COVER SHEET

Creative requirement: A neglected construct in the study of employee creativity?

Kerrie L. Unsworth,

School of Management

Queensland University of Technology

Brisbane Q 4001, AUSTRALIA

k.unsworth@qut.edu.au; phone +61 7 3864 5081; fax +61 7 3864 1313

Toby D. Wall, & Angela Carter

Institute of Work Psychology

University of Sheffield

Sheffield, S10 2TN, UK

t.d.wall@sheffield.ac.uk; a.carter@sheffield.ac.uk; phone +44 114 222 3259

Keywords: Creative requirement, employee creativity, structural equations

Acknowledgements: This work was supported by the Institute of Work Psychology, University of Sheffield. Many thanks to Matthew Neale, Nick Turner, the editor and two anonymous reviewers for their help and invaluable suggestions.

IN PRESS: GROUP & ORGANIZATION MANAGEMENT

CREATIVE REQUIREMENT: A NEGLECTED CONSTRUCT IN THE STUDY OF EMPLOYEE CREATIVITY?

We identify the creative requirement of a job as a neglected predictor of employee creativity and propose that it may account for relationships between traditional work factors and creativity. As such, it may represent a more effective means of increasing creativity than changes in job design. Using structural equation modeling, we tested this model against four competing models, using a sample of 1083 health service employees. Creative requirement was found to account for much of the variance by fully mediating the effects of supportive leadership and role requirements and partially mediating those of empowerment and time demands. We conclude that creative requirement is an important proximal determinant of employee creativity and a potentially significant intervention.

Research on creativity in the workplace has generally focused on the role of work factors, such as empowerment or support for innovation, in encouraging employees to generate new ideas. In focusing on work factors, however, investigators may have overlooked a more immediate and simpler explanation, that creativity is a response to the creative requirement inherent in the work. In other words, people are creative at work because they are expected or required to be. This possibility suggests a proximal determinant that may add to, lessen the impact of, or even completely account for, the effects of work factors. Such a finding would significantly alter interventions designed to increase creativity by focusing on changing requirement rather than changing job design. However, few studies have investigated the effects of creative requirement on employee creativity, and none has considered its effects relative to work factors. Our aim in this paper is to provide the first step in addressing this gap.

We explore the neglected construct of creative requirement both theoretically and empirically. First, we define creative requirement and consider its conceptual links with previous research. Then we discuss the possible relationships between creative requirement and four established predictors of creativity (empowerment, leader support, support for innovation, and time demands). From this we develop five competing models to predict employee creativity. These differ with regard to whether creative requirement eliminates the effects of established work factors, complements those factors, predicts those factors, or moderates their effects. Finally, we test these models empirically using structural equation modelling. Throughout, we define employee creativity as the generation of novel, and useful work-related ideas (see Amabile, 1996).

What is Creative Requirement?

We define creative requirement as the perception that one is expected, or needs, to generate work-related ideas. Being a perception, creative requirement is the experienced, psychological aspect of both explicit requirements (e.g., being told to be creative), and other cues (e.g., as a response to task demands) At the organizational level, it has long been recognized that successful adoption and diffusion of ideas requires a perceived need for change (e.g., Van de Ven, Angle & Poole, 1989). Indeed, Angle and Van de Ven (1989) suggest that organizational innovations are triggered when people are dissatisfied, pulled by demands or otherwise perceive a need to change. Creative requirement can thus be seen as the individual-level counterpart of the organizational notion of perceived need for change.

Prior Research into Creative Requirement

The goal setting literature provides a strong foundation on which to build the construct of creative requirement. Much research has examined and developed the original goal-setting theory of Locke (1976), which proposed that specific and difficult (but attainable) goals would lead to higher productivity than general goals (see Locke, Shaw, Saari & Latham, 1981 for an overview).

In the creativity field, creative requirement can be viewed as a particular type of goal – that performance, or output, should be creative. Indeed, experimental studies with students have shown that creativity goals can effectively enhance creative output. Shalley's work (1991, 1995) shows that any form of creativity goal (either a "do your best" or a "difficult" goal) can increase student's subsequent creativity levels. Such main effects provide strong evidence for an effect of creative requirement.

