead of GMA, EI may be more important in dealing with such negative impacts. Thus, we propose:

Hypothesis 1. Emotional intelligence has predictive power for job performance for employees in jobs that require high GMA, such as research and development scientists.

MEASUREMENT: SELF-REPORTED VERSUS ABILITY TESTING

A considerable part of EI research has focused on its measurement. As Mayer, Caruso, and Salovey noted, "The development of theoretical models of emotional intelligence has been paralleled by the development of tests to measure the concept" (2000b: 320). However, compared with an emerging definition of EI, there is little consensus on its measurement methods (Salovey, Woolery & Mayer, 2001). Debate on EI in the literature is often caused by the lack of an established measure. For example, Davies et al. (1998) concluded that EI was an "elusive" construct because, in factor analyses, measures of EI-related scales overlapped with the well-established personality factors. However, Salovey et al. (2001) criticized this conclusion as "incredibly premature". Law et al. (2004) also disagreed and noted that this conclusion was not justifiable because the EI-related scales under investigation were not developed based on their adopted four-dimensional definition of EI. Law et al. (2004) also successfully demonstrated that when properly defined and measured according to the

four-dimensional definition, EI was a distinct and useful construct for psychological and management research.

There are two types of EI measures: task-based tests and self-reported scales. Scholars in favor of task-based tests stated that EI can be assessed most directly by asking a person to solve an emotional problem (Mayer et al., 2000a; Salovey et al., 2001). So far, the most prominent measures of this type are the Multifactor Emotional Intelligence Scale (MEIS) and a newer version of this scale, the Mayer, Salovey, Caruso Emotional Intelligence Test (MSCEIT) (Mayer, Caruso & Salovey, 2000). Both tests are based on the ability-based EI model (Salovey & Mayer, 1990; Mayer & Salovey, 1997). The MSCEIT has four subscales, each of which includes several subsets. *Perception of Emotion* contains three subsets asking how much a certain emotion is expressed in pictures of human faces, landscapes and abstract designs. *Emotional Facilitation* contains several subscales but centers on the synesthesia subscale, which asks participants to judge the similarity between an emotional feeling, such as love, and other internal experiences, such as temperatures and tastes. *Understanding Emotion* examines how participants make emotional judgments through a variety of tasks, such as matching close emotions and reasoning why certain emotions are felt. *Managing Emotion* asks participants to choose the best way to achieve certain emotional goals in various situations, such as what the best action is for a sad person who wants to cheer up, "talking to some friends," "seeing a violent movie," "eating a big meal," or "taking a walk alone."

Compared with the limited number of task-based tests, many self-reported EI scales have been developed, such as the Emotional Quotient Inventory (EQ-I; Bar-On, 1997), the Trait Meta-Mood Scale (TMM; Salovey et al., 1995) (see Salovey et al., 2001 for an extensive

review of available measures). Usually, self-reported measures ask the participant's judgments on a series of descriptive statements, such as "It is difficult for me to control my anger". Self-reported scales can also be used in the context of the evaluation of others, that is, asking the informant to judge a focal person on the items in the self-reported scale (e.g., "It is difficult for X to control his/her anger") (Law et al., 2004).

Since EI is argued to be a facet of intelligence, direct and objective assessments seem to be better measures than do self-evaluation measures. However, unlike traditional general intelligence tests that have definite correct answers, EI tests must define which one is the correct choice. Developers of task-based tests argue that there are evolutionary and cultural foundations for the existence of "correct" answers (Mayer et al., 2000b). Three alternatives have been proposed as the criterion to identify these correct answers: target answer, expert judgment, and group consensus. Positive correlations were found among the three criteria and the group consensus criterion appeared to be the single best means (Mayer et al., 2000b). Unfortunately, norm-referenced criteria may not apply in cross-cultural settings. For instance, a non-reactive quiet response by a subordinate to his/her boss who made unreasonable demands may be seen as "smart" among Chinese respondents in the People's Republic of China but probably not among U.S. respondents (Law et al., 2004; Wong, Law & Wong, 2004; Wong, Wong & Law, 2007). Moreover, tests developed by U.S. scholars may not consider the cultural background of the participants. For instance, in some MSCEIT items, respondents are asked to judge the amount of a certain emotion expressed in pictures of several faces, but Asian participants who are not familiar with the U.S. culture may not be able to "read" the faces correctly. Some MSCEIT questions require a certain feeling for art to make judgments on the

expression of emotion, for example, in an abstract colorful design. Specific artistic feelings may differ across cultures on such things as the underlying meanings of various colors. This may make norm-referenced criteria unreliable or invalid across cultures. While high reliabilities of the MEIS and the MSCEIT have been provided by the developers using U.S. samples (sub- and full-scale internal consistency around .90; Mayer et al., 2000b), little other empirical evidence, especially from outside the U.S., has been published.

