The perceived importance and the presence of creative potential in the health professional’s work environment

Sue Lukersmith* and Robin Burgess-Limerickb

*Lukersmith & Associates, Sydney, New South Wales, Australia; bMinerals Industry Safety & Health Centre, University of Queensland, Brisbane, Queensland, Australia

(Received 9 June 2012; final version received 18 February 2013)

The value of creative employees to an organisation’s growth and innovative development, productivity, quality and sustainability is well established. This study examined the perceived relationship between creativity and work environment factors of 361 practicing health professionals, and whether these factors were present (realised) in their work environment. Job design (challenges, team work, task rotation, autonomy) and leadership (coaching supervisor, time for thinking, creative goals, recognition and incentives for creative ideas and results) were perceived as the most important factors for stimulating creativity. There was room for improvement of these in the work environment. Many aspects of the physical work environment were less important. Public health sector employers and organisations should adopt sustainable strategies which target the important work environment factors to support employee creativity and so enhance service quality, productivity, performance and growth. Implications of the results for ergonomists and workplace managers are discussed with a participatory ergonomics approach recommended.

Practitioner summary: Creative employees are important to an organisation’s innovation, productivity and sustainability. The survey identified health professionals perceive a need to improve job design and leadership factors at work to enhance and support employee creativity. There are implications for organisations and ergonomists to investigate the creative potential of work environments.

Keywords: creativity; work environment; work organisation; health professional

1. Introduction

The research study explored the relationships between creativity, workplace environment factors and health care practice settings. Creativity refers to the development of novel, potentially useful ideas (Shalley, Gilson, and Blum 2000; Dul, Ceylan, and Hendriks 2007).

The value of creativity and innovation at work is well established in the literature (European Commission 1995; West and Anderson 1996; Gryskiewicz and Epstein 2000; Shalley, Gilson, and Blum 2000; Dul and Ceylan 2006; Carmeli, Cohen, and Elizur 2007; Kahya 2009; Jaskyte et al. 2010; Coelho, Augusto, and Lages 2011; Dul, Ceylan, and Jaspers 2011). Organisations including health care services need to be innovative to grow, develop, maintain service quality and remain competitive within cost constraints. Organisations need creative workers or knowledge workers particularly in knowledge-based economies (Dul, Ceylan, and Jaspers 2011) or settings such as health care practice. Consequently, the creative behaviour of employees is a key element in the sustainable growth and viability of an organisation (Gryskiewicz and Epstein 2000; Shalley, Gilson, and Blum 2000; Carmeli, Cohen, and Elizur 2007; Genaidy et al. 2009; Valentine et al. 2011). The first step to innovation and implementation of ideas at the organisational level is to enable and facilitate the creativity of people at work (Politis 2005; Genaidy et al. 2009; Coelho, Augusto, and Lages 2011).

Creativity is important to any business, including health care practice, in both the public and private sectors. Problem solving at work often involves finding new and useful ideas, but creative solutions can enhance productivity and job satisfaction in the health care setting (Basadur, Runco, and Vega 2000; Valentine et al. 2011; Jokari, Jorfi, and Ebadi 2012). Creativity in the health care setting can contribute to new or improved services and procedures, alternative or new methods for service delivery and communication (cornerstones of health care), reducing duplication of services between and within health care organisations, developing solutions to service delivery barriers including financial constraints and resolving day-to-day problems. Growth, sustainability and maintaining quality are particularly relevant when the rising costs of health care services are considered.

Whilst it has been established that creativity is important to innovation and productivity, it is the role of creativity in clinical reasoning and problem solving that is particularly relevant in the health care setting. The provision of health care...
services, assessment and treatment requires the health professional to clinically reason. Clinical reasoning involves solving complex problems involving the patient’s health needs, best clinical practice and scientific evidence within available resources and the circumstances of the patient. Clinical reasoning and problem solving require the health professional to use a range of different approaches including narratives, critical thinking, the best research available, generic thinking, collaborative reasoning and creative thinking in consultation with the patient (and often their family) to make professional judgments and decisions on the most appropriate solutions for the patient (Rogers 1983; Mattingly 1991a, 1991b; Unsworth 2005; Higgs et al. 2008; May et al. 2008; Rassafiani et al. 2009). Creative thinking and reasoning can also improve the connection between health care research and practice (Seymour, Kinn, and Sutherland 2003; Higgins et al. 2008).