Despite these laboratory studies, little research has investigated this construct in the

field. Moreover, creative requirement is often cast in a secondary role with the consequence that evidence concerning its measurement and effects in the workplace is relatively limited. Scott and Bruce (1994), studying research and development staff, used a single item to measure the extent to which supervisors felt their subordinate's role was that of an "innovator or being a supporter of innovation" (p.591). They found that this expectation of innovation was positively associated with innovative behavior by staff. While this provides initial evidence consistent with an effect of requirement on creative performance, the minor role given to creative requirement led to two limitations for our present purposes. First, the construct was measured by a single item, and so is of unknown reliability. Second, a supervisor's perception of the expectations of a role is not a direct measure of employee perceptions per se.

Shalley, Gilson and Blum (2000) also examined creative requirement in the workplace. They combined two methods for assessing the creative requirement of employees who were gathered from 11 occupational categories. The first was a rating of creative requirement based on information of their role as provided in the Dictionary of Occupational Titles. They acknowledged that this provides a global score that does not reflect particular organizational or task features. Thus, they combined the rating with a single-item self-report measure ("My job requires me to be creative" p.217) and only included those participants whose global rating matched the self-report measure. They found this index of creative requirement to be positively associated with job complexity, empowerment and time demands, and negatively related to the extent of organizational controls. Again, however, the measurement of creative requirement is problematic within the context of our present concerns. A particular limitation is that the measure itself

confounds two levels of analysis, in that general role requirement (as inferred from Occupational Titles) is not equivalent to job requirement (as inferred from the self-report). Indeed, the reported correlation for the two measures for all participants was only .38, indicating that these two constructs are quite different. There is a need, therefore, to measure creative job requirement, and its various relationships, independently of role requirement.

A third study, by Morrison and Phelps (1999), bears indirectly on the current interest in creative requirement. Using a sample of 265 white-collar staff, they measured the degree to which employees felt responsible for bringing about change, which clearly overlaps with our notion of creative requirement. They found that felt responsibility was significantly related to employees voluntarily effecting change. Though felt responsibility and change are one step removed from creative requirement and employee creativity, this study is consistent with that of Scott and Bruce (1994) in linking requirement with work behavior.

In summary, it is evident that while there is a strong foundation for supposing creative requirement to affect employee creativity, there has been little research to date on creative requirement at work. That which has been completed suggests that antecedents of creative requirement include high job complexity, high empowerment, high time demands and low organizational controls (Shalley et al., 2000). That research also supports the assumption that creative requirement is linked to employee creativity (Scott & Bruce, 1994). However, as discussed, this field-based evidence suffers from some methodological limitations. Moreover, because the antecedents and outcomes of creative requirement have been the focus of separate studies, the role of creative requirement in linking work factors to employee creativity has not been addressed.

Cognate Research on Work Factors and Employee Creativity

In contrast, there has developed a substantial body of evidence concerning the relationship of work factors with employee creativity. Four factors, in particular, stand out from the literature: empowerment, leader support, support for innovation, and time demands.

Much research has shown empowerment, as reflected in autonomy, influence in decision-making and participation at work (Wall, Clegg & Cordery, 2002), to be positively related to creativity and innovation (e.g., Aiken, Bacharach & French, 1980; Amabile, Conti, Coon, Lazenby & Herron, 1996; Bailyn, 1985; Greenberg, 1992; Pelz, 1967; Pelz & Andrews, 1976). Numerous studies have also found relationships between supportive, non-controlling leadership behavior and employee creativity (e.g., Cummings & Oldham, 1997; Guastello, 1995; Oldham & Cummings, 1996; Redmond, Mumford & Teach, 1993). Organizational culture and support for innovation have been shown to be strongly related to creativity and innovation (e.g., Burkhardt & Brass, 1990; Ciotta, 1987; Eisenberger, Fasola & Davis-LaMastro, 1990; Kanter, 1983; Mohamed & Rickards, 1996). Finally, although some research has found time demands negatively affect creativity (Amabile et al., 1996), other research suggests that tight time-scales promote creativity (Andrews & Farris, 1972; Pelz & Andrews, 1966).

