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Creative Work Environment correlates to Job Satisfaction and Creative Self-Efficacy in Two Medical Professions

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Abstract

Objectives. This study examined the relationship between creative work environment, creative self-efficacy, and job satisfaction among two medical professions.

Methods. The participants were 61 allied health staff in two medical professions from the same hospital, namely physiotherapist (n=26) and radiographers (n=35). They completed a questionnaire that assesses creative work environment, creative efficacy, job satisfaction, and demographic information. A pilot test was carried out to confirm the internal consistency of the revised Western scales used in the local study.

Results. The Cronbach’s coefficients alpha were high ranging from .75 to .90, indicating high internal consistency and reliability of the items in the scale. The results suggested that physiotherapists perceived their work place as more creative, had higher level of creative self-efficacy, and had higher job satisfaction than radiographers did. Creative work environment was found to be a good predictor of participants’ job satisfaction and creative self-efficacy level. Also, the interactive effect of perceived creative work environment and creative self-efficacy on job satisfaction was found to be non-significant. Duration of professional service had no effect on participants’ creative self-efficacy level. In addition, the creative work environmental subscale “pressure” and “encouragement for creativity” were
shown to be the most prominent factors responsible for the differences in the perception of creative work environment between the two medical professions.

**Discussion.** Promoting a creative work environment in medical field is as important as in other work fields, since such environment enhances staffs’ job satisfaction and creative self-efficacy level. Most importantly, it has been shown that job satisfaction and job performance are correlated (Iaffaldano & Muchinsky, 1985). This two-way buffering effect may result in the improvement of hospital service to patients.
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The study of human creativity is not a new topic in the psychological research. Research on creativity has increased rapidly in the 1950's and most of the studies are focused on: (a) creative individual's personality characteristics (Barron, 1955; Helson, 1965); (b) the way to train individual to be more creative (Gordon, 1961); (c) development of the testing materials to measure individual's creative ability (Torrance, 1966) or (d) investigating the factors which initiate individual to solve problems creatively etc. However, research focusing on the influences of working environment on individual's job satisfaction and creative efficacy is rare.

Although different approaches are employed by different researchers to explore creativity, their result is similar. They commonly define creativity as the production of novel and useful ideas in any domain. However, innovation is a term closely related to creativity and some researcher even defined creativity as a subset of innovation. To make it clearer, innovation is the successful implementation of creative idea in any domain. Creativity and innovation seem to have close relation with each other. It is very important for people to use creative ideas and innovative mind to facilitate the always 'changing' world. In fact, creative mind is useful in every aspect of our daily life. It is more obvious when creativity involved in the occupational fields, which require a lot of innovative ideas for their fast growing needs. These include the
industrial, business and managerial fields etc. A lot of projects and researches have been carried out to study creativity in the fields mentioned above. A large proportion of the participants in these studies came from business, research and design fields. However, it does not mean that creativity is not needed to support the effective operations of the other work settings. In fact, the importance of creativity in other work settings is unquestionable. A possible explanation for this phenomenon is due to the fact that research on organizational creativity is still rare. As many factors and characteristics are involved in creativity, separate studies on different aspects are carried out in order to clarify the relationship between these factors and creativity. They need time to explore how and to what extent each factor is related to creativity in the work place. It encourages continuous investigations on organizational creativity. Another reason for encouraging organizational creativity research is that the generalization of result gained from particular work field to others is still in question. It is because different work settings may have different work environment. Also, different factors may have different degree of influence on creativity when applied to different work fields.

Research on creativity in medical field is also rare. In fact, medical field does require as many creative ideas as other work fields although it is not obvious. One of the important points of creative ideas in medical field is to improve the hospital service for the patients. One thing I want to emphasize is that people who work in hospital may experience higher
level of stress than people who work in other fields. It is because even minor fault in a medical procedure might lead to severe irreversible result involving loss of human life. This responsibility is a source of stress due to their job nature. On the contrary, fault caused by people who work in other fields, say the business field, may at worst resulting in loss of a great deal of money. Thus, stressful working environment is everyday reality for people who work in medical field. Due to this special character in their job nature in medical field, this study aims at finding out how creative work environmental factors influence people working in this particular field. This study will concentrate on exploring relationship between perception of work environment, job satisfaction and creative efficacy level of people who work in hospital.

Job satisfaction is an attitudinal variable that reflects how people feel about their jobs overall as well as about various aspects of them. In simple term, job satisfaction is the extent to which people like their jobs; while job dissatisfaction is the extent to which they dislike the job. Also, job satisfaction is related to one's life satisfaction, which is considered to be an indicator of overall happiness or emotional well-being (Judge & Watanabe, 1993). So, job satisfaction is an useful concept to be chosen as one of the variable of the study to indicate if there is any influence of creative work environment on one's life.

Another reason for this study is that research on creativity has a relatively long tradition in the West. Development in empirical studies into creativity has lagged behind in the Eastern
culture. Hong Kong is a very special place where the East meets the West. The intrusion of westernized ideas affects the original Chinese cultural thinking. So Hong Kong people may be more difficult to adjust themselves comfortably, as there is the presence of two different cultures, which may influence individual behavior. The older generation of Hong Kong people prone to follow the old traditional Chinese culture and the Confucian thinking. The harmony of the Yin and Yang was regarded as an ideal state to pursue a perfect life. People tried to do things in order to keep everything in a harmonious state and attain the balance. They pursued the idea of compromise, moderation and conformity etc. Moreover, the traditional Chinese society encourages cooperation, acceptance, compromise and conformity. This entire characteristic seems to violate the criterion of creativity. As a result of this, Chinese people are considered to be less creative when compared to people in the Western countries (Bond, 1991). However, in the latest study on the creativity level of the Chinese primary school children as compare to the school children in the West, results obtained seem to have contradiction with the assumptions. (Rudowicz, Kitto, & Lok, 1994). The performance of the Hong Kong school children on the non-verbal scales of the Torrance Test of Creative Thinking was higher than participants of other countries do. But on the other hand, their performance on the Verbal Scales of the test was lower. Due to the fact that Hong Kong was a colony before 1997, most of them think that their future is unpredictable, so they try their best to earn a lot of money. They usually think that money is the only thing which can save them and provide them a sense of
security. They also think that creativity can only be related to activities of businessmen and politicians rather than those of artists. It is because they would like to link creativity to more pragmatic thing such as enrichment and job achievement. As Hong Kong united with China in 1997, Hong Kong people may think that their cultural and ethnic identities are approved. So people may, more or less, change their view over creativity. It may be an explanation of why Hong Kong people perceive creativity in a more similar manner to the people of Western countries in the more recent studies. Also, due to the Colonial background of Hong Kong for more than a century, the westernized characters of Hong Kong people are also more prominent when compared to people living in other Asian countries. The Western culture has been instilled into the mind of the new generation. It enhanced the characteristic of creative behavior of Hong Kong people. However, when Mooney's four P's approach is used to assess the creativity level, Hong Kong people's perception on creativity do fit the person, product and process, with less emphasize on the press aspect of the model (Rudowicz & Hui, 1998). It means that Hong Kong people do not put the environmental factor into consideration to describe creativity. It is worth studying the creativity of Hong Kong people by putting more emphasis on the environmental factor. Also, Hong Kong people are characterized by hard working. Most Hong Kong Chinese would like to put first priority in earning money, especially when they experience the financial downstream period recently. They prefer spending time in working instead of spending time with their families. Work life becomes
essential part of their daily life. It further supports the notion that working environment will exert considerable effect on creativity.

Finally, as human behavior is the interaction between individual and the current situation, environmental factors should be taken into consideration to predict one's behavior. This is also one of the reasons of studying creativity under the influence of environmental factor.

In this study, radiographers and physiotherapists are chosen as the two medical professions for comparison. It is because their job nature is completely different although they are both the allied health staff in a hospital. The main duty of radiographers in the X-ray Department is to help radiologists making diagnosis of patients by using different medical imaging modalities and procedures. What they are supposed to do is to follow the radiologists and other medical specialists' instruction to produce radiographic images with diagnostic value. Each procedure of their work is fixed or rigid and should follow the rules of doctors. They have no right to control and decide their own working procedures or pace. New ideas and suggestions that deviate from the conventional one are not appreciated. On the other hand, physiotherapists have to design a specific training procedures for each patient according to their medical need. After interviewing the patient each time, they have their right to change the treatment type, which they think will help the patient. They are encouraged to modify the
treatment sequence that fit different patient. Also, they may discuss the treatment pace of the patient with doctors.

However, these two professions bear some similar backgrounds. They are regarded as allied health working teams in the hospital service. People who work in these two professions have similar academic qualifications and most of them graduated from the same academic institution. They have the same ranking system and receive the same pay scale. The two groups of participants invited to take part in the study are working in the same hospital. Participants with the same rank are chosen because past research showed that people at more senior level reported higher job satisfaction (Burke, 1996). Conducting study in a single organization helps to control the effects of context variables. It can also be assumed that they are experiencing similar physical working environment and similar financial support from the hospital. Therefore, the results obtained from this study should be least affected by other intervening variables as most of them are being controlled.