The creativity of the individual health care professional does not only depend on personal characteristics and their own creativity. The social or work environment can influence both the level and the frequency of creative behaviour (Amabile et al. 1996; Soriano de Alencar and Bruno-faria 1997; Schepers and Van den Berg 2007; Dul, Ceylan, and Jaspers 2011). Creativity is also affected by the extent to which the physical work environment or the organisational environment initiates, stimulates, (Livingstone, Nelson, and Barr 1997; Soriano de Alencar and Bruno-faria 1997) fosters and acknowledges creativity, encourages idea generation and adopts the new idea developed by the individual worker.

Dul and Ceylan formulated a conceptual model on the relationships, work environment and creative performance (Dul, Ceylan, and Jaspers 2011). The Creativity Development Quick Scan Instrument (CDQS) was also developed as a checklist (Dul and Ceylan 2006; Dul, Ceylan, and Hendriks 2007; Dul and Ceylan 2011). The conceptual model and related checklist articulates the relationship between individual factors, organisational work environment, the physical work environment and worker creativity. The individual, organisational environment and physical environment all contribute to enhancing creativity and thus novel and useful ideas. The checklist identifies creativity enhancing variables, which are grouped into four categories such as job design, leadership, indoor design and building design. It is these factors which may be important and present (or not) in a work environment.

Although there has been previous study into creativity and work, there has been limited research, which explores creativity and the health professional’s work environment. One study investigated the interplay between age and creativity and explored the job resources (such as support for creativity from supervisors) amongst a limited sample of nurses (Binnemies, Ohly, and Niessen 2008) but no other work variables. Another study of nurses explored the relationship between nurses creativity and innovation in one hospital in Iran and linked these to motivation and personality (Jokari, Jorfi, and Ebadi 2012). The link between creativity to both the physical and organisational design of workplaces is of interest to ergonomics. Ergonomics aims to provide a good fit between products and services (in this study, health care and rehabilitation service) and the users (patients, sick people, persons with disabilities or clients) and the workers (health professionals). The research aimed to explore whether the creative potential of health care work environments is realised (there is a fit between perceived importance and presence).

The research study sought to explore the perceived creativity of health professionals, the creative potential of health professionals work environments within health care practice settings and across employment status. Various practice settings and disciplines were targeted due to the differences in the work environments, roles and tasks performed. These factors have the potential to display trends between work environments, practice settings and employment status.

2. Method

The descriptive research study explored the creative potential of the health professional’s work environment. Health professionals in Australia employed in private or public settings were recruited. Following ethics approval from the University of Queensland, participants were recruited to this study using a method of convenience sampling known as ‘snowball’ or network sampling (Polit, Beck, and Hungler 2001). The method involves starting with a smaller number of participants and then expanding through referrals (Babbie 1995). The recruitment was primarily through email (electronic media) whereby people were invited to participate. Recruitment occurred through email within the investigator’s network, one state and one national health professional association, and three email list serves. Recruitment occurred over a period of 3 months.

A survey method was used involving a questionnaire adapted from the CDQS checklist (Dul, Ceylan, and Hendriks 2007). The questionnaire included questions on the participant’s:

- Demographic information (age, gender, job status, professional health discipline, year of qualification, years worked, practice setting and location of employment).
- The participant’s perception of their own creativity and creative personality and the idea score. The latter relates to question 11 which asked how much the participant thought they had ideas ‘to significantly improve the way their job was done’ (questions 9–11 with an ordinal scale from 1 to 10 for question 10 and 1–7 for question 11).
The importance of 21 work environment factors to support their creativity (question 12 involving an ordinal scale of 1–7). The participant rated each of 21 work environment factors as to whether they perceived these to be important to support their creativity (importance score).

The realised or presence of these 21 work environment factors in their organisation (question 13 involving an ordinal scale of 1–7). The participant rated these same 21 work environment factors as to how much they considered these factors were present in their organisation and workplace (realised score).