Models of Work Creativity, Creative Requirement & Work Factors

Although the literature on work factors is extensive, none of these studies have measured creative requirement; thus, how this factor fits alongside work factors as a predictor of employee creativity is unknown. Five alternative models can be identified (see Figure 1).

Model 1: Creative Requirement Accounts for Work Factor Effects. Our preferred model positions work factors as antecedents leading to creative requirement, which in turn, is the immediate determinant of employee creativity. In this model, creative requirement takes the role of a mediator in the work factor–creativity link. Intuitively, creative requirement is related to task and organizational-level factors. For example, the degree to which employees are empowered seems likely to influence their level of creative requirement. An employee who decides upon day-to-day issues is more likely to come across situations that require idea generation. The degree to which supervisors set examples for creativity and high performance may also lead to perceptions of increased creative requirement. Similarly, a culture that is supportive of innovation is likely to be related to increased feelings of creative requirement amongst employees as modern organizations are becoming more explicit in asking employees to contribute ideas as well as effort (e.g., Rover UK: Caulkin, 1993). Finally, those with high time pressure are more likely to feel the need to be creative in order to deal with those demands.

On the basis of these arguments, we suggest that creative requirement will account for the variance in work creativity normally ascribed to traditional work factors. Figure 1 displays our hypothesized model alongside the four alternative models specified below.

Model Two: Creative Requirement Explains Additional Variance. As a benchmark against which to test our preferred model, an opposing, and more conservative, argument is that creative requirement simply adds to the variance in work creativity accounted for by the traditional work factors. In other words, creative requirement is just another predictor of creativity, signifying there are non-mediated relationships between the traditional work factors and work creativity. The model is predicated on goal-setting theory (e.g., Locke,

1976), which suggests that having explicit goals (i.e., creative requirement) increases performance relative to having no goals.

Model Three: Creative Requirement Partially Mediates Traditional Factors. The third model combines the first two: Creative requirement is posited to account for some of the variance normally ascribed to traditional work factors, however, the work factors also have direct relationships with work creativity. In other words, creative requirement partially mediates the effects of traditional work factors.

Model Four: Creative Requirement Predicts Traditional Factors. As a logical comparison to our preferred model, the fourth model poses creative requirement as a predictor of the traditional factors, which then predict employee creativity. This model is founded on rational job design theories that suggest that a job requiring creativity would be designed in order to fulfill that requirement (Stone, 1998). Support for the relationship between traditional factors and creativity has been previously discussed.

Model Five: Creative Requirement Moderates Traditional Factors. The final model suggests that creative requirement moderates the effects of traditional work factors on work creativity. We propose that the relationship between traditional work factors and work creativity may be strongest when creative requirement is high. In other words, when an employee is required to be creative, they make use of the supporting work factors. However, when they are not required to be creative, the presence of supportive work factors plays little role in whether or not an employee engages in creativity. This supposition is plausible, given that much research finding direct effects of work factors on creativity has been conducted in professions that one would suppose to be high in creative requirement (e.g., engineers, see Owens, 1969; architects, see Mackinnon, 1962; and R&D scientists,

see Pelz & Andrews, 1966).

The Present Study

The idea that creative requirement is related to work factors and predicts employee creativity is intuitively plausible and, if established, would be of considerable theoretical and practical significance. This paper builds on this fledgling area of investigation by making an initial investigation into the role of creative requirement in relation to work factors traditionally found to be predictive of employee creativity. In particular, we hypothesize that creative requirement fully mediates the relationship between these work factors (empowerment, leader support, support for innovation, and time demands) and employee creativity (Model 1). To help assess this proposition, we examine plausible rival models. These models differ in the role that creative requirement plays: additional predictor (Model 2); partial mediator (Model 3); antecedent of work factors (Model 4) or moderator (Model 5).

METHOD

Sample

As part of a larger program of research into creativity and organizational characteristics, questionnaires were distributed to a random sample of 2070 employees via the internal post of a UK general hospital. Returns were received from 1180 employees (57% response rate). After list-wise elimination of missing data, the final sample of 1083 participants comprised nurses (30%), doctors (6%), administrative staff (19%), managers (11%), professionals allied to medicine (13%), and technical and ancillary staff (21%). The mean age for the sample was 41.7 years and 80% of respondents were female.