In contrast, while self-reported scales may be affected by participants' incorrect self-perceptions, social desirability or positive affectivity, they have some comparative advantages. First, they avoid possible assessment clues or methods to get the correct answers because they ask the respondent to make direct judgments. Second, they can be used to evaluate others (e.g., Law et al., 2004) so that self biasing problems can be avoided. Third, self-reported measures have been employed for a relatively long time and empirical evidence has shown that they can have acceptable reliability, along with convergent, discriminant and criterion validity (see, e.g., Wong & Law, 2002; Law et al., 2004). Fourth, feedback about one's ability to handle emotions may be very frequent in social interactions and thus one's evaluation of this type of ability may be more accurate than evaluations of other types of abilities, such as reasoning and logical deduction. Finally, one attractive feature of such instruments to organizational researchers is that they are usually more practical than the available objective tests because of concerns of the cost of money and time.

As the self-reported WLEIS has been shown to be an EI measure with acceptable reliability and validity for Chinese samples while some of the MSCEIT items may be culturally specific, we predict that:

Hypothesis 2. Emotional intelligence as measured by the WLEIS developed from Chinese samples has better predictive power for Chinese workers' job performance than does the MSCEIT, which was developed from U.S. samples.

On top of job outcomes, life satisfaction should, in theory, be positively related to EI. Intrapersonal emotional recognition and management will help an individual to deal with his/her emotions. A person with high EI should be able to recognize his/her emotions, to regulate these emotions and to use these emotions to facilitate performance. As a result, this person should be happier as a whole in life. Several empirical studies have provided evidence of this positive relationship in Chinese samples (e.g., Wong & Law, 2002; Wong, Wong & Law, 2005). To provide further evidence about the predictive power of the two EI measures, we include life satisfaction as a dependent variable in our study. Specifically, we test the following hypothesis:

Hypothesis 3. Emotional intelligence as measured by the WLEIS developed from Chinese samples has better predictive power for Chinese workers' life satisfaction than does the MSCEIT, which was developed from U.S. samples.

METHOD

Sample and Procedures

The data used in this study were collected from employees in the research laboratory of a large Chinese computer company in Beijing. The company has more than 12,000 employees and there are 120 employees in this research laboratory. We sent out invitations to all research laboratory employees to participate in the study. All employees were assured of data

confidentiality and that the study was for research purposes only. Each employee was then contacted in person by one of the authors. Those who were willing to participate completed the Wonderlic test (a well-known test of GMA) within specific time limitations in the presence of one author. Then, the employee was allowed to fill in the rest of the survey questionnaire and to return it to this author later. Participation was voluntary and 102 employees agreed to participate in the study and returned their questionnaires, with a response rate of 85%. These 102 employees formed the final sample of this study. Among all participants, the mean age was 27 (see Table 1); 78% were male; and 70% had earned a graduate degree. While it is understandable that up to now, the majority of research and development scientists are male in China, it should be noted that with such a small number of female respondents, generalizing our results to female scientists should be done with cautions. Objective performance measures were obtained from the participants' job appraisal records kept in the human resource department of the company.

Variables and Measures

Job performance. The company's formal appraisal of the employees' performance was used as the measure of job performance. The research laboratory of the company has a formal evaluation system that evaluates performance with one of six marks, C, B-, B, B+, A-, and A, from low to high (coded as 1 through 6, correspondingly). The evaluation is based on the employee's overall job performance, which is directly related to their current and past research outputs. We noticed that the highest appraisal of "A" is seldom given, and the proportion of employees being evaluated as "C" in the laboratory is as low as 10 percent because employees with such a poor evaluation would usually be fired.