The importance of the interaction of the personal characteristics, organisational environment and physical environment (relative importance score – participant was required to allocate numerical the relative importance of the importance to total 10).

Refer to the Appendix for the questionnaire.

Analysis was performed using descriptive, non-parametric and parametric statistics with the Statistical Program for the Social Sciences (SPSS). On the ranking scales of relative importance of groups of factors (personality, organisational environment and physical environment) for stimulating creativity (questions 15, 16, 17), the mean scores were used. The practice setting scores were transformed from nine categories into two groups of private and public.

The work environment factors were grouped into four categories and the mean of the sum of the ranking for each of the variables per category:

- Job design (variables – challenging job, team work task rotation, autonomy in the job)
- Leadership (variables – coaching supervisor, time for thinking, creative goals, recognition of your creative ideas, incentives for creative results)
- Indoor design (variables – furniture, indoor plants/flowers, calming colours, inspiring colours, privacy)
- Building design (variables – windows view to natural elements, any window view, quantity of light, daylight, indoor (physical) climate, sound, smell).

Similarly, the work environment factors were also explored in terms of larger groupings of organisational factors (job design and leadership variables) and physical factors (indoor design and building design). The healthcare practice variables were grouped in setting (private and public sector), job status (employed or self-employed), workplace location (city or regional).

In addition calculations were used to generate ‘fit’ scores [a score of creative potential (or its equivalent ‘fit’) of the work environment] for job design, leadership, building design (importance and realised) and two categories of organisational and physical factors. Fit is defined as the extent to which the organisation fulfills a person’s need for creativity support (Dul, Ceylan, and Hendriks 2007). It is based on a similar concept related to the person–organisation fit concept or compatibility between people and organisation in which they work (Kristof 1996 quoted in Dul, Ceylan, and Hendriks 2007). Livingstone, Nelson, and Barr (1997) examined the influence of the person, environment and the concept of fit as it relates to creativity at work. Certain contexts match individuals personal characteristics and that this match can result in high levels of employee creativity (Shalley, Gilson, and Blum 2000).

The fit score was determined by dividing the realised/present score by the important score, multiplied by 100.

$$\text{mean fit score} = \frac{\sum \text{realised score per factor} / 361}{\sum \text{important score per factor} / 361} \times 100$$

Interpretation of fit scores assumed that environmental factors with fit scores below 100 indicate there is less creativity potential and so room for improvement. For example a health professional may have rated the work environment variable ‘Incentive for creative results’ 6 on the scale (more than moderately important) but then rated the realised score as 2 (little realised). The fit score is 33 (out of a possible 100) which indicate that there is little incentive present at the workplace for creative results and there is opportunity for substantial improvement. On the basis of this information, an ergonomist might recommend to the employer that strategies and systems are put in place to provide incentives to employees or groups of employees who produce creative results and innovation. Some examples might be targeted recognition by the employer or manager such as a reward system (such as a gift or certificate), verbal acknowledgement or public affirmation or perhaps bonus systems (money, time benefits to engage in other activities).

Numerous comparisons between variables were explored. Non-parametric statistics were used. Mann–Whitney U test was used to study differences between personality characteristics and variables such as practice setting, location, job status, discipline, importance of work environment categories (job design, leadership, indoor design, building design, organisational and physical factors). Kruskal–Wallis correlation tests were performed to explore comparisons of the work environment categories (job design, leadership, indoor design, building design, organisational and physical factors) with job status, discipline, practice setting, job status. Spearman’s rank correlation test was used to compare the differences between
personality characteristics and idea scores with graduation year, first completed health qualification, age and current employment. Parametric tests (ANOVA with post hoc Tukey HSD) were used for comparisons with scores that had been calculated such as the fit score (interval scale) based on the participant’s responses (ordinal or ranking scale) of the work environment categories (job design, leadership, indoor design, building design, organisational and physical factors) compared to job status, discipline, job status, location, setting, private/public and location.