Measures

The *employee creativity* measure assessed the degree to which respondents generated ideas in five areas of their work. The original measure was found to be valid and associated with independent ratings of creativity (correlation of 0.62 between self-report and supervisor ratings; Axtell, Holman, Unsworth, Wall, Waterson, & Harrington, 2000). The scale assessed the degree to which the respondent generated new ideas over the past year. There were five items asking about the extent to which the respondent generated ideas about: "Changing services or facilities for patients and/or visitors"; "Changing ways of organizing the work"; "Changing work goals and objectives"; "Changing work procedures"; and "Changing the environment in which you work". Responses were given on a five-point scale ranging from "Not at all" to "A great deal". The first and last items were modified slightly from the original Axtell et al. (2000) measure to reflect the different work context in this study. First, the original measure examined new products or product improvements and new information and recording systems; instead, we measured changing services or facilities. Second, the original measure examined "Other aspects of their work"; we modified this to be more specific to the NHS environment. The internal consistency was .92.

A new measure of *creative requirement* was developed specifically for this study. It comprised five items and followed the aspects of work measured in the creativity scale. Each item assessed the degree to which the job required the respondent to be creative. The items were: "My job requires me to have ideas about changing services or facilities for patients and/or visitors" ; "My job requires me to have ideas about changing ways of organizing work"; "My job requires me to have ideas about changing work goals and

objectives"; "My job requires me to have ideas about work procedures"; and "My job requires me to have ideas about changing the environment in which I work". Responses were given on a five-point scale ranging from "Not at all" to "A great deal" and its internal consistency was .92.

Empowerment was measured by a four-item scale assessing the degree to which individuals perceived they were allowed to be involved in decisions concerning their own, and others', work. (Haynes, Wall, Bolden & Rick, 1999). An example item is, "Are you allowed to participate in decisions which affect you?" and responses were on a five-point scale ranging "Not at all" to "A great deal". This scale was found to be internally reliable (α=.83 to .89), to discriminate across occupational groups within the health services, and to be predictive of expected outcomes such as job satisfaction (r=.29, p<.001) and job-related depression (r=-.09, p<.001) (Haynes, et al., 1999). Internal consistency (Cronbach's alpha) for this sample was .87.

Leader support was based on a measure of supervisory leadership (Taylor & Bowers, 1972) and covered four aspects of leadership: support, goal emphasis, work facilitation and interaction facilitation. It was adapted for the health service population by Haynes et al. (1999). An example item is, "How much does your immediate superior encourage you to give your best effort" and all four items were rated on a five-point scale ranging from "To a very little extent" to "To a very great extent". The internal reliability of the measure for this sample was .89.

Support for innovation measured the extent to which the NHS Trust (the organization) was seen as responsive to change and the degree to which senior staff were interested in the suggestion and the development of ideas. It was a six-item scale with an

example item being, “New ideas are readily accepted in the Trust”. Responses were made on a five-point scale ranging from “Strongly agree” to “Strongly disagree”. The measure was based on the Organizational Climate Measure (Lawthom, Patterson, West & Maitlis, 1998) and adapted for the health service population (Hill, 1998). In this sample, its internal reliability was .93.

The *time demands* scale was based on Caplan, Cobb, French, Harrison and Pinneau’s (1975) measure of Subjective Quantitative Workload and assessed the degree to which individuals felt they had the time to carry out the job properly. It comprised six items with an example item being, “I do not have enough time to carry out my work”. Ratings were made on a five-point scale ranging from “Not at all” to “A great deal” and the internal reliability was .90.

As suggested earlier, there may be a difference between the general role requirement that is constant across the entire population holding that role (e.g., architects versus technicians), and perceived creative requirement of a particular job (e.g., an architect on a ‘creative’ project versus an architect on a ‘non-creative’ project). Thus, to control for the possible contaminating effects of *role requirement*, we included a measure that was determined by the job title reported by the participant. On the basis of discussions with experts in the NHS and theoretical suggestions, it was decided that managers were more likely to have greater role requirement than medical staff, who in turn, were more likely to have greater role requirement than technical and ancillary staff. Greater differentiation in the categorization was not deemed appropriate. Therefore, managers were assigned a score of ‘1’, doctors, nurses and professionals allied to medicine were assigned a score of ‘2’, while technical and ancillary staff were assigned a score of ‘3’.