Emotional Intelligence. Two measures of EI were used. The first measure was the 16-item *WLEIS* developed by Wong and Law (2002). Coefficient αs for the EI dimensions of self-emotion appraisal, others-emotion appraisal, emotional regulation, and utilization of emotion were .82, .81, .87 and .89, respectively. The second measure was the *MSCEIT* (Mayer et al., 1999), which yields scores of four EI dimensions: perceiving emotions, using emotions, understanding emotions, and managing emotions. It includes 141 items and takes around 30 to 45 minutes to finish. The MSCEIT was scored by the test developer. No information on test reliability was provided, and, as a result, we did not report reliability measures in Table 1.

General Mental Abilities. We attempted to control for the effects of GMA on job performance in this study in two ways. First, most participants had very high education levels (70% had graduate degrees) and had occupied similar research positions in another company. This company is famous for its research and development in the China. It has a rigorous selection process based on academic performance and interview results. This, together with the fact that employees were constantly assessed and only the top performers remained in the company, leads us to the assumption that its employees would have quite homogenous GMA scores. Second, we controlled for the effects of GMA on job performance by directly measuring it with the Wonderlic Personnel Test (WPT; Wonderlic Inc., 1999). This GMA test, developed by E.F. Wonderlic in 1937, has been used worldwide for more than 60 years with widely accepted reliabilities and validities. The mean score of our participants was 37.5. According to the Wonderlic User's Manual, the average score for high school graduates is about 18.7 and that for college graduates is around 25.8. The exceptionally high mean

Wonderlic score of 37.5 confirmed our argument that GMA was well above average in our sample of research and development employees.

***Life Satisfaction*.** This was measured by 9 items from the scale developed by Campbell, Converse and Rodgers (1976). The first eight items of this scale include pairs of opposite adjectives (e.g., interesting versus boring, enjoyable versus miserable) with a 7-point Likert-type scale of numbers between them. Participants are requested to circle the number that best describes their feeling towards their lives. The last item is a direct question asking about the level of satisfaction in life, namely, "how satisfied or dissatisfied are you with your life as a whole?" The coefficient α of these items was .89 for this sample.

***Control variables*.** We controlled for four demographic variables: age, measured by the actual number of years; gender dummy (1 for male, 2 for female); educational level (with 1 to 5 indicating degree from low to high: two-year college graduate, four-year university graduate, master, doctoral, and post-doctoral), and job tenure, measured by the number of years that an employee has been in his/her current position in the company.

RESULTS

The means, standard deviations, and correlations among all the variables are presented in Table 1. Table 1 shows that most of the measures have acceptable reliability estimates. Mean scores of the four MSCEIT dimensions (84.94, 92.45, 82.41 and 77.58 for perceiving emotions, using emotions, understanding emotions, and managing emotions, respectively) of our sample are well below the figures provided by the publisher (mean score = 100). This confirms our argument that task-based EI tests may reflect cultural biases. Despite the fact that our

participants are highly educated, their scores are relatively low when compared to the U.S. respondents. The first-order Pearson correlations also provide some preliminary evidence for this argument. Life satisfaction is significantly related to two dimensions of the MSCEIT (*r* = .24 and .31, respectively for using emotions and managing emotions) and two dimensions of the WLEIS (*r* = .35 and .23, respectively, for emotional regulation and utilization of emotion). Job performance, however, is not related to any of the MSCEIT dimensions but significantly related to two dimensions of the WLEIS (*r* = .26 and .20, respectively, for other's emotional appraisal and emotional regulation).

Insert Table 1 about here.

Before testing our hypotheses, we conducted a confirmatory factor analysis (CFA) on the WLEIS scale because the factor structure was known. The key fit indices from the CFA supported the four-factor model (CFI = .93; TLI = .92; RMSEA = .07). The correlations among the four WLEIS dimensions were all moderate and significant (*r* ranged from .20 to .33) except one insignificant correlation between the dimensions of other's emotion appraisal and utilization of emotion (*r* = .16).