3. Results

3.1 Demographics

There were 361 participants in the study. The mean age was 37 years old (range 22–61). The majority of the participants was female (92.2%). The disciplines represented included 46% occupational therapists, 16% speech pathologists and 11% physiotherapists. The remaining 27% included social workers, psychologists, registered nurses, exercise physiologists, dieticians, doctors, podiatrists, health promotion officers, prosthetists, residential or care worker. Health professionals who participated were primarily from NSW (68%) (Victoria 12%, Queensland 8%, Western Australia 3%, Australian Capital Territory 4%, South Australia 2%, Tasmania 1%, outside Australia 2%). With respect to location, 69% were employed in city locations and 31% in regional or country locations. The median graduation year of their first health professional qualification was 1996 (range 1967–2006). The majority of participants was employees (77%) who worked in the public sector (70%).

3.2 Perceived own creativity (creative personality characteristics) of health professionals

The median personality characteristic score (total person) was six characteristics (refer to Appendix) (mean 6.73, SD 3.11; 25th percentile point was 5, 75th percentile point was 9). This means that participants ticked six of the creativity characteristic traits (out of a possible maximum score of 16) to describe themselves. The median creativity score (creativity) was 7 out of a possible 10 (very high) (mean 6.63 and SD 1.58). Participant median score on the scale of agreement that they have ideas (‘which would significantly improve the way my job is done’) was 5 out of a possible 7 (mean 5.38, SD 1.09).

Comparisons of the personality characteristics results were made using Spearman’s rank correlation. The perceived own creativity and age identified a significant difference between age and total person (level of significance < 0.01, correlation coefficient 0.25) and creativity scores (p < 0.05 correlation coefficient 0.12), but not for the idea score (where older people scored higher). There was also a significant difference in the total person score and graduation year (p < 0.01 correlation coefficient 0.19). The creativity score and graduation year was also significant (p < 0.05 correlation coefficient –0.12). The results indicate that participants, who graduated earlier, have a higher total person personality characteristics and creativity score.

3.3 The importance, realisation and fit of work environment factors

Table 1 presents the mean scores for importance, realised and fit scores across the 21 work environment factors. Both importance and realised scores were rated by participants from the 1 (not important at all) to 7 (very important). Realised rankings used the same scale (very little realised) to 7 very much realised. Refer to the Appendix for the questionnaire. Realised scores refer to whether these job characteristics are present in their work environment and so support the health professionals creativity. The fit score indicates whether the factors that the participants perceived to stimulate their creativity were present or whether there was a need for change in these factors in order to stimulate creativity. Thus a fit score of more than 100, and using the example of the mean fit score for the variable calming colours in Table 1 of 123/72, suggests that the health professionals work environment already had calming colours (painted walls or colours of furniture) and which they perceived to be appropriate for supporting their creativity or the potential for being creative in their work environment. There is no need for improvement or change in the work environment colours. In contrast a lower fit score, using the example of sound in Table 1 of 51.77, suggests that the sound in the work environment is a problem for potential creativity and that there is room for improvement. The way the sound might be improved would need to be determined at the workplace but could involve anything from the installation of sound barriers, using dampening features on floor surfaces, providing background or mood music key areas.

3.4 Job status (employed/self-employed)

There was a significant difference in the perceived importance of job design and organisation factors between job status (employed and self-employed) (p < 0.05). Managers (employed) rated job design higher than self-employed
sub-contractors (mean difference 0.53). Employees, employed managers rated organisational factors higher than self-employed (sub-contractors) (mean difference 0.36, 0.48 respectively).

3.5 Private and public sectors

The only significant difference in the perceived importance of workplace environment factors between the private and public sectors was building design ($p = 0.05$, mean difference 0.34).

There are 14 of 21 (67%) of work environment factors where the fit is better in the private sector than the public. These are job design (challenging job, task rotation, autonomy in job), leadership (Recognition of creative ideas, Incentive for creative results), indoor design (Furniture, Calming colours, Privacy), building design (Window view to natural elements, any window view, quantity of light, daylight, indoor (physical) climate, sound, smell). The level of significance was $p < 0.01$ for all factors except challenging job, creative ideas, quantity of light, and daylight which were at $p < 0.05$. On 10 of these factors, there was no requirement for improvement ($> 100$) compared with the public sector where there were only three work environment factors.