The main objective of this study is to compare the working environment of radiographers and physiotherapists. The focus is the creative aspect of their work environment factors. However, creative efficacy level and job satisfaction level are the two dependent variables. How these two variables are influenced by creative work environment will be investigated.
The first part of the literature review section explains the concept of creativity by using an interactionist perspective. In this model, four important elements are considered. Each of the elements will be examined and related to the hospital setting. The second part links creativity to the organizational level and explain how creative work environment is important in organization. The discussion on the environmental factors that have influence on individual creativity will be given. The development of measurement scale for creative work environment is reviewed in the third part. Also presented in these three parts are the definition of job satisfaction and creative efficacy. How these two variables, which are related to creative work environment, are being examined by referring to previous research results. Lastly, creativity is considered in a more macroscopic way and the idea of person-environment fit for creativity is also examined.

Literature Review

Several researchers have emphasized the importance of individual and contextual influences on creativity theory development by advancing general theories of creative behavior (Amabile, 1983, 1988; Woodman et al., 1993). The underlying relationship between individual and environment on creativity by two different theoretical models will be examined. The interactionist model on creativity developed by Woodman et al will be examined first followed by Amabile's theoretical model to creativity in the later section.
2.1 Interactionist perspective on creativity

Woodman et al. (1993) developed an interactional framework for organizational creativity proposing that creativity is the result of a person's behavior in a situation. In fact, the variables constituting the work environmental factors should be clearly defined before considering their influences on creativity. Contextual and social factors of the situation influence creative behavior. The person bringing cognitive and non-cognitive characteristics to the situation also influences creativity.

The interactionist model involves the understanding of the creative process, the creative product, the creative person and the creative situation (press), and the way in which these components interact with each other (Harrington, 1990). The situation is characterized in terms of the contextual and social influences that either facilitate or inhibit creative accomplishment. Various antecedent conditions can have influence on an individual as he or she bears both cognitive abilities and non-cognitive traits or predisposition. This interactionist model provides an integrating framework that combines important elements of the personality, cognitive, and social psychology explanations of creativity.

2.1.1. Creative person

Studies of individual differences in creativity have focused on personality characteristics. Personality characteristics have been hypothesized to be related to creativity because they allow the individual to a) have multiple understanding available; b) be willing to use a variety of
understandings; c) be sensitive to inconsistent information; and d) be willing to resolve facts that conflict (Mumford & Gustafson, 1988). So personality is one of the apparent factors influencing the level of creativity in individual. Studies on the personality characteristics of creative individual found that most creative people have some personality characteristics in common. Their personality usually accompanied with the characteristics of having self-confidence, flexibility, aggressiveness, attraction to complexity, risk-taking, a desire for recognition, high energy, intuition, and creative self-image, etc. (Barron & Harrington, 1981). Kogan (1973) described creative individuals as open to experience, having wide variety of interests and an absence of repression and suppression etc. But it did not mean that people who possess these personality characteristics should do thing creatively at all times. However, the personality of an individual can, to some extend, be changed throughout the life.

Some people were creative only in their early adulthood, whereas others began creative careers, or changed the character of their work in their middle age (Nelson, Roberts & Agronick, 1995). When the enduringness of creativity in human is being studied, environmental influence cannot be eliminated to be a factor and should be taken into account. One's preceding experience, social factors and even cultural factors can alter it. Evidences to this issue were obtained in a longitudinal study examining the enduringness of creativity. Although the researchers expected that there would be considerable consistency in creative personality, they also looked for the evidence of two kinds of change. Firstly, they expected
that creative individual would be affected by the kind of work they are engaged over many years. Secondly, they expected that when there was some change over the individual's life circumstances, no matter change for better or for worse, would change the individual's creative vitality. Their results also showed that half of their participants having a change of more than one standard deviation from at least one time of testing to the next in the creative temperament scale. Thus, from the result obtained by these researchers, we could conclude that both work environment and individual life circumstances might have influences over individual creative personality characteristics. The individuals would not behave creatively if they were exposed to environment, which restricted their creativity quality. According to the person-environment fit model, people having creative characteristic will have higher job satisfaction if they work under creativity encouraging environment (Nicholson and West, 1988).

2.1.2 Creative process

Creative process refers to those cognitive factors involved in creative idea production. Researchers have identified a number of cognitive abilities that relate to creativity. The majority of research examining creativity has focused on the influence of individual characteristics on creativity. Two perspectives have mainly emerged from most researches concerning on this aspect. They are (a) the role of individual cognitive processes; and (b) the role of other individual differences in creativity. Cognitive abilities were found to be related to
creativity include intelligence, divergent thinking, associational and analogical abilities, and the ability to use metaphors or imagery. Guildford (1984) has identified the cognitive processes of fluency, flexibility, originality, and elaboration as essential to divergent production. Research concluded that one aspect of creativity is the use of intelligence in unusual and useful ways (Sternberg, 1988). Divergent thinking is the ability to generate multiple potential solutions to a problem. The divergent production has long been considered the cognitive key to creativity and has continued to be a major consideration in creativity research. Many studies have found positive and statistically significant relationships between scores on divergent thinking tests and creativity indexes (Barron & Harrington, 1981). Also, eight factors have been identified as involved in idea production when studying creative process. These include associative fluency, fluency of expression, figural fluency, ideational fluency, speech fluency, work fluency, practical ideational fluency, and originality. Associational or analogical abilities, images, and metaphors also have potential for improving creativity because they provide unique ways to apply understandings (Mumford & Gustafson, 1988).

Basadur, Graen, and Green (1982) postulated a sequential application of ideation and convergent thinking through the stages of problem finding, solution generation, and solution implementation. Thus, for a creative person to produce socially useful products, he or she should use divergent thinking as well as convergent thinking at the same time. Studies also found that special training given to organizational members in creative thinking would
improve their tendency using divergent thinking technique to solve problems (Basadur, Wakabayashi, & Graen, 1990). Furthermore, contextual and social variables may also influence the cognitive process. It is evidential from the fact that social pressures toward conformity may reduce allowable variation, or rigid adherence to algorithms for evaluation of possible associations may bias selection. And in turn, lower the probability to produce creative ideas. The contextual and social variables may refer to working environmental factors when considering a work setting. That means creative work environment should have effects on people's cognitive style to solve problem creatively or conventionally. That means when people works in a creative work setting, he or she will be more likely to solve problem using more creative approach than one who work under creative-restricted work setting.

2.1.3 Creative product

Research by Amabile and her associates (Amabile, 1983; Amabile, Goldfarb, & Brackfield, 1990) documents the value of examining the creativity of individuals and groups within their relevant social settings. The theory developed in these studies bring the perspective of interactional psychology to bear on the integration of process, product, person, and situation into a more comprehensive theory of organizational creativity than previously proposed. However, the interactional ideas provided strong theoretical base from which to model complex behavioral phenomena and the interactionist perspective has great promise.
for explaining human behavior in complex social settings. When people work in-group, it is common to see feedback given by others. And something is operated to influence the feedback loop within the system. These components include (a) the effects of the consequences of behavior on the subsequent behavior of both individuals and within this groups; (b) the feedback provided to individuals and groups through social and contextual influence processes; and (c) the reciprocal influences on the social and contextual situation as individual and group behavior unfolds over time. Feedback given by other members within the organization can be considered a type of creative product in the creative theory. It does exert effect on organizational creativity. For example, when people express their talent by some creative means to solve problem in an organization, rewards such as praise given verbally or in material bases may increase the probability of this creative behavior to happen again. Past studies have put effort on examining creativity in relation to reward and found that the chance to do things creatively is increased when the reward is given afterward. Furthermore, Resources provided by the organization can facilitate creative process. The resources include both the physically existing material and spiritual support. However, spiritual support also can be referred to motivation given by other party. Also, it is most enhanced when someone is intrinsically motivated (Amabile, Hennessey, & Grossman, 1986). Rewards can be in the form of encouragement given by higher level of personnel before the task have been done or sense of achievement after the task have been completed. In a
longitudinal study on the enduringness and change in the creative personality ran by Helson, Robertsm and Agronick (1995), the creative individual are conceptualized as having three components. They are (a) the resources to engage in symbolic constructions; (b) the motivation to do the creative work; and (c) an identity to sustain the individual in this environment. However, the first two components just been mentioned above should be supported and affected by environmental factor.