Data Analysis

We use structural equation modelling via LISREL to compare the models outlined in the introduction. As suggested by Anderson and Gerbing (1988), the measurement model is assessed separately to the structural models. This measurement model contains all variables loading on to their respective latent constructs with correlations between all constructs. However, unlike the structural models, no paths between latent constructs are specified. This model provides an element of construct validation for the new creative requirement measure: If the items fall on to the correct factor and do not cross-load, then convergent and divergent validity may be supposed. In addition, the model will be tested against a more parsimonious model that combines the creative requirement and creativity measures.

Following testing of the measurement model, we assess the fit of the hypothesised structural model, then compare this with the findings for the four alternative models (see Figure 1). Note that the final alternative model (Model 5) includes interaction effects between creative requirement and each of the traditional work factors. The equations for the moderator model are based upon Jöreskog and Yang (1996): the interaction terms comprise one cross-product term of observed indicators and latent mean scores are included in the estimation of loadings, error variances and covariances.

Chi-square difference tests are used to compare the incremental predictive power of the nested models (models 1, 2, and 3). It was expected that the proposed model would fit the data significantly better than the more parsimonious model (non-mediated), but that it would not differ significantly from the partially-mediated model. Comparison of the non-nested models (models 4 and 5) with the hypothesised model will be based upon goodness-of-fit measures.

RESULTS

The original measurement model specified had an adequate fit to the data (χ^2=2684.49, df=357, p<.001; RMSEA=.077; NFI=.89; CFI=.90), but was weakened due to intercorrelations amongst the requirement and creativity items. When examining these intercorrelations further, it appeared that the content of the idea was an important distinguishing point. Thus, the second model split both requirement and creativity into two factors each: creative requirement for products, creative requirement for processes, creativity in products and creativity in processes. The products latent factors had only one item loading on to each and loadings were fixed to a value of 1.0. This model provided a significantly better fit to the data (χ^2=1870.84, df=344, p<.001; RMSEA=.066; NFI=.92; CFI=.94; $\Delta\chi^2$=813.65, df=13, p<.05). All factor loadings except for "I am required to do basic tasks which prevent me from completing more important ones" on the Time Demands scale loaded above .70; the Time Demands item loaded at .66. In addition, given the high correlations between the requirement and creativity measures, we tested an additional model combining these constructs into one latent variable. This model showed worse fit than the differentiated model (χ^2=3030.03, df=363, p<.001; RMSEA=.08; NFI=.87; CFI=.89; $\Delta\chi^2$=1159.19, df=19, p<.05). Thus, in line with our predictions, it appears that creative requirement and creativity are related, but distinct, concepts. The results also suggest that there are differences between types of requirement and creativity (product or process). Means, standard deviations and intercorrelations are presented in Table 1.

We now consider the substantive questions concerning the role of creative requirement as tested through the results of our structural models. As shown in Table 2, the

hypothesized fully mediated model (see Model 1, Figure 1) showed a good fit to the data (χ^2=1951.15, df=356, p<.001; RMSEA=.066, NFI=.92, CFI=.93). All structural coefficients were significant, apart from those between support for innovation and creative requirement.

As noted previously, the hypothesized model was compared to a non-mediated model, a partially mediated model, a model with creative requirement as a predictor of work factors and a moderating model (see Table 2). The non-mediated model showed a reasonable fit to the data (Model 2: χ^2=2694.55.54, df=355, p<.001; RMSEA=.079, NFI=.89, CFI=.89, GFI=.85). However, the difference in chi-squares showed that this was significantly worse fit to the data than the hypothesized fully mediated model ($\Delta\chi^2$=743.40, df=1, p<.001). On the other hand, the goodness of fit of the partially mediated model (Model 3: χ^2=1887.34, df=346, p<.001; RMSEA=.066; NFI=.92; CFI=.94; GFI=.89) was significantly better than the hypothesised fully mediated model ($\Delta\chi^2$=63.81, df=10, p<.01). Finally, both the models assessing requirement as a predictor of work factors (Model 4) and the moderating model (Model 5) showed poor relative fit to the data (Model 4: χ^2=4475.71, df=359, p<.001; RMSEA=.11; NFI=.82; CFI=.83; Model 5: χ^2=8618.73, df=481, p<.001; RMSEA=.11; NFI=.76; CFI=.77).