To test the incremental predictive validity of EI measured by the MSCEIT and the WLEIS, we ran a hierarchical linear regression using job performance and life satisfaction as dependent variables. After entering the four control variables and GMA as the first block, we entered the EI dimensions of each measure in the second step. Results from the regression analyses are shown in Table 2. After controlling for all the control variables and GMA, we found that the

WLEIS has incremental predictive validity for both job performance (ΔR^2 = .10, p < .05) and life satisfaction (ΔR^2 = .12, p < .05). However, the MSCEIT only has incremental predictive validity for life satisfaction (ΔR^2 = .14, p < .05) but not for job performance (ΔR^2 = .05, p > .05). These results provide support for hypotheses 1 and 2. Although EI is related to life satisfaction as expected, the overall predictive power of the WLEIS and the MSCEIT appear to be comparable, which means that hypothesis 3 is not supported by the results.

Insert Table 2 about here.

To further compare the WLEIS and the MSCEIT, we conducted some additional confirmatory factor analyses using their dimensions and the life satisfaction items. Due to the limited sample size, we calculated three indicators of life satisfaction by randomly averaging its original measurement items. Thus, we had four indicators for the WLEIS, four indicators for the MSCEIT and three indicators for life satisfaction. The fit of the three factor model was only marginally acceptable (CFI = .87; TLI = .83; RMSEA = .09). When the indicators of the WLEIS and the MSCEIT were forced to be indicators of the same factor, the fit was totally unacceptable (CFI = .82; TLI = .77; RMSEA = .11), indicating that the dimensions of the WLEIS and the MSCEIT do not form an underlying emotional intelligence factor. However, when the WLEIS indicators are dropped, the fit of the two-factor (i.e., the MSCEIT and life satisfaction) model is acceptable (CFI = .95; TLI = .92; RMSEA = .08). Similarly, when the MSCEIT indicators are dropped, the fit of the two-factor (i.e., the WLEIS and life satisfaction) model is acceptable (CFI = .97; TLI = .95; RMSEA = .06).

DISCUSSION

In the past one and a half decades, we have observed a rapidly growing interest in EI in both in popular media and among researchers in psychology, sociology, education, and management areas. However, scientifically rigorous studies for the validation of the construct are still far from satisfactory. In comparison to other areas, such as education and psychology, up until now, there has been a regrettable lack of attention from organizational researchers on the EI construct. Some studies have shown the construct validity of EI and its potential utility for management studies (e.g., Mayer et al., 2000b; Wong & Law, 2002; Law et al., 2004), however. As an effort in this under-researched area, this study contributes to the literature in two ways. First, it demonstrates that the effect of EI on job performance is also valid for a job position that requires a very high GMA. We have drawn on Campbell et al.'s performance component model and conducted an in-depth analysis to show conceptually how GMA and EI could have independent effects on job performance. Second, by focusing on two EI measures, the task-based test the MSCEIT developed in the U.S. and the self-reported WLEIS developed in China, we discussed and compared these two types of EI measures. Theoretically, as a set of abilities related to handling emotions, EI should be a universal construct across cultures. However, given that there are no universally correct answers on how one should respond to aptitude test items across cultures, task-based tests developed in a particular culture may have limited validity when used in other cultures. In this regard, we expected that the WLEIS would be a better predictor of job performance among Chinese employees. In this regard, we found evidence for the incremental predictive validity of the WLEIS on job performance, but not for

the MSCEIT. The relatively low scores on the MSCEIT of our sample may be a demonstration of the potential problems of using the MSCEIT in countries other than the United States. Although MSCEIT scores are related to life satisfaction, it is not able to predict performance and does not load on the same factor as WLEIS. These raise serious doubts about its validity of capturing the true EI level of Chinese respondents.

Findings from this study have at least three implications. First, they provide evidence for the validity of EI to predict job performance, which adds to our knowledge of the importance of EI in the workplace. As Schmidt and Hunter (1998: 266) said, incremental validity "translates into incremental utility, that is, into increases in practical value". Personnel psychologists have argued that when any other personnel measure, such as the integrity test or the conscientiousness test, is used, one question must be asked; that is, "…how much will each of these measures increase the predictive validity for job performance over the .51 that can be obtained by using only GMA?" (Schmidt & Hunter, 1998: 266) Results from this study demonstrate that on top of GMA, EI still accounts for about 10 per cent of overall job performance.