2.1.4 Creative environment

Creativity research has strongly emphasized individual influences on creativity. Although some studies have introduced components of the organizational environment that potentially influence creativity, research on the environmental influences is not as well developed as that examining individual influences on creativity. As a result, important environmental influences on creativity may have been ignored. Mowday and Sutton (1993) indicate that one of the weaknesses of recent organizational behavior research has been the lack of theoretical and empirical work that emphasizes the importance of the organizational context in understanding behavior in organizations. There are two approaches when studying creativity in the organizational level. They are a) organizational influences on the creative process and b) development of integrated understanding of individual and organizational influence on creativity.
In past research study concerning creativity in the organizational level using creative process approach, level of support for individuals' innovative actions is found to be the most critical factor in the environment (West & Farr, 1989). Furthermore, support and feedback are another environmental factors, which may influence individual creativity level. Support and feedback can come from supervisors and/or peers. Supervisors can encourage creativity by supporting activities required for the development and implementation of new ideas and by recognizing creative effects (Mumford & Gustafson, 1988). Although peers cannot provide outcomes associated with resources or financial rewards in most instances, they can provide outcomes such as encouragement for and constructive feedback on creative efforts (West & Farr, 1989). A flexible structure, adequate resources, and enriched jobs have also been found to encourage innovation. Flexible structures are associated with increased autonomy and the belief that new ideas will be accepted (Kanter, 1983). Financial and material resources must be available for the task at hand as well as appropriate production systems, resources for market analysis, informational resources, relevant training, and the time to engage in long-term thinking important to developing new ideas (Amabile, 1988). Enriched jobs enhance creativity because autonomy gives job holders more opportunities to make decision themselves, they are more challenging and require more complex mental activities, and they are more meaningful to the person and thus motivate the person to continually improve his or her performance.
In most recent stream of research proposes the integration of individual and organizational influences on creativity. Researchers at the Center for Creative Leadership proposed that organizations can improve employees' creativity by shaping a work climate that increases employees' intrinsic motivation to engage in a task (Burnside, 1990). Research also indicates that characteristics of the individual and characteristics of the work environment are factors necessary to understand in promoting creativity (Amabile, 1983). Individuals who are encouraged to be creative at work have higher levels of job satisfaction and are more satisfied and more fulfilled than individuals with fewer opportunities for creativity (Broadbent, 1987).

In view of the fact that environment is an important factor influencing individual's creative behavior, Amabile and her colleagues (1987) applied an interview to investigate the factors that influence creativity in work organizations. They interviewed 129 R&D (Research and Design) scientists from several different companies. The critical-incident technique used in the interviews calling for participants to describe in detail two significant events from their work experience: one that exemplified high creativity, and one that exemplified low creativity. Content analyses of transcripts of both classes of stories revealed a powerful finding. They found that the interviewees made more comments describing the work environmental factors than the personal characteristics in most of the descriptions given. It revealed that the weight of work environment in determining human creative behavior in organization setting is high and
cannot be ignored. The environmental stimulants and obstacles identified in Amabile et al. (1989) will be listed later and discussed in chapter 2.3.

2.2 Organizational level of creativity

Our life cannot develop normally without interacting with other people. No one can live alone without any social involvement and support. It is more pragmatic to study creativity in organizational level because organization acts like a micro social system, in which a lot of social interactions are occurring between staff working in this organization. When we study a group of people instead of an individual, it becomes a more complicated task. We should consider several factors at one time since it is common for some factors to interact and operate together. In most cases, organizations involve people working within various hierarchical groups. Usually, the higher the position in the organization hierarchy, the smaller the number of staff are in this position. And the higher the position a person holds in the hierarchy, the more power and authority this person possesses. According to Sackmann (1992), although some aspects of an organization's environment can be considered homogeneous, other aspects can differ considerably across subgroups within the organization. It is especially true for the difference in working environment experienced by people who work with different ranks and groups.

Furthermore, a study of human creativity in an organization can be divided into three parts. Each of these components is highly correlated to each other and forms a set in the
social system. These components include (1) individual; (2) group; and (3) organizational creativity (Woodman & Schoenfeldt, 1990). From which, individual is the smallest unit in the system. Group creativity is a function of individual creative behavior. The creative characteristics and behaviors of each individual will influence the group creative outcome. Also, organizational creativity is a function of the creative outputs of its component groups and contextual influences. The gestalt of creative output for the entire system stems from the complex mosaic of individual, group, and organizational characteristics and behaviors occurring within the salient situational influences existing at each level of social organization. As a result, the higher the level in this hierarchy of the creative system being studied, the more complex and more consideration should be taken into account to complete the investigation. It should be more safe and easy to study human creativity on the individual level first.

When all the above mentioned ideas are applied to this research study, hospital is an organization, each department is a team or a sub-unit. Staff in each department may perceive their working environment differently. So staff in X-Ray Department and Physiotherapy Department may experience different working conditions and environment although they are working in the same hospital. The perception of the working environment is important in determining individuals' creativity level. Perception is related to cognition style and is also affected by the emotional state of the people considered in this particular moment. So, it is
more suitable to put one's psychological state into consideration when examining people's working environment. However, working environment variable will not be suddenly changed within a short period of time and will be quite constant. Also, there should be more than one factor constitutes in work environment. As a result, other factors may overcome the effect of psychological influence on perception of one factor in the working environment. For example, if a respondent have a recent unhappy experience with some of his colleagues, he may score lower in the coworker sub-scale in the creative work environment checklist. But creative working environment consists of many other factors, which are included in other subscales. If these other factors are constant to this respondent, the overall result obtained in this measurement is also valid and reliable. The most important point is whether or not a respondent is sensitive to perception of the creative work environment. This motion is further supported by the example given by Pierce and his colleagues (Pierce, Gardner, Cummings, & Dunham, 1989). They said that whether individuals felt their co-workers, their supervisors, or their high-level superiors encourage them to take risks in their project work, the most important factor is that whether they have perceived such encouragement. But what one perceives of his or her work environment may affect the behavior and way of thinking. It is actually a two-ways system. Individuals and their work environment have mutual influence to each other. Also, when considering creativity in organizational level, one cannot ignore all the above mentioned theoretical bases are operating.
In this research study, information is gathered on an individual level. Every participant is an unique individual and has his or her own way of thinking. The participants should have different perceptions of the working environment although they operate within the same context. After analyzing data from each group of participants, the results obtained could represent the findings of the department, which has been considered to be in an organizational level.

2.3 Work environment and creativity conceptual model on work environment for creativity

The factors mentioned above are only part of the factors that may influence human creativity. However, it is only in a general aspect of influence because the factors are obtained from the macroscopic view. To order to concentrate on the environmental side, one should focus on the major factors that influence organizational creativity. The content analyses of data obtained for Amabile and Gryskiewicz (1987) resulted in nine qualities of environmental stimulants, which served to promote creativity, and nine qualities of environmental obstacles that served to inhibit creative act in organization setting. The environmental stimulants and obstacles listed below are according to the weight of their influences on organizational creativity.

2.3.1 Work environmental stimulants and obstacles

Environmental stimulants to creativity (Amabile & Gryskiewicz, 1987)

1. Freedom: It is explained to be one's sense of control deciding what can be done.
2. **Good Project Management:** The presence of someone who can act as a good role model. It also means the presence of someone who is willing to offer help, shows enthusiasm, has good communication skills, protects the project team from outside distractions and interference. A good manager knows how to match tasks to workers' skill and interests, and sets a clear direction without managing too tightly.

3. **Sufficient Resources:** Access to necessary resources, including facilities, equipment, information, funds and people. More generally, it also includes resources such as spiritual support.

4. **Encouragement:** Management enthusiasm for new ideas, creating an atmosphere free of threatening evaluation.

5. **Various organizational characteristics:** A mechanism for considering new ideas, a corporate climate marked by cooperation and collaboration across levels and divisions, an atmosphere where innovation is prized and failure is not fatal.

6. **Recognition:** A general sense that creative work will receive appropriate feedback, no matter it is positive or negative.

7. **Sufficient time:** Time to think creatively about the problem, to explore different perspectives rather than having to impose an already-determined approach.
8. **Challenge**: A sense of challenge arising from the intriguing nature of the problem itself or its importance to the organization. The challenge can be given by anyone in the organization.

9. **Pressure**: A sense of urgency that is internally generated from competition with outside organizations or from a general desire to accomplish something important.

**Environmental obstacles to creativity** (Amabile & Gryskiewicz, 1987)

1. **Various organizational characteristics**: Inappropriate reward systems in the organization; excessive red tape; a corporate climate marked by a lack of cooperation across divisions and levels, little regard for innovation in general.

2. **Constraint**: Lack of freedom in deciding what to do or how to accomplish the task; a lack of a sense of control over one's own work and ideas.

3. **Organizational disinterest**: A lack of organizational support, interest, or faith in a project: a perceived apathy toward any accomplishments coming from the project.

4. **Poor project management**: A manager who is unable to set clear direction, who has poor technical or communication skills, who controls too tightly, or who allows distractions and fragmentation of the team's efforts.

5. **Evaluation**: Inappropriate or inequitable evaluation and feedback systems; unrealistic expectations; an environment focused on criticism and external evaluation.
6. **Insufficient resources:** A lack of appropriate facilities, equipment, materials, funds, or people.

7. **Time pressure:** Insufficient time to think creatively about the problem; too great a workload within a realistic time frame; high frequency of "fire fighting".

8. **Overemphasis on the status quo:** Reluctance of managers or coworkers to change their way of doing things; an unwillingness to take risks.

9. **Competition:** Interpersonal or inter-group competition within the organization fostering a self-defensive attitude.