Thus, the partially mediated model, Model 3, provided the best fit to the data. This was particularly so when deleting all non-significant paths ($\Delta\chi^2$ =53.38, df=8, p<.05). This modified version (Model 3a) accounted for 29% of the variance in products requirement, 45% in process requirement, 69% in products creativity, and 81% in process creativity. The final structural model and coefficients are presented in Figure 2 (and model fit statistics are

shown in Table 2). As can be seen from this figure, support for innovation was not related to either creative requirement or creativity. As we predicted, leader support and role requirement were fully mediated by creative requirement. However, empowerment and time demands were only partially mediated by requirement. Nevertheless, the direct association between these factors and creativity (empowerment .07 and .07, time demands .09 and .08, for products and process creativity respectively) is much weaker than the indirect effects calculated by multiplying the path coefficients (empowerment .32 and .46, time demands .09 and .19, for products and process creativity respectively). Thus, we find partial support for our hypothesis that creative requirement accounts for much of the variance in the relationship between traditional work factors and employee creativity.

DISCUSSION

We identified a neglected construct in the field of employee creativity, that of creative requirement. On the basis of previous literature, we hypothesised that creative requirement could account for the variance traditionally ascribed to work factors (empowerment, leader support, support for innovation and time demands), and found, through structural equation modelling, that this was largely the case. These findings suggest that organizations wishing to increase levels of employee creativity should emphasise issues surrounding creative requirement rather than solely work design.

In particular, we found that the effects of leadership and role requirement on creativity were fully mediated by creative requirement, and that the effects of empowerment and time demands were partially mediated. Support for innovation was not related to either creative requirement or employee creativity. We now discuss each of these findings in detail.

First, and most importantly, much of the relationship of empowerment, time demands and leadership with employee creativity was accounted for by the mediating effect of creative requirement. Although some direct effects were found for empowerment and time demands, these were substantially lower than the indirect effects. There are two possible interpretations for these findings. First, that empowerment, leadership and time demands promote increased creative requirement, which, in turn, affects employee creativity. The second interpretation is more controversial: The effects of empowerment, leadership and time demands on creativity previously found are spurious and caused by the confounding influence of creative requirement. Either interpretation is plausible based upon the statistical techniques used, and only longitudinal studies can help distinguish between the two. Nevertheless, given the direct effects of empowerment and time demands on creativity, the first interpretation is the more credible.

This finding has a number of implications. Theoretically, it may now be possible to develop more parsimonious theories that deal with the proximal determinants of creativity. We may also be able to use creative requirement as a way of understanding the mechanisms through which other work factors, such as communication and teamworking, influence creativity. There is a need to more fully elaborate the construct of creative requirement by investigating its relationships with other related variables and developing a psychometrically sound and valid measure. Furthermore, an understanding of "where" the perceived requirement derives from (e.g., job description, tasks, supervisor's guidance, collegial norms, etc) is needed.

On a practical level, our findings suggest that interventions aimed at increasing perceived levels of creative requirement may lead to increased creativity. Certainly, our

findings raise the possibility that being more explicit about creative requirement is likely to be a more effective strategy than operating simply on traditional work factors. Creative requirement can be introduced, or increased, in a number of ways. First, on the basis of goal-setting theory, simply including the requirement in job descriptions may increase creativity. However, given that the requirement is a perceived construct, it will most likely be necessary to enact creative requirement in the job itself, through such means as performance appraisals, training and development schemes and organizational symbols (e.g., posters, screensavers).