4. Discussion and conclusion

4.1 Demographics

The study sample was health professionals in Australia. Although sampling (recruitment) was not random, the age range of the sample reflects the adult working population from 22 years to 61 years old. Similarly, the gender split reflects the health practitioner population of the majority being female [females comprise 74% in health occupations in Australia (Australian Institute of Health and Welfare 2007) and 93% of occupational therapists are female (Australian Institute of Health and Welfare 2006)].

The majority of participants had completed their health qualification ≥ 10 years ago, worked in their current role for 5.58 years (mean) and with their current employer for ≥ 5 years (mean). The respondents are experienced practitioners, who
have worked in at least 2 practice settings. The level of work experience is likely to be reflected in the participant’s rating of the importance and presence of work environment factors compared to new health professional graduates, who have less capacity to compare practice settings.

Whilst most of the participants were from NSW, the ‘good enough principle of sampling’ (Thomas and Nelson 2001) suggests that plausible links from the results can be made to health professionals in Australia, although not necessarily to medical practitioners (doctors and non-allied health professionals who were under represented in the sample). The number of respondents outside Australia was small, came from English speaking countries with similar health care qualifications required for professionals and worked in similar largely public health care systems, thus their data was included in the analysis.

Most participants were employed (89% – employee or employed manager) in city or metropolitan locations and 70% of participants were employed in the public sector. The employment (job) status reflects health care practices and funding sources in a predominantly public health system.

4.2 Creativity of health professionals

Individuals with creative personality characteristics may be effective at recognising problems or at combining new information leading to the production of more creative work (Shalley, Gilseon, and Blum 2000). The need for organisations to have creative individuals and creative leaders has been recognised as a human resource issue (Amabile et al. 2004; Egan 2005; Madjar 2005; Waight 2005). Previous studies suggest that the most creative work was achieved when creative people had challenging jobs and had supportive (coaching) supervisor (Oldham and Cummings 1996; Coelho, Augusto, and Lages 2011).

An interesting finding of the current study was the health professional’s perception that personality characteristics were considered more important than organisational or physical factors in a health care organisation for stimulating creativity. Front line workers, such as health professionals have a major communication role in the provision of health care, in particular in terms of history taking (which demands accurate but narrative information from the patient and family) assessment and diagnosis (which requires cooperation and honesty from the patient) through the patients understanding of, and compliance with recommended health and rehabilitation interventions. Coelho, Augusto, and Lages (2011) identified that the interaction front line employees have with their ‘customers’ allows them to respond with appropriate actions and refines their own responses creatively to meet the customer needs. The study concluded that the workers relationship with customers is positively related to creativity. Accordingly, the high importance placed on personality in the current study is more likely to be related to the nature of the work and task demands of the health professional as a front line worker, rather than parameters such as age or gender.

The results of the current study show that health professionals consider themselves to be creative. Older health professional participants perceived themselves to be creative. Younger health professionals described themselves to be creative but did not rate themselves as high in their creativity as did older health professionals. There was no correlation identified with workplace factors. This result is slightly different to the study on nurses by Binnewies, Ohly, and Niessen (2008) which suggested that age and creativity were linked to specific workplace variables (high support for creativity from supervisors or high job demands) with older nurses being more creative where there was support for creativity and high job demands.

4.3 Importance and creative potential (fit) of work environment factors

The work environment factors for job design (challenging job, team work, task rotation, autonomy), leadership (coaching supervisor, time for thinking, creative goals, recognition of creative ideas and incentive for creative results) was considered to be the most important in supporting creativity in this study. The results are consistent with other research which suggests that job design (autonomy, variety and feedback) and creativity are significantly associated with employee creativity (Cangemi and Miller 2007; Carmeli, Cohen, and Elizur 2007) as have been organisational structure (team work, support from colleagues and supervisors and managers to be creative) been empirically identified as key variables to a work climate for stimulating creativity at work (Soriano de Alencar and Bruno-faria 1997; Politis 2005; McElvaney 2006). Coelho, Augusto, and Lages (2011) explored the link between front line workers creativity and managerial/supervisor behaviour (Coelho, Augusto, and Lages 2011). The authors concluded that supervisory support and organisational support enhance intrinsic motivation thereby creativity.