### 2.3.2 Scales assessing work environment for creativity

The first environmental factor checklist was developed by Amabile and Gryskiewicz (1987) and the published name was "Creativity in the R&D laboratory". However, Amabile and her colleagues made revisions in the scale construction followed conceptual considerations, item analyses, and own-scale/other-scale correlation in 1989 and rename the scale to "The Creative Environment Scale: Work Environment Inventory" (WEI). They tested the previous items in the inventory by setting up these new criteria. After the amendments, most of the items remained had met the criteria mentioned above. Apart from the fact that some items were dropped if they did not meet the statistical criteria, the new scale is closed to the original scale. Furthermore, because the original Work Environment Inventory (WEI) was revised in response to initial data analyses an effort had been put on reducing redundancy of some of the items. The
new version of the Work Environment Inventory contains only 12 environmental scales. (There are eight scales describing environmental stimulants to creativity and four scales describing environmental obstacles to creativity). Two assessment scales are included in the Work Environment Inventory for validation purposes. They are designed to assess the overall creativity and productivity of work in the organization. This new testing material is more powerful in assessing the working environmental factors, which may influence creativity in the work place. It is because the new Work Environment Inventory has undergone variety of statistical procedures to test for its reliability and validity. Also, normative data on this new Work Environment Inventory have been collected on five different groups, representing different professional levels within organizations and functional groups. One of the sample groups was drawn from a sample of business leaders from a wide variety of professions and organizations in a Mid-Western state. That means the participants in this group were invited from the different organization. So this sample group may act as a baseline group. The results of this study showed that different work groups experienced different work environment measured by the WSI and these differences formed consistent and meaningful patterns. Also, the perceptions of the respondents coincided with researchers' views about what a creativity stimulants and obstacles consisted of. To conclude, the data presented in the study done by Amabile et al. (1989) suggested that the WEI had both internal integrity and external validity. This instrument may not only be used to describe employees' perceptions of their work
environment, but also to diagnose those features of the organizational climate that may need improvement in order to stimulate creativity.

In 1996, a modified instrument was designed to assess perceptions of all of the work environment dimensions that have been suggested as important in empirical research and theory on creativity in organization (Amabile, Conti, Coon, Lazenby, & Herron, 1996). The new assessing instrument is called KEYS: Assessing the Climate for Creativity. It is a modified version of Work Environment Inventory that we have mentioned previously. But the conceptual model underlying assessment of perceptions of the work environment for creativity in this measuring instrument is more simplified. The work environmental factors, which have been hypothesized to influence creativity, are re-categorized into 5 points. They are (a) Encouragement of creativity which consists of organizational encouragement, supervisory encouragement and work group supports; (b) Autonomy or freedom; (c) Resources; (d) Pressure; containing challenging work and workload pressure; (e) Organizational impediments to creativity. Since the KEYS are based on the model including individuals' perceptions on working environment, It is adopted as the guidelines to develop a measuring instrument for this research study.

2.4 Job satisfaction

As mentioned in the Introduction, the job satisfaction refers to people's feelings about the different aspects of their work. It is a kind of internal feeling resulting from perception of the
different aspects of the job. There have been two approaches to the study of job satisfaction, namely the global approach and the facet approach. The global approach treats job satisfaction as a single, overall feeling toward the job. However, the facet approach focuses on different aspects of the job separately. It permits a more complete picture of job satisfaction. An individual typically has different levels of satisfaction with the various facets of work. He or she might be very dissatisfied with pay and fringe benefits but at the same time be very satisfied with the nature of the work and supervisors. But many studies used to assess people's overall satisfaction instead of using facet approach because it is more convenient.

2.4.1 Antecedents of job satisfaction

Over a hundred of studies have been undertaken to find out the factors causing people to like or dislike their jobs (Hugick & Leonard, 1991). Results of these studies found that satisfaction with different facets of work varied. And the largest percentage of people was satisfied with aspects of work that involved the nature of the work itself. Most people were satisfied with how interesting the work was for them. Some studies suggested that various features of the job environment influence the internal feeling of job satisfaction. These features include characteristics of job and job tasks as well as various aspects of the organization. Indeed many studies have supported the idea that certain job environment variables relate to job satisfaction (Fried and Ferris, 1987). They have investigated features of jobs and organization that lead employees to be satisfied or dissatisfied. Several studies have shown that people with
the same jobs and highly similar job conditions can vary considerably in their level of satisfaction (Spector, 1992). To explain this phenomenon, researchers focused on personality differences. Their purpose was to show that certain types of people were inclined to like or dislike certain type of jobs. Still other researchers have taken the interactionist perspective of person job fit, which combines the environmental and personality approaches. To conclude, all three perspectives - environment, personality, and interactionist - are important in order to study job satisfaction in depth.

2.4.2 Environmental antecedents of job satisfaction

Job characteristics are one of those variables greatly affecting job satisfaction. Job characteristics refer to the content and nature of job tasks themselves. According to the job characteristics theory proposed by Hackman and Oldham (1976), job characteristics can be understood by the following five components.

1. Skill variety: The number of different skills necessary to do a job.
2. Task identity: Whether or not an employee does an entire job or a part of a job.
3. Autonomy: The freedom employees have to do their jobs as they see fit.
4. Job feedback: The extent to which it is obvious to employees that they are doing their jobs correctly.
5. Job scope: The overall complexity of a job, computed as a combination of all five individual characteristics.
The above mentioned five components of the job characteristics are to some extent overlapping with the creative work environmental factors discussed by Amabile and Gryskiewicz (1989). The two components, autonomy and job feedback, exactly resemble the creative work environmental stimulants included in KEYS. That means, creative work environment should have relation with job satisfaction. A study undertaken by Johnson and McIntyre (1998) aimed at finding out correlation among organizational climate, and culture with job satisfaction from a sample of government employees. Results showed that job satisfaction was positively correlated with all items of organizational climate. The results indicated that employees who reported higher scores on job satisfaction also tended to report that they had received fair recognition for job performance, valuable job-related feedback, and assistance with career development. Participants of the study also indicated that they were empowered to make job-related decisions, were kept informed about issues affecting their jobs, encouraged to express new and creative ideas, and involved in decision-making and goal-setting. Some processes of these conditions could be considered to fall into categories of creative work environmental stimulant.

2.5 Creative Efficacy

According to Bandura (1977), self-efficacy is defined as the self-perception of one's capacity in a particular domain area. And creative efficacy is referred to the degree of confidence one's think about the ability to generate creative ideas and products. Creative
efficacy is used as another measure criteria in this research study. People having higher creative efficacy will have higher tendency to solve problems using creative methods. It is because when people believe they are capable to do thing creatively, they will try to solve the problem using more creative approach. It enhances their motive for creative behavior. A qualitative interview study conducted with over hundred of research and design (R&D) scientists revealed that self-confidence was one of the most prominently reported characteristics of creative individuals (Amabile & Gryskiewicz, 1987). These findings suggested that successfully creative people hold a strong self-efficacy level for their creative potential. The confidence and efficacy perceptions of creative persons may account for their ability to generate new ideas. Bandura (1986) has noted that efficacy perceptions are partly socially constructed and influenced by the environment in which the individual operated. And the rest of the component in self-efficacy should account for personality attributes. In a study investigating the influence of cognitive climate on job satisfaction and creative efficacy carried out by Tierney (1997), author suggested that individuals with more innovative cognitive styles would have a greater sense of confidence in their capabilities. Since cognitive style has been related to creative outcomes in past research, the relationship between cognitive style and creative efficacy have been further confirmed in his study. The results revealed that creative efficacy is positively correlated to cognitive climate as well as individual cognitive style. In fact, everybody have his or her own cognitive style, which is an individual level attribute. And within an organization or
work group, there is a tendency to expect that the group members will solve problem following
a norm. And the majority of members in any particular organization shall commonly accept this
norm. If the organizational cognitive climate appreciate creation and innovation, it may affect
individuals' cognitive style and creative efficacy within this organization. As a whole, we can
hypothesize that physiotherapists, who are working within an environment with more creative
stimulants, shall show higher job satisfaction and creative efficacy than the radiographers.

2.6 Person-Environment Fit Model for Creativity

"Fit" refers to the degree of similarity or compatibility between individual and situational
characteristics. It is determined by examining the relationship between person and environment
components measured on the same conceptual dimension. Two versions of fit have been
identified (French, Caplan & Harrison, 1982): a) supply-value (S-V) fit and demand-ability (D-
A) fit. They are viewed as separate and distinct types of person-environment fit (P-E fit).
Supply-value fit exists to the extent that the motives or needs of the person match supplies in
the environment for those motives. Motives that have been examined with regard to
commensurate supplies include the need to achieve and the need to gain power. While supplies
have been examined with regard to commensurate values and included money, supportive
people and opportunities to achieve (French, Caplan, & Harrison, 1982).

The person-environment fit approach examines the joint influence of person and
environment factors. The model proposes that any misfit in person and environment
components leads to more negative outcomes such as lower satisfaction, lower performance, and higher strain (French et al., 1974; Harrison, 1976).