Second, this study further confirms some recent works (see, e.g., Davies et al., 1998; Law & Wong, 2002) on defining EI as a four-dimensional construct and views EI as an overall measure of a set of interrelated abilities. We, therefore, suggest that researchers use this definition of EI in future EI research. Third, through a comparison of the task-based and the self-reported measure of EI, we see that there are pros and cons for both types of measures. A self-reported EI measure, when designed properly, may still be important in EI research. However, we do not mean to downplay the importance of task-based EI measures. Instead, we

believe that EI should be measured by task-based tests provided that they can be modified and adjusted across cultures. Further efforts in this direction should be encouraged.

As an early effort in this emerging field, our study has several limitations. First, our study was conducted in one company without diverse job types in the sample. This may limit the generalizability of the results. However, we chose this design because it involved less confounding factors so that performance could be comparable. Another advantage is that we used objectively based overall job performance appraisal information from the company with variations in GMA controlled for the position. This may be the reason that in our study, GMA is not a significant predictor of job performance. Second, although using an objective measure of job performance allows us to avoid the problem of common method variance, common method variance is still a problem for the life satisfaction measure. However, the predictive power of EI on these two variables is consistent with previous findings using different sources of information (e.g., Law et al., 2004). Thus, common method variance may not be a serious problem here. Third, an ideal research design to test the proposed model of the relationships among human mind, EI, GMA, and job performance is to use performance measures that fit Campbell's performance model, that is, to use measures of the three components of performance. However, the availability of such job performance data prevented us from a more direct test in the present study. Future studies are needed on this issue. Finally, both of the two EI measures we chose were newly developed. While we can compare our results with some previous studies using the WLEIS, empirical evidence for the reliability and validity of the MSCEIT is still needed for us to make comparisons. The result of our additional CFA analyses that the MSCEIT and the WLEIS dimensions do not converge on the same factor may indicate

that there are some biases in either or both of these measures. Given the results that the MSCEIT is not able to predict job performance and its relatively low scores for this highly educated Chinese sample, more validation evidence appears to be necessary before the MSCEIT can be used to measure the levels of EI among Chinese respondents. It may be worthwhile to re-examine all the MSCEIT items to determine what the correct responses should be in the Chinese culture, instead of directly using the original scoring mechanism.

It is somewhat ironic that with its overwhelming popularity in the mass media, EI seems to be losing its attractiveness as a solid construct in the academic arena. It is encouraging that scholars have accumulated evidence about its potential contribution to management research when EI is properly defined and measured. With these efforts toward establishing a generally accepted EI construct, future research could investigate its relationship with many other well-established constructs in organizational research.

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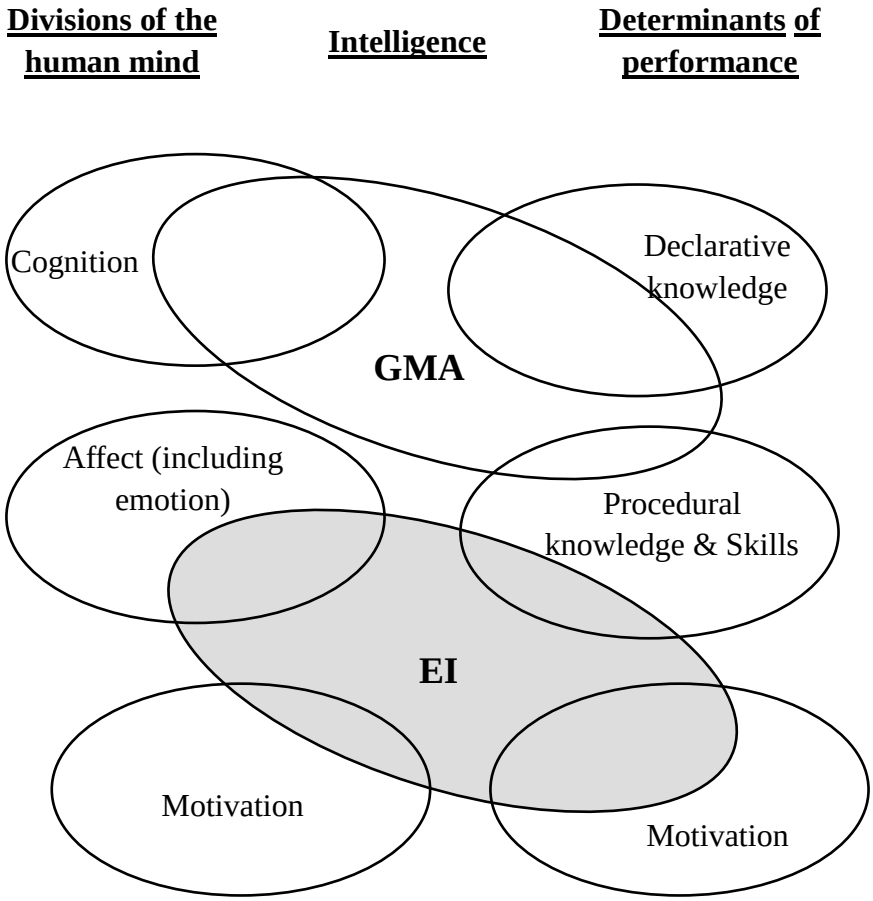