In this study, building design (view to natural elements, any window view, quantity of light, daylight, indoor climate, sound, smell with the least important smell) was more important than indoor design (furniture, indoor plants, calming colours, inspiring colours and privacy). However, the indoor design variable that was the most important factor was privacy.
This result is consistent with other research which identified that privacy in the workplace is important to well-being and that a lack of privacy at work (which also indicates a lack of control over one’s environment) will interfere with performance in cognitively demanding tasks (Bridger and Brasher 2011).

The fact that participants consider the need for autonomy and time for thinking to be the most important for supporting creativity is acutely felt in the current health care practice environment. There are shortages of health professionals (recruitment), a reduction in staff/patient ratios, evidenced by waiting lists and increasing pressures within practice settings in terms of health care costs and budget cuts (Ray, Turkel, and Marino 2002). A combination of these issues is likely to result in time constraints to think and complete work tasks. The health professionals identify thinking as important in the current climate for the industry. In the future, it may be less important if all or some of the aforementioned issues were resolved.

Challenging job was rated by participants to be one of the most important work environment factors for stimulating creativity. Creative people seek job challenges in the workplace (Carmeli, Cohen, and Elizur 2007). Health professionals rate themselves to be above average in creativity and so it is consistent that a challenging job is an important work environment factor. Similarly, health professionals perceived team work to be important, which is recognised in the literature to be important to organisations (McCoy 2005).

In terms of creative potential of the work environment, the study results identified five factors considered to be a good fit (realised creative potential of the work environment – the fit between presence and importance) and where there was no indication for improvement (mean 100) were creative goals, furniture, indoor plants, calming colours and any window view. Organisation factors (time for thinking, incentive for creative results, and recognition of creative ideas) needed more improvement than physical factors. It is interesting to note, that whilst some of the creative potential of the work environment is met, these factors are less important (furniture, indoor plants, calming colours) whilst some of the more important work environment factors are the least met (time for thinking, recognition of creative ideas). These findings are consistent with other research that support for creativity with the social-organisational work environment factors is more important than the physical work environment (Politis 2005; McElvaney 2006; Coelho, Augusto, and Lages 2011; Dul, Ceylan, and Jaspers 2011).

The work environment factor that needs the most improvement was incentive for creative results. Whilst health professionals do not consider that their work environment adequately provides ‘incentive for creative results’, it is not one of the most important factors for health professionals. A person does not generally enter a health profession (in the public sector as an employee) for significant financial rewards (or incentives). Whilst there may be incentives other than financial, the participants are likely to perceive incentives for creative results to be linked to financial incentives. Public sector employees have limited opportunity to engage in productivity or results based financial incentives. Most participants in the study were employed in the public sector, which may have influenced the importance rating.

4.3.1 Private/public

Generally there is a better fit of work environment factors in the private sector compared to public sector with improvement needed across most factors other than the physical environment.

Health professionals working in the private sector consider building design more important (and a better fit) than health professionals in the public sector. One of the reasons for this may relate to the heightened need and expectations for the private sector to present well (in terms of building design factors) to their clients. A room in a private hospital or service (where the client is also paying more for the service) with windows, daylight, pleasant sounds and smells is more appealing and likely to encourage a positive attitude towards the service and staff. A room that is poorly lit, has no window view, and no daylight may be more easily accepted in the public sector service, given there is typically no direct payment made by the patient. As there is a need for better building design and workplace environment factors in the private sector for commercial reasons, may explain the higher ranked importance and fit by privately employed health professionals.

4.3.2 Employed/self-employed

The results indicate that self-employed health professionals have better creative potential of their work environment (fit) than do employed health professionals. There is a consistent pattern with 12 of the 21 work environment factors (57%) where self-employed had a better fit than employed (challenging job, autonomy, coaching supervisor, incentive for creative results, furniture, calm colours, privacy, view window, daylight, indoor climate, sound, and smell). As many of the self-employed participants were sub-contractors or sole traders, they may be responsible and have control for their own work environment (at least the office space).
In previous research (Block and Stokes 1989; Soriano de Alencar and Bruno-faria 1997; Shalley, Gilson, and Blum 2000) lack of privacy was considered as a work environment factor that inhibited creativity. Block and Stokes (1989) identified that those working in greater privacy and performing a complex task expressed greater satisfaction than those who did not have privacy. Self-employed persons income is directly related to performance, completion of tasks and outcomes (more than the public sector where the person is paid a wage irrespective). For example, if the task is not satisfactorily completed, in an appropriate time and without distractions there is the potential for the self-employed subcontractor or sole trader’s income to be affected in the short or long term with respect to customer satisfaction. Self-employed persons have a business need to arrange for a better fit with privacy, as potentially this can have an impact on performance and thus income.