In order to have more comprehensive understanding of creativity, it is important to differentiate between supply-value fit and demand-ability fit because they are distinct versions of fit and may have unique relationships with outcomes (Edwards & Harrison, 1993). By failing to differentiate between supplies and demands or between values and abilities, research may have confounded the actual relationships that exist. Nicholson and West (1988) found that a lack of fit between individuals' preferences for creativity and the creative climate of the organization were perceived as stressful. Such a perception may result in lower job satisfaction. This prediction was supported by research examining P-E fit with individual satisfaction level. P-E fit was positively related to job satisfaction (Furnham & Schaeffer, 1984). Nicholson and West (1988) found that individuals who utilized their creative abilities at work were more satisfied than those with fewer opportunities to use their creative abilities. Creativity supply-value fit exhibits an asymptotic relationship with job satisfaction. It means that having fewer supplies for creativity than one desires is associated with lower satisfaction. Individuals might feel pressure to be more creative once supplies exceed values resulting in relatively constant levels of job satisfaction. It is also expected that job satisfaction is higher when supplies and values for creativity are high rather than low. Moreover, job satisfaction will increase as organizational demands for creativity increase to the level of individual abilities for creativity.
As job demands for creativity become greater than capabilities, the person may develop additional skills in creativity that will maintain the level of job satisfaction. If demands greatly exceed abilities, individuals may experience burnout, which could lead to reduced job satisfaction (French et al., 1982). Also, job satisfaction is expected to be higher when demands and abilities for creativity are high, rather than low. Individuals should be more satisfied when much is expected of them from the organization and they have much to give to the organization, rather than when the organization expects little and the individual has little to give in return.

2.7 Hypotheses

From the literature discussed in the previous chapters, the following hypotheses were derived.

1. Physiotherapists perceive their work environment as more creative than radiographers do.
2. Physiotherapists have higher level of creative self-efficacy than radiographers.
3. Physiotherapists have higher job satisfaction than radiographers.
4. Participants who perceive their working environment as a creative one might have higher creative self-efficacy score than participants who perceive their working environment as a non-creative one.
5. People who have worked under creative working environment for longer duration of time should be influenced more by the environment and display higher level of creative self-
efficacy. That means there should be some correlation between years of service and creative self-efficacy.

6. People who have high creative self-efficacy and work in creative environment will experience higher level of job satisfaction than those with lower level of creative self-efficacy and work in creative-bound environment.

7. Different sub-scales in creative work environment have different degrees of influence on creative self-efficacy. Which creative environmental factor is the most important one to affect creative self-efficacy score in each group of participants will be investigated in this study.

Method

3.1 Participants

3.1.1 Pilot study

Ten people were invited to participate in the pilot test. They were all enrolled or registered nurses, both males (N=3) and females (N=7), who work in the same hospital. Six of them were the permanent staff working exclusively in the X-ray department, and the rest of the participants were working in the Cardiac Care unit (CCU) for about four days a week and about two to three days a week in the cardiac vascular disease diagnostic section in the X-ray department. They were asked to fill in the questionnaire and give it back to me directly when finished.
3.1.2 Actual study

Only grade I/II radiographers (N=41) and physiotherapists (N=39) were invited to participate in the main study. There were 75 questionnaires distributed to all participants in these two departments in the same hospital. From which, 39 of these questionnaires were distributed to radiographers and the remaining 36 questionnaires were given to physiotherapists. Out of this, 61 questionnaires were returned. The response rate was 89.7% (35 questionnaires) for the radiographers and 74.3% (26 questionnaires) for the physiotherapists. In the radiographers group, there were 15 females and 20 males in this sample. The average year of service of this group of participants was 9.1 years (S.D. = 6.15), with the minimum of 2 year and the maximum of 24 years. However, for the physiotherapists, there were 17 females and 9 males in this sample. The average year of service of this group of participants was 6.5 years (S.D. = 3.69), with the minimum of 1 year and the maximum of 15 years. For both groups of participants, the greatest numbers of them falls in the age group of 26-30 years old.

3.2 Design of the questionnaire

The questionnaire consisted of 53 questions concerning three different areas of measurement, namely, creative work environment (28 items), creative efficacy (6 items) and job satisfaction (19 items).

The 28 items measuring the creative work environment were selected from the KEYS (Amabile, 1996). The selected items belong to four different sub-scales of work environment
factors. They are: (a) **encouragement of creativity** (9 items); (b) **autonomy or freedom** (7 items); (c) **resources** (7 items); and (d) **work pressure** (5 items), which included challenging, work measurement and workload pressure measurement. Some of the wordings and terms were verified to make the items more suitable for assessing the creative working environment in Hong Kong hospital setting. For the creative efficacy scale, some of the items used were adapted from the generalized self-efficacy scale published by Wegner, Schwarzer, and Jerusalem (1993). Again, some of the wordings were changed to enhance the applicability of the scale to local context. Finally, the 19 items used for measuring of the job satisfactions were selected from the Job Satisfaction Scale (JSS) published by Spector (1985). In the original version of JSS, nine facets of job satisfaction have been included. Since some of the facets such as pay, promotion and fringe benefits are identical for the two groups of participants to be compared, these items have been omitted. Also, some facets were combined into one facet. For example, the operating procedure facet was grouped into nature of work facet. The supervision facet was combined with coworker facet, as supervisor was actually someone who worked with the participant in the team work setting such as a hospital. The remaining job satisfaction facets included in the questionnaire used in this study were (a) nature of work, (b) coworkers, and (c) rewards. Besides, some additional items were designed for the purpose of the current study, which were used as an indirect indicator measuring level of job satisfaction.
A four point Likert-like scale was attached to each item. The scale ranged from 1=not at all true to 4=exactly true. There was no middle point to avoid tendency of choosing the middle point in some ambiguous conditions. Participants were asked to rate how true was the statement for them and their working conditions. All of these items measuring different variables were combined randomly to reduce bias and increase the viability of the measurement.

At the end of the questionnaire, participants' sex, age, post and number of years of service were asked for. The questionnaire was anonymous. I assumed the anonymity would encourage more honest responses by the participants.

As the scale consisted of some negatively formulated items, the score of these items had to be re-coded to a new score before further statistical procedure could be carried out. After some of the scores have been re-coded, the higher the score of the item indicated the higher level of the given variable.

3.3 Procedures

In view of the fact that the questionnaire composed of self-designed items and self-modified items from different scales, a pilot study was carried out to check the internal consistency of the scale in the questionnaire. Results obtained in the pilot test were statistically analyzed by using Cronbach alpha method. The higher the coefficient values approaching 1, the higher the internal consistency and the more reliable the items are in the
scale. They were being used as an indication for any alteration of the items in the questionnaire used in the actual sample study.

In the main study, an English-language version questionnaire survey was used to obtain data from the two groups of participants. As the participants have at least attained a degree or professional diploma, they were capable to read and understand the questions in English. A cover page concerning a brief introduction of the purpose of the study was included. The participants were told that the survey was for an academic purpose only and data collected will be treated as strictly confidential. Following the short introduction, a clear instruction for self-administering of the questionnaire was given to participants.

However, there was some difference between the way of distributing and collecting the questionnaires for these two groups of people. As I am working in the X-ray Department in this hospital, it was quite easy and convenient for me to distribute the questionnaire directly to the participants around the working place. But for the physiotherapists in the physiotherapy Department, on the other hand, I had to seek help from the senior physiotherapist for distribution of the questionnaires since it was impossible for me to meet each of them. Both groups of participants were asked to return the completed questionnaire in a sealed envelope, which was attached to a collection box placed in the common room in each Department. I hoped such a procedure could promote the
response rate by increased confidentiality of the data. The whole data collection process took
ten days to complete.

3.4 Statistical Analysis

Reliability test was performed as the first step to find out the internal consistency of each
sub-scale employed in the study. Following this procedure, some other statistical analyses were
used to test the hypotheses.

For hypothesis 1, 2, and 3, t-test was used to assess the significance of the difference in
total score of creative work environment, creative efficacy and job satisfaction between these
two groups of participants. For hypothesis 4 and 5, Pearson correlation method was employed
to find out the relationship between variables, which were in consideration. In hypothesis 4,
Pearson correlation coefficient was calculated to examine relationship between creative work
environment score and creative efficacy scores for each group of participants. However, linear
regression method is also employed to find out whether perceived work environment is a
control variable to individual's creative efficacy. For hypothesis 5, Pearson correlation
coefficient was computed between years of service in the department and creative efficacy
score for each group of participants. And to test hypothesis 6, there are two methods for
statistical analysis. Firstly, Two Way ANOVA method is used to find out the cross effect of
creative work environmental factors and creative efficacy level to individual's job satisfaction
level. Secondly, each group of participants was considered separately according to their
Department. Pearson Correlation statistical method is used to find out the relationship between creative efficacy and job satisfaction in these separated groups of participants. For hypothesis 7, t-test is employed to find out whether the difference of each sub-scale score of creative work environment between group of physiotherapists and radiographers is significant or not. Then, linear regression method is used to find out which sub-scale in creative work environmental factor is control variable of creative efficacy and job satisfaction. From which, the four sub-scales of creative work environmental factors are the independent variables while job satisfaction score is the dependent variables. The significance of the result will indicate the influence of each sub-scale of creative work environmental factor to participants' creative efficacy and job satisfaction level.

Results

The data collected from the questionnaires were analyzed using the Statistical Package for Social Sciences (SPSS).