Figure 1

The relationship among GMA/EI, the divisions of the human mind, and the determinants of performance

TABLE 1
Descriptive statistics, Reliability Coefficients, and Correlations[a, b]

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.AGE	27.14	4.00														
2.GEN	1.21	.41	-.03													
3.EDU	2.81	.72	.23**	-.01												
5.TEN	.87	1.24	.65**	-.06	-.12											
5.GMA	37.503	4.99	-.27**	.04	.02	-.18										
6.M1	84.94	19.20	.06	.21*	-.03	.03	-.07	--								
7.M2	92.45	22.62	-.09	.02	-.01	-.13	-.02	.36**	--							
8.M3	82.41	17.13	-.10	-.10	.04	-.09	.21*	.24*	.38**	--						
9.M4	77.58	16.63	-.14	.20	-.15	-.02	.13	.30	.22	.12	--					
10.W1	5.46	.88	-.00	.10	.08	-.01	-.02	-.05	.12	-.04	.16	(.82)				
11.W2	4.63	1.10	-.06	-.16	.12	-.04	-.04	-.19	-.10	-.09	.06	.33**	(.81)			
12.W3	5.40	1.04	-.22	.11	-.10	-.14	-.05	.08	.18	-.07	.32**	.32**	.29**	(.87)		
13.W4	4.86	.69	-.06	.09	.02	-.03	.10	.24*	.13	-.16	.39**	.20*	.16	.32**	(.89)	
14.LS	5.54	.86	-.11	.12	-.16	-.05	.17	.18	.24**	-.07	.31**	.10	.07	.35**	.23*	(.89)
15.PF	3.34	.82	.10	.04	.13	-.01	-.07	-.16	-.13	-.02	-.04	.14	.26*	.20*	.00	.13

*p<.05; **p<.01

[a] n = 102. Internal consistency reliability coefficients (alphas) appear on the diagonal.

[b] GEN=Gender (1 for male, 2 for female), EDU=Education (with 1 to 5 indicating degree from low to high: two-year college graduate, four-year university graduate, master, doctoral, and post-doctoral), TEN=Tenure (number of years), GMA=General Mental Ability, M1=MSCEIT_ Perceiving Emotions, M2=MSCEIT_ Using Emotions, M3=MSCEIT_ Understanding Emotions, M4=MSCEIT_Managing Emotions, W1=WLEIS_Self Emotion Appraisal, W2=WLEIS_Other's Emotion Appraisal, W3=WLEIS_Emotional Regulation, W4=WLEIS_Utilization of Emotion, LS=Life Satisfaction, PF=Performance.

TABLE 2
Results of hierarchical multiple regression[a]

	Performance		Life Satisfaction	
Variable	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Age	.14	.19	-.03	.03
Gender	.09	.07	.03	.07
Education	.09	.07	-.12	-.15
Tenure	-.11	-.09	-.02	-.03
GMA	-.10	-.01	.06	.05
MSCEIT				
Perceiving Emotions	-.18		.06	
Using Emotions	-.12		.24*	
Understanding Emotions	.09		-.21^{+}	
Managing Emotions	.05		.22*	
WLEIS				
Self Emotion Appraisal		.00		-.02
Other's Emotion Appraisal		.23*		.00
Emotional Regulation		.19^{+}		.30**
Utilization of emotion		-.09		.14
ΔR^2	.05	.10*	.14**	.12*
F change	1.09	2.59*	3.67**	3.38*
Model R^2	.08	.13	.18	.17

[a] n = 102.

$^{+}$P<.10; *p<.05; **p<.01