5. Conclusions

There is a substantial body of research which has established the link between factors in the work environment and worker creativity. Stimulating the health professional’s creativity will enhance their performance in the use of narratives, creative thinking, collaborative decision making to clinically reason, make professional judgments and decisions on the most appropriate assessment and treatment solutions for the patient. Stimulating and supporting the creativity of health professionals will also assist organisations to maintain services, maintain productivity and growth and provide quality services in an increasingly cost-saving environment of health care. The study results suggest to ergonomists, employers and organisations that health professionals consider themselves to be creative. However, there is room for improvement in health care settings to stimulate their worker’s creativity.

Strategies should be adopted to improve the creative potential of the work environment, particularly in the public sector of the health practice setting. The approach should use a bottom up approach within a participatory ergonomics framework (Haines et al. 2002; Jaskyte et al. 2010). In order to effect change and with better impact to stimulate creativity, workers need to be an active stakeholder (Eklund 1997; Dul et al. 2012) and thereby also become an agent of change. Participative ergonomics methods and tools are also integral to the integration of the bottom-up and top-down processes. Consequently, the tools need to be bottom-up and seek information from workers.

There are a number of tools that could be used to identify workplace factors that need improvement, so that changes can be made to a work environment towards one that supports and stimulates worker creativity. These are not limited to but include tools such as questionnaires (such as the CDQS), interviews with employees, semi-structured questions or games (Gryskiewicz and Epstein 2000), focus groups with work groups and frameworks to guide planning (such as concept mapping) (Jaskyte et al. 2010). Ergonomists can offer a way forward to employers and organisations and assist with the design and management of enhancing the changes to a work environment to better enhance the creativity of their workers.

6. Implications for ergonomics practice

While the research did not set out to assess creativity, performance nor productivity per se, the results have a number of implications for ergonomics practice which aims at improving performance and productivity. Factors of building design, and in particular the use of windows and natural lighting, were highlighted as particularly important to creativity, as were some internal building design factors such as privacy. Organisational design factors such as autonomy and time for reflection were identified as particularly important. A ‘challenging’ job was identified as being critical for creativity and is consistent with the conditions for clinical problem solving for health professionals established in the literature. The results have also indicated that these work organisation factors require more remedial attention for the health professional survey respondents than the physical work environment.

7. Study limitations and future research

This study focused on health professionals. Of interest to future research is the interaction of creativity, the work environment and the impact on performance with clinical reasoning. Future research may also investigate the fit of work environment factors across public and private settings and employment status (employed or self-employed) for other professions. The large representation of females in the study would be interesting to explore further and potentially purposefully seek male health professionals perceptions in future research. One of the limitations of the study is the sampling technique. Whilst the sampling removed geographic distance as a barrier, the sampling did depend on professional and friendship networks. The cultural context and some words used in the checklist may have been less clear for some participants. For example the term ‘coaching supervisor’ is not a term typically used in a work environment in Australia, whereas terms such as supportive supervisor, senior supervisor (who provides support with clinical decisions and practice) or in the health professions it might also refer to a mentor.
Acknowledgements

We thank Jan Dul (Erasmus University, The Netherlands), Canan Ceylan (Uludag University, Turkey) and Helleke Hendriks (Consumer Association, The Netherlands) for the use of the CDQS, which was adapted and expanded for Australian health professionals and this study.

Funding and conflict of interest:

No financial assistance was provided for the study from any source. The authors report no declarations of interest.

References


Dul, J., C. Ceylan, and H. Hendriks. 2007. “A practical instrument to measure the creativity potential of the work environment 10th European conference on Creativity and Innovation.” Copenhagen, Denmark.