4.1 Internal consistency of the Scales

For both the pilot (N = 10) and actual samples (N = 61), a reliability test was carried out. A Cronbach alpha correlation coefficient was calculated to test the internal consistency of Creative Work Environment Scale. Results showed that the alpha ranged from .65 -.82 in the pilot and .75 - .89 in the main sample for the four sub-scales of creative work environmental factors (Table. 1).
The reliability test results of creative efficacy scale showed that the six items measuring creative efficacy level of participants was acceptable. The Cronbach's alpha value was .58 for the pilot and .82 for the actual samples.

The reliability test of job satisfaction scale showed that the 19 items measuring job satisfaction level was high and acceptable (alpha = .58 for the pilot and alpha = .93 for the actual sample).

To conclude, the items being used in this questionnaire to measure creative work environment, creative efficacy and job satisfaction showed quite acceptable level of internal consistency or reliability for a small size samples in pilot test. Therefore the questionnaire was being used for the actual sample of this study without any further alterations.
4.2 Creative Work Environment, Creative Efficacy and Job Satisfaction of Physiotherapists and Radiographers

Hypothesis 1 predicted that physiotherapists would perceive their working environment to be more creative than radiographers. Consequently it was expected that physiotherapists would have higher level of creative efficacy (Hypothesis 2) and job satisfaction (Hypothesis 3).

Table 2 shows the means, standard deviations and p-values of creative work environment, creative efficacy and job satisfaction measures between the group of

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### Table 1: Summary Table of the Cronbach Coefficient Alpha of all the Dependent Variables and Its Sub-Scales used from The Two Groups of Participants

<table>
<thead>
<tr>
<th>The dependent variables and its sub-scale</th>
<th>Reliability alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pilot</td>
</tr>
<tr>
<td>1. Creative work environmental factors</td>
<td></td>
</tr>
<tr>
<td>measures</td>
<td></td>
</tr>
<tr>
<td>la. encouragement of creativity</td>
<td>.82</td>
</tr>
<tr>
<td>lb. autonomy or freedom</td>
<td>.65</td>
</tr>
<tr>
<td>lc. resources</td>
<td>.75</td>
</tr>
<tr>
<td>ld. pressures</td>
<td>.73</td>
</tr>
<tr>
<td>2. Creative efficacy measures</td>
<td>.58</td>
</tr>
<tr>
<td>3. Job satisfaction measures</td>
<td></td>
</tr>
<tr>
<td>3a. reward</td>
<td>.58</td>
</tr>
<tr>
<td>3b. work nature</td>
<td>.61</td>
</tr>
<tr>
<td>3c. coworker</td>
<td>.67</td>
</tr>
</tbody>
</table>
physiotherapists and radiographers. Physiotherapists have higher mean scores for all these dependent variables than the radiographers. Also, all the differences between means of each scale were significantly on .01 confidence level. These mean that physiotherapists perceived their work environment more creative than radiographers do. Physiotherapists also have higher creative efficacy and job satisfaction than radiographers. Thus, hypotheses 1 to 3 were supported.

<table>
<thead>
<tr>
<th>Creative Work Environmental Factors</th>
<th>Hypothesis Tested</th>
<th>Group of participants</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>creative efficacy measures</td>
<td>1</td>
<td>Physiotherapists</td>
<td>76.62</td>
<td>14.61</td>
<td>6.16**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Radiographers</td>
<td>56.37</td>
<td>11.09</td>
<td></td>
</tr>
<tr>
<td>job satisfaction measures</td>
<td>2</td>
<td>Physiotherapists</td>
<td>17.19</td>
<td>3.02</td>
<td>2.65**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Radiographers</td>
<td>15.29</td>
<td>2.60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Physiotherapists</td>
<td>54.15</td>
<td>9.44</td>
<td>4.31**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Radiographers</td>
<td>43.83</td>
<td>9.12</td>
<td></td>
</tr>
</tbody>
</table>
4.3 Perception of Creative Work Environment and Creative Efficacy among Physiotherapists and Radiographers

As discussed in the previous section, different people could have different perception of their work environment although they work in the same context. So, we cannot exclude that some people who work under high creative work environment do not perceive the creative atmosphere in their work setting. And what the current study measures was the subjectively perceived creative work environment. To test hypothesis 4, the two groups of participants, radiographers and physiotherapists were clustered together to find out the relationship between perceived creative work environment and creative efficacy with exclusion of type of work performed. And I expected that, as stated in hypothesis 4, people who perceived their work places as creative would have higher creative efficacy.

Results of Pearson correlation coefficient show that the correlation between perceived creative work environment and individual's creative efficacy level was .538 and the correlation was significant at the .01 level (2-tailed). It means that these two variables are moderately correlated to each other. However, the relationship shows no causation effect for each other. Hypothesis 4 was supported.

When linear regression method is adopted, result shows that 28 percent of variance in creative efficacy score can be explained by perceived creative work environmental factors ($R^2 = .28$, Beta = .538, p < .01)
4.4 Years of Service for the job and Creative Efficacy among Physiotherapists and Radiographers

Pearson correlation was used to find out the relationship between duration of service in the particular work environment and one's creative efficacy level. As stated in hypothesis 5, it was expected that people who have worked longer period of time in a perceived creative work place would have higher level of creative efficacy. At first, the two variables were tested for each group separately since it was expected that considering each group separately might eliminate the factor of work environmental difference in the two groups of participants. Then, results of each group of respondents would be more conclusive. The correlation coefficients between year of service and creative efficacy were .095 and .202 for physiotherapists and radiographers respectively. However, the two values were not significant. It means that there is a minimal relationship between duration of service and creative efficacy of an individual who works in a particular work environment no matter the work environment was perceived as highly creative or not. Hypothesis 5 was not supported.

4.5 Perceived creative work environment, Creative Efficacy and Job Satisfaction corresponding to Person-Environment Fit Hypothesis among Physiotherapists and Radiographers
Person-environment fit hypothesis assumed that people who work under environment which fit their creative efficacy level will experience higher job satisfaction than those with lower level of creative efficacy and work in creative-bound environment (hypothesis 6).

A simple Two Way ANOVA was employed to test the hypothesis 6. The data presented in Table 3 showed the main effect of each independent variable, namely perceived creative work environment and individual's creative efficacy level as well as their interactive effect on job satisfaction (dependent variable).

### Table 3. Two Way ANOVA Summary for Job Satisfaction of Physiotherapists and Radiographers.

<table>
<thead>
<tr>
<th>Independent Variables (Factors)</th>
<th>df</th>
<th>F - Values</th>
<th>Mean Square</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived creative work environment (EN)</td>
<td>31</td>
<td>12.72</td>
<td>123.02</td>
<td>.015**</td>
</tr>
<tr>
<td>Creative Efficacy (CE)</td>
<td>9</td>
<td>1.31</td>
<td>12.43</td>
<td>.306</td>
</tr>
<tr>
<td>EN * CE</td>
<td>13</td>
<td>3.37</td>
<td>33.33</td>
<td>.095</td>
</tr>
</tbody>
</table>

*P<.01

We can conclude from the above results that the main effect of perceived creative work environment on individuals' job satisfaction is statistically significant while the main effect of creative efficacy is not significant. The interactive effect of these two factors on the independent variable is also negligible.
To further analyses the result, the two groups of participants were considered separately corresponding to the person-environment fit hypothesis. By referring to the results testing hypothesis 1, physiotherapists perceive their work environment as more creative than radiographers do. Therefore, the Physiotherapy Department was classified as a creative work place and X-Ray Department as a low creative work environment. Pearson correlation coefficient was used separately for each group to find out the relationship between creative efficacy level and job satisfaction level. Results showed that the correlation coefficients were .709 and .134 for physiotherapists and radiographers respectively. The correlation coefficient of the physiotherapists' group was significant on p< .01 level while the correlation coefficient of radiographers' group was not significant. It means that in the high creative work environment, people who are more creative have higher job satisfaction. But on the other hand, when people worked in environment, which was low in creativity, there would be no relation between individual's creative efficacy level and job satisfaction level.

4.6 Sub-Scales of Creative Work Environment Score

Creative work environment consists of some elements. Each element or sub-scale will have influence on individual's perception of work environment. The results of our study showed that physiotherapists perceive their work environment as more creative than radiographers did. But this conclusion was based on the overall score of the work environment.
factors. To have a closer look on the creative environment factors, further analysis was carried out in the sub-scales level.