Consistent with the research of Andrews and Farris (1972) and Shalley et al. (2000), but contrary to the results of Amabile et al. (1996), we found that time demands were positively related to creative requirement and creativity. We suggest that this discrepancy may occur due to the way in which time demands are interpreted. If the participant, or the norms that influence the participant, view time demands as a challenge to be overcome, then it is likely that time demands will be positively related to creativity. If, however, they are viewed as an unsurpassable barrier, then time demands will probably be negatively related to creativity. In a high time pressure environment, such as the NHS Trust studied here, it is likely that time demands are viewed as an issue that needs to be dealt with, rather than being a barrier. Future research needs to investigate, in detail, the contexts in which time demands acts as a facilitator, and those in which it is an inhibitor.

Surprisingly, support for innovation did not significantly predict either creative requirement or creativity. Other creativity research has also found non-significant findings for support for innovation (e.g., Clegg, Unsworth, Epitropaki & Parker, in press; Shalley et al., 2000). It may be that in these samples, organizational-level support does not manifest

itself locally. For example, while in this sample the NHS Trust may support and value creativity, the particular department the participant works in may not. Such discrepancies should be examined more closely in future research, perhaps by examining both local and organizational support.

Finally, the data better fit the measurement model when both work creativity and creative requirement were split according to their content. This is not surprising for index measures like those used in this study. An employee may feel required to generate product ideas, but not process ideas; or they may generate many process ideas but not many for different products. Future research into employee creativity may begin to distinguish among the different elements in which creativity may play a role (cf. Unsworth, 2001).

Two caveats must be mentioned. First, we acknowledge that common method variance may be underlying the high correlations. All measures were self-report, and as such, may be exhibiting higher relationships than alternative methods would show. Nevertheless, this criticism may be leveled at all three sets of relationships within this study (work factors/creative requirement, work factors/creativity, creative requirement/creativity), and as such, does not represent a serious threat to the prediction of a differential relationship. On the other hand, the similar demand characteristics of creative requirement and work creativity may represent a threat. Nevertheless, the creativity measure has been previously validated (Axtell et al., 2000) and the better fit of the differentiated model over the one-creativity-factor model suggests that the two constructs are, in fact, different. However, this was an initial investigation into creative requirement and further research using measures of creative requirement and work creativity, with the

latter derived from independent sources, will help overcome this potential methodological problem.

Second, there is a danger that these findings may be limited only to the health care sector. Employees in the health care sector in the UK are known to be under high work pressure and high levels of stress (Wall et al., 1997). It may be that under conditions of high time pressure, employees concentrate only upon what is required; thus, creative requirement is a strong predictor of creativity. Under lower degrees of time pressure, requirement may become less important. Research is needed to explore the effect of creative requirement on work creativity under these different work conditions.

Nevertheless, these findings suggest that the forgotten construct of creative requirement is the proximal determinant that mediates most of the variance between traditional work factors and employee creativity. The importance of this construct for explaining work creativity in a parsimonious fashion cannot be ignored.

References

Aiken, M., Bacharach, S.B., & French, J.L. (1980). Organizational structure, work process and proposal making in administrative bureaucracies. Academy of Management Journal, 23(4), 631-652.

Amabile, T.M. (1996). Creativity in Context. Boulder, CO: Westview Press.

Amabile, T. M., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). Assessing the work environment for creativity. Academy of Management Journal, 39(5), 1154-1184.

Anderson, J.C., & Gerbing, D.W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. Psychological Bulletin, 103, 411-423.

Andrews, F.M., & Farris, G.F. (1972). Time pressure and performance of scientists and engineers: A five-year panel study. Organizational Behavior and Human Performance, 8, 185-200.

Angle, H.L., & Van de Ven, A.H. (1989). Suggestions for managing the innovation journey. In A.H. Van de Ven, H.L. Angle, and M.S. Poole (Eds.), Research on the Management of Innovation: The Minnesota Studies, (pp.663-698). New York: Harper & Row.

Axtell, C.M., Holman, D.J., Unsworth, K.L., Wall, T.D., Waterson, P., & Harrington, E. (2000). Shopfloor innovation: Facilitating the suggestion and implementation of ideas. Journal of Occupational and Organizational Psychology, 73(3), 265-286.

Bailyn, L. (1985). Autonomy in the industrial R&D laboratory. Human Resource Management, 24, 129-146.

Breaugh, J.A. (1985). The measurement of work creativity. Human Relations, 38(6), 551-

570.