Appendix. Creativity and the work environment questionnaire

Appendix  Creativity and the work environment questionnaire

Please fill in individually (10-15 minutes). We are interested in your personal interpretations. Please answer all 17 items. There are no right and wrong answers.
Completion and return of the questionnaire will be taken as an indication of voluntary consent to participate in this study.

ABOUT YOU
1. Age …….. Years
2. Gender □ Female □ Male
3. Job status (primary job)
   □ employee □ manager (employed)
   □ self-employed (sub-contractor/sole trader)
   □ self-employed employer (owner/manager of a business with >2 employees)
   □ other …………………………………………………...

4. Professional health discipline
   □ occupational therapist □ physiotherapist □ psychologist
   □ social worker □ nurse (registered) □ rehabilitation counselor
   □ speech pathologist □ exercise physiologist/human movement
   □ other …………………………………………………...

5. Year completed first health professional qualification ……………

6. Years worked
   a. In current role ………………. years
   b. With current employer ………………. years

7. Practice setting (where your skills as a qualified health professional are used – even if your job title is not as a health professional, yet your training is a requirement for the job)
   □ Private business or industry sector (e.g rehabilitation coordinator at a manufacturing company, rehabilitation advisor workers compensation/CTP insurer, occupational rehabilitation provider)
   □ Private clinical practice/private therapy clinic (your own or as an employee)
   □ Public business sector (e.g Commonwealth Rehabilitation Service, rehabilitation advisor at a government authority)
   □ Public Hospital inpatient service □ Public Hospital outpatient service
   □ Private Hospital inpatient □ Private Hospital outpatient

8. Location of employment □ City □ Regional State ………….

YOUR CREATIVITY
9. Tick with X which of the following words best describe you:

<table>
<thead>
<tr>
<th>Capable</th>
<th>Intelligent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clever</td>
<td>Inventive</td>
</tr>
<tr>
<td>Confident</td>
<td>Original</td>
</tr>
<tr>
<td>Egotistical</td>
<td>Reflective</td>
</tr>
<tr>
<td>Humorous</td>
<td>Resourceful</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
</tr>
<tr>
<td>Individualistic</td>
<td>Self-confident</td>
</tr>
<tr>
<td>Informal</td>
<td>Unconventional</td>
</tr>
<tr>
<td>Insightful</td>
<td>Wide interests</td>
</tr>
</tbody>
</table>

10. Mark “X” in the box, **how creative you consider yourself** (developing new or novel or useful ideas) in comparison to colleagues with similar jobs.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very low</td>
<td>average</td>
<td>very high</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11. **Mark X how much you agree** with the following statement: “I have ideas which would significantly improve the way my job is done”

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not agree</td>
<td>neutral</td>
<td>agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12. **Mark “X” or circle in the table how IMPORTANT you consider each factor in your work environment for supporting your creativity**

1 = not important at all ... 4 = moderately important ... 7 = very important

<table>
<thead>
<tr>
<th>Challenges job</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team work</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Task rotation</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Autonomy in job</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Coaching supervisor</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Time for thinking</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Creative goals</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Recognition of creative ideas</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Incentives for creative results</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Furniture</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Indoor plants/flowers</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Calming colours</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Inspiring colours</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Privacy</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Window view to natural elements</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Any window view</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Quantity of light</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Daylight</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Indoor (physical) climate</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Sound</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Smell</td>
<td>I</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

**YOUR ORGANISATION'S CREATIVITY**
13. Mark X or circle how each factor in your work environment has been REALISED/is PRESENT in your organisation for supporting your creativity

<table>
<thead>
<tr>
<th>Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Challenging job</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task rotation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autonomy in job</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coaching supervisor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time for thinking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creative goals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recognition of creative ideas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incentives for creative results</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Furniture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indoor plants/flowers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calming colours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspiring colours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Privacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Window view to natural elements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any window view</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantity of light</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daylight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indoor (physical) climate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sound</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smell</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. Indicate relative importance of personal characteristics, organisational environment and physical environment for stimulating creativity in ANY organisation

<table>
<thead>
<tr>
<th>Personal characteristics</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisational environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>