In order to make the sub-scales of the creative work environment scale comparable, the mean of each sub-scale was re-coded on the scale 1 - 100 using the following formula,

\[
\frac{(\text{Mean} - \text{no. of items in each sub-scale})}{\text{interval difference between the minimum and maximum score of the sub-scale}} \times 100
\]

The mean score, S. D., as well as the re-coded means for each sub-scale were computed and the differences between the two groups, Physiotherapists and Radiographers were studied using t-test. Results are summarized in Table 4.
Creative Work Environment

T-test result showed that physiotherapists have statistically significant higher score than radiographers in all four creative work environmental sub-scales. That means all the creative work environmental sub-scales have made contribution on explaining why Physiotherapy Department has been perceived as a more creative work place than the X-ray Department did. By comparing the re-coded mean score of each sub-scale, physiotherapists rated their work environment as "encouragement of creativity" which having the highest mean score among the four sub-scales. However, physiotherapists perceived that their work place is relatively lack of "resources". On the other hand, radiographers rated the "autonomy or freedom" the highest and

<table>
<thead>
<tr>
<th>Sub-scales</th>
<th>Group of participants</th>
<th>mean</th>
<th>Re-code item (scaled 1-100)</th>
<th>S.D.</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encouragement of creativity</td>
<td>Physiotherapists</td>
<td>25.73</td>
<td>61.96</td>
<td>5.08</td>
<td>6.27**</td>
</tr>
<tr>
<td></td>
<td>Radiographers</td>
<td>18.49</td>
<td>35.15</td>
<td>3.95</td>
<td></td>
</tr>
<tr>
<td>Autonomy or freedom</td>
<td>Physiotherapists</td>
<td>19.08</td>
<td>57.52</td>
<td>3.44</td>
<td>4.72**</td>
</tr>
<tr>
<td></td>
<td>Radiographers</td>
<td>14.77</td>
<td>37.00</td>
<td>2.67</td>
<td></td>
</tr>
<tr>
<td>Resources</td>
<td>Physiotherapists</td>
<td>7.85</td>
<td>1.67</td>
<td>3.74</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Radiographers</td>
<td>13.51</td>
<td>31.00</td>
<td>3.74</td>
<td>4.48**</td>
</tr>
<tr>
<td>Pressures</td>
<td>Physiotherapists</td>
<td>13.97</td>
<td>59.80</td>
<td>2.39</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Radiographers</td>
<td>9.60</td>
<td>30.67</td>
<td>2.42</td>
<td>7.00**</td>
</tr>
</tbody>
</table>

Table 4. The Summary Table of the Mean, Standard Deviation, Re-coded Mean and T-Value in Each Sub-Scales of the Creative Work Environmental Measures for the Physiotherapists and Radiographers.

where, *p < .05; **p < .01
"pressures" the lowest in re-coded mean score among the four sub-scales. This means that physiotherapists and radiographers have their own criteria for judging their workplace as creative or not.

Also, when we examine the standard deviation value in each sub-scale for the two groups of participants, we notice that all standard deviation values are quite close (S.D. range from 2.39 - 3.95) with one exception, namely the "encouragement of creativity" sub-scale in the group of physiotherapists (S.D. = 5.08). This indicates that the score of the participants in each sub-scale distributed closely.

In addition, the re-coded mean difference of each sub-scale of creative work environment was shown in Table 5. From which, we could see that the sub-scale of "pressures"(29.13) and "encouragement for creativity"(26.81) having the greater difference between the two groups, whereas "resources" (20.67) and "autonomy or freedom" (20.52) remain in a relatively low difference in values. So we concluded that the "pressures" and "encouragement for creativity" factors were the most prominent creative work environment sub-scales in determining these two different workplace as creative or not. And it might also be the most important environmental factor causing people who worked under this particular environment more creative.
4.7 Creative work environmental sub-scales on creative efficacy and job satisfaction

Linear regression method is used to find out which element or elements in the creative work environment have influence on individual's creative efficacy level and job satisfaction in these two groups of participants. For the group of physiotherapists, results showed that 60% of variance in creative efficacy could be explained by the "pressures" sub-scale of creative work environment ($R^2 = .603, \beta = .0776, p < .01$) while 80% of variance in job satisfaction can be explained by the "autonomy of freedom" creative work environment sub-scale ($R^2 = .802, \beta = .0895, p < .01$). In the group of radiographers, only 3.1% of variance in creative efficacy can be explained by all four creative work environment sub-scale ($R^2 = .031, \beta = 14.374, p > .05$) while 76% of variance in job satisfaction can be explained by "encouragement for creativity"
sub-scale \( R^2 = .755, \) Beta = .869, p < .01). More detailed Results are shown in Table 6 (for physiotherapists) and Table 7 (for radiographers).

Table 6 Four Creative Work Environment Sub-scales as Predictor of Creative Efficacy and Job Satisfaction for Physiotherapists

<table>
<thead>
<tr>
<th>Creative work environmental sub-scales</th>
<th>Dependent variables</th>
<th>Beta values</th>
<th>t-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encouragement of creativity (9 items)</td>
<td>Creative efficacy</td>
<td>.327</td>
<td>1.575</td>
</tr>
<tr>
<td></td>
<td>Job satisfaction</td>
<td>-.038</td>
<td>.951</td>
</tr>
<tr>
<td>Autonomy or freedom (7 items)</td>
<td>Creative efficacy</td>
<td>.143</td>
<td>.701</td>
</tr>
<tr>
<td></td>
<td>Job satisfaction</td>
<td>-.049</td>
<td>9.56**</td>
</tr>
<tr>
<td>Resources (7 items)</td>
<td>Creative efficacy</td>
<td>.121</td>
<td>6.19</td>
</tr>
<tr>
<td></td>
<td>Job satisfaction</td>
<td>.231</td>
<td>1.05</td>
</tr>
<tr>
<td>Pressure (5 items)</td>
<td>Creative efficacy</td>
<td>.981</td>
<td>6.04**</td>
</tr>
<tr>
<td></td>
<td>Job satisfaction</td>
<td>-.009</td>
<td>1.94</td>
</tr>
</tbody>
</table>
The main objective of this study is to find out the relationship between perceived creative work environment, creative efficacy and job satisfaction in two groups of Hong Kong Chinese allied health staff, Physiotherapists and Radiographers, who work in the same hospital.

Although a number of previous studies have been done to examine the creativity in the organizational setting, this study offers a new perspective on the issue. Firstly, this study relates creative work environment to job satisfaction and creative efficacy level in a new cultural context, Hong Kong Chinese. Past studies have been carried out predominantly in the West.

Secondly, most investigations have been carried out in business or industrial field while this

<table>
<thead>
<tr>
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<th>Dependent variables</th>
<th>Beta values</th>
<th>t-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encouragement of creativity (9 items)</td>
<td>Creative efficacy</td>
<td>-.038</td>
<td>-.113</td>
</tr>
<tr>
<td></td>
<td>Job satisfaction</td>
<td>1.26</td>
<td>3.54**</td>
</tr>
<tr>
<td>Autonomy or freedom (7 items)</td>
<td>Creative efficacy</td>
<td>-.049</td>
<td>-.198</td>
</tr>
<tr>
<td></td>
<td>Job satisfaction</td>
<td>.486</td>
<td>1.26</td>
</tr>
<tr>
<td>Resources (7 items)</td>
<td>Creative efficacy</td>
<td>-.783</td>
<td>-.783</td>
</tr>
<tr>
<td></td>
<td>Job satisfaction</td>
<td>.403</td>
<td>1.23</td>
</tr>
<tr>
<td>Pressure (5 items)</td>
<td>Creative efficacy</td>
<td>-.035</td>
<td>-.035</td>
</tr>
<tr>
<td></td>
<td>Job satisfaction</td>
<td>.543</td>
<td>1.24</td>
</tr>
</tbody>
</table>

Discussion

The main objective of this study is to find out the relationship between perceived creative work environment, creative efficacy and job satisfaction in two groups of Hong Kong Chinese allied health staff, Physiotherapists and Radiographers, who work in the same hospital.
study involves health professionals. Thirdly, it is a new attempt to adapt previously developed creative environment scale to the cultural and social context. In this respect, the current study makes a little contribution since the revised scale for measuring perceived creative work environment in the Hong Kong medical setting has good internal consistency. Creativity is commonly defined as the production of novel and useful ideas. The need of new ideas in medical field is not so apparent as in other work fields. However, creative work environment in medical field is beneficial for the staff who work in hospital because it enhances their job satisfaction and creative efficacy level. Results of this study indicate that perception of the working environment as a creative one is a good predictor of job satisfaction and creative self-efficacy. Job performance is correlated with job satisfaction (Iaffaldano & Muchinsky, 1985). Satisfaction might lead to good performance. That is, people who satisfy their jobs will work harder and therefore perform better. And on the other hand, performance might lead to further satisfaction. People are more likely to get reward from their good performance, and those benefits could enhance job satisfaction. This two-way buffering effect may result in the improvement of hospital service to patients. So the idea of promoting a creative work environment in medical field is as important as in other work fields.