Burkhardt, M. E., & Brass, D.J. (1990). Changing patterns or patterns of change: The effects of a change in technology on social network structure and power. Administrative Science Quarterly, 35, 104-127.

Caplan, R.D., Cobb, S., French, J.R.P. Jr, Harrison, R.U., & Pinneau, S.R. Jr (1975). Job Demands and Worker Health: Main Effects and Occupational Differences. Washington: Department of Health, Education and Welfare.

Caulkin, S. (1993). British firms resurrected by courtesy of Japan. The Guardian, 8th May, p. 24.

Ciotta, P. (1987). The anatomy of a creative corporate culture. The Journal of Creative Behavior, 21(2), 145-152.

Clegg, C.W., Unsworth, K.L., Epitropaki, O. & Parker, G. (in press). Implicating Trust in the Innovation Process. Journal of Occupational & Organizational Psychology.

Cummings, A., & Oldham, G.R. (1997). Enhancing creativity: Managing work contexts for the high potential employee. California Management Review, 40(1), 22-37.

Ekvall, G. (1993). Creativity in project work: A longitudinal study of a product development project. Creativity and Innovation Management, 2, 17-25.

Eisenberger, R., Fasolo, P., & Davis LaMastro, V. (1990). Perceived organizational support and employee diligence, commitment, and innovation. Journal of Applied Psychology, 75(1), 51-59.

Greenberg, E. (1992). Creativity, autonomy, and evaluation of creative work: Artistic workers in organizations. The Journal of Creative Behavior, 26(2), 75-80.

Guastello, S. J. (1995). Facilitiative style, individual innovation and emergent leadership in

problem solving groups. The Journal of Creative Behavior, 29(4), 225-268.

Haynes, C.E., Wall, T.D., Bolden, R.I., & Rick, J.E. (1999). Measures of perceived work characteristics for health service research: Test of a measurement model and normative data. British Journal of Health Psychology, 4, 257-275.

Hill, F.M. (1998). Trying to catch a cloud: In pursuit of organisational climate. Unpublished doctorial dissertation. Institute of Work Psychology, University of Sheffield, England.

Jöreskog, K.G., & Yang, F. (1996). Nonlinear structural equation models: The Kenny-Judd model with interaction effects. In C.A. Marcoulides & R.E. Schumacker (Eds.), Advanced Structural Equation Modeling: Issues & Techniques. New Jersey: Lawrence Erlbaum Associates.

Kanter, R.M. (1983). The Change Masters. New York: Simon and Schuster.

Lawthom, R., Patterson, M., West, M.A., & Maitlis, S. (1998). Development of the Organisational Climate Inventory - a new measure of organisational climate. Institute of Work Psychology Memo No. 109. Institute of Work Psychology, University of Sheffield, England.

Locke, E. (1976). The nature and causes of job satisfaction. In M.D. Dunnette (Ed.), Handbook of Industrial and Organizational Psychology. Chicago: Rand McNally.

Locke, E.A., Shaw, K.N., Saari, L., & Latham, G.P. (1981). Goal setting and task performance: 1969-1980. Psychological Bulletin, 90, 125-152.

Mackinnon, D.W. (1962). The personality correlates of creativity: A study of American architects. In G.S. Nielsen (Ed.), Proceedings of the 14th International Congress of Applied Psychology, Copenhagen. Copenhagen: Munksgaard.

Mohamed, M. Z., & Rickards, T. (1996). Assessing and comparing the innovativeness and creative climate of firms. Scandinavian Journal of Management, 12(2), 109-121.

Morrison, E.W., & Phelps, C.C. 1999. Taking charge at work: Extrarole efforts to initiate workplace change. Academy of Management Journal, 42(4), 403-419.

Oldham, G. R., & Cummings, A. (1996). Employee creativity: Personal and contextual factors at work. Academy of Management Journal, 39(3), 607-634.

Owens, W.A. (1969). Cognitive, noncognitive and environment correlates of mechanical ingenuity. Journal of Applied Psychology, 53(3), 199-208.

Pelz, D. C. (1967). Creative tensions in the research and development climate. Science, 157, 160-165.

Pelz, D. C., & Andrews, F.M. (1966). Autonomy