In the current study, two groups of allied health staff, physiotherapists and radiographers, have been used for comparison. Since their job nature and job requirements are totally different. Also they belong to the different departments in the same hospital.
Therefore they are expected to expose in different work environment. The results of the study show that physiotherapists perceive their work environment as more creative than Radiographers do. This result corresponds to what was expected and "hypothesis 1" was being supported. The main differences between physiotherapists and radiographers in perceived creative work environmental factors on the four sub-scales, namely encouragement, autonomy, resources and organizational pressures proved to be statistically significant. And these factors are included in the Work Environment Inventory (WEI) and KEYS as creative stimulants in a study on creative work environment carried out by Amabile & Gryskiewicz (1989). So it is not surprising to see such results in the current study. Two factors, the "pressures" and "encouragement for creativity" seem to be two most important factors distinguishing X-Ray Department, a less creative working environment, from the Physiotherapy Department, which is considered to have a more creative working environment (hypothesis 7). The sub-scale "Pressures" consisted of items concerning both workload pressure and challenging work. It seems that workload pressure carries a negative sense to influence job dissatisfaction although challenging work may promote creativity. Few previous studies reviewed the effects of pressure on creativity in organizations (Amabile, 1988; Amabile & Gryskiewicz, 1987). And these researchers found that although workload pressures that were considered to be extreme could undermine creativity. Some degree of pressure could have a positive influence if it was perceived as arising from the urgent,
intellectually challenging nature of the problem itself. Similarly, Andrews and Farris (1972) found that time pressure was generally associated with high creativity in Research & Design (R&D) scientists, except when that pressure reached an undesirably high level. Thus, only excessive workload pressure would be expected to undermine creativity, especially if that time pressure were perceived as imposed externally as a means of control (Amabile, 1993). But time pressure that is perceived as a necessary concomitant of an important, urgent project may add to the perception of challenge in the work that positively correlates with intrinsic motivation and creativity (Amabile, 1988).

Physiotherapists have significantly higher level of creative efficacy and greater job satisfaction than Radiographers do. This finding further supports the assumption that creative work environment does have influence on people's creative efficacy and job satisfaction level. Creative work environment proved to be a good predictor of these two variables since it explains 28% and 82% of variance of creative efficacy and job satisfaction respectively in the two groups of participants. Although Physiotherapists have higher score in all these three variables than Radiographers do, conclusion cannot be drawn with confidence, as we cannot neglect the possibility that people having higher level of creative efficacy tend to choose Physiotherapy as their occupation. Previous research carried out by Spector (1992) shown that certain types of people were inclined to like or dislike certain type of jobs. Another research concerning the relationship between creativity and personality characteristics also found that
individuals having higher self-confidence, challenge-prone character and being extrovert are more creative (Barron & Harrington, 1981). It seems that Physiotherapists are more similar to the type of person just mentioned above and are more prone to choose physiotherapy rather than radiography as their professions. In the interview section before entering the course of physiotherapy in the Hong Kong Polytechnic University, applicants are asked to imagine themselves as different characters such as a turtle swimming in the sea, or an owl standing on the tree. They are encouraged to act out the imaginary character as truly as they can. The departmental staff welcome those applicants with highly imaginative mind. Also, applicants who are more energetic and stronger in body build are preferred. Besides, those who having outstanding performance in sports are also more advantageous to be accepted. So, people who have extrovert personality and imaginative thinking are more favored for the professional career of physiotherapist. And this factor may make some contributions on the result of current study. On the other hand, applicants for studying radiography in the same tertiary institution are only required answering basic questions in the interview section. In view of the uncertainty in drawing such conclusion, personality test should be included in the questionnaire to eliminate the effect of personality factor affecting the outcome of the study in future research.

The results of this study show that there is a moderate correlation between perceived creative work environment and individual's creative efficacy level. One important point is
that not everyone under the same creative work setting perceives his/her work environment
to be creative to the same degree. It is because everyone has his or her own standards for
determining what type of the work conditions are considered to be creative. Perception is
also affected by people antecedent experience in the particular situation. And the scale used in
this study measured the perceived creative work environmental factor of participants' working
place. People, who perceive their working place as creative, may be easily influenced by the
perceived creative climate. Creative climate provides them a norm and gives them more chance
to do thing creatively. Recent research (Scott & Bruce, 1994) has found support for the positive
influence of an innovative cognitive or decision making style on the creative behavior of
employees. So referring to the results of this study, only people who have perceived their
working place to be creative will have higher creative efficacy level (hypothesis 4).

Hypothesis 5 of this study has predicted that people would be influenced more by their
work environment when they work under this condition for a longer duration of time. These
assumptions is based on the idea that there will be more chances for an individual to practice
his/her creative mind or thinking when working under a creative work environment for a longer
period of time. So the more the chances for them to practice or managing things creatively, the
more they think they are capable to do so. Or, on a contrary, if they work in a creative-bound
work setting, the longer they situated in such a condition, the lesser the chance to do things
creatively. As a result, they may easily get used to do things in a conventional way. And lower
Creative self-efficacy level may be manifested. Although, this assumption has not received much research attention in the past studies, the current investigation has tried to examine whether duration of service correlates with the individual's creative efficacy level. The results do not support this assumption. I think the most probable reason is that creative efficacy is a kind of individual's internal "feeling" about his/her ability to do things or to solve problems creatively. Creative efficacy is just like a personality trait, which is not very susceptible to change. The difference for determining whether a person is creative or not should refer to how often this person acts out his/her behavior creatively irrespective of how this person thinks about his/her creative ability. Another probable reason is that there are only six items in the scale measuring individual's creative efficacy. Although the scale has a high internal consistency (coefficient alpha .58 for the pilot and .82 for the main sample), the items are quite general without specifying the situation to be considered. For example, five out of the six questions do not mention about the situation. Only the last item of the scale "I believe that I am currently very creative in my work" has specified the work situation. So the measured result of the scale seems to be too general and does not fit the work situation in which the current study concerned about. Thus, the results indicate that duration of service under creative environment or creative-bound environment dose not contributes to people's creative efficacy level. On the other hand, in order to study the influence of duration of service under particular creative work environment, longitudinal study seems to be a more appropriate design method to be used.
From which, a baseline measurement is being made when the person starts working in a particular department and continuous comparison on the person's creative efficacy level is made. By using this method, it is possible to obtain a more conclusive result.

The results of the person-environment fit hypothesis showing that perceived creative work environment and creative efficacy have no interactive effect on individual's job satisfaction level when two groups of participants are putting together. However, when each group of participant is considered separately, correlation between creative efficacy and job satisfaction is significant for the group of physiotherapists but not for the group of radiographers. Firstly, I assume that people with higher creative efficacy score equivalent to people of high creativity. Again, as I have mentioned, people are considered to be creative only when they act out their creative behavior. But according to the person-environment fit model, values and abilities are included in the characteristics of a person (French, Caplan, & Harrison, 1982). Therefore this assumption has no empirical support. Creative efficacy of an individual refers to the degree of confidence and the ability to generate creative ideas and products. It is the measurement of the ability rather than the value in the person characteristics of Person-Environment fit model. I suggest that the individual's value measure of creativity in their work place should also be included in the questionnaire in the future study. Secondly, in the second statistical method, participants are divided into two groups according to the department they belonged to. I assume that, with referring to hypothesis 1,
the Physiotherapy Department is a more creative work place than the X-Ray Department.

This assumption may not be so appropriate because hypothesis 1 only supports the fact that
majority of the staff who work in Physiotherapy Department perceived their work
environment to be creative than those who work in X-Ray Department. That means there
should be a small proportion of staff who work in Physiotherapy Department do not
perceived their work place as creative one. This hypothesis is also true when applying to the
radiology department, but in an opposite manner. That is, still a small proportion of
radiographers does perceive X-Ray Department as a creative working place. So each group of
people still consists of person-environment fit participants and person-environment unfit
participants and made the result inconclusive. Thus, if we want to have a more conclusive
result, we have to further subdivide the two groups into sub-groups of person-environment fit
group and person-environment unfit group according to their creative efficacy score. But
the splitting procedure is a bit more complicated and has some technical problem in
implementation. In addition, result obtained by using the Two Way ANOVA show that
creative work environment has greater influence on people's job satisfaction level than
creative efficacy do. The result is further supported when using linear regression method
putting creative work environment and creative efficacy as the predictors of job satisfaction
(beta obtained using creative work environment as predictor is .836, p < .01, while beta
obtained using creative efficacy as predictor is .086, p > .05). These results contradict to the
result of the demand-ability version of fit in the person-environment fit hypothesis (Furnham & Schaeffer, 1984). It may also be explained by the fact that the measuring scale for creative efficacy is too general.

Although some contributions has been provided by the current study on creativity to a new cultural and social context, some suggestions could be employed by the researchers who want to perform study of the related issue in future. As the sample size of the current study is small, therefore the results obtained do not truly represent the population. I suggest the sample size should make some adjustments by those researchers in order to obtain a more representative and conclusive result. It can be achieved by recruiting participants from more than one hospital. Furthermore, the result of current study will be more informative if we put the variables "age" and "gender" into the analyzing procedures. These may provide us a new scope in the creativity study.

In conclusion, due to the difference in job nature and work environment between physiotherapists and radiographers, Physiotherapy Department is perceived as a more creative work place than the X-Ray Department by their corresponding staff. However, perceived creative work environment have influence on both creative efficacy and job satisfaction level of these two groups of medical professions. But job satisfaction does not influence by individual's own creative efficacy perception. Also, person-environment fit hypothesis is not supported to affect people's job satisfaction level in this study. Furthermore,
pressures (constituted of challenging work and workload pressure) and encouragement for creativity, are the most important factors responsible for the difference in the perception made between Physiotherapists and Radiographers on creative work environment.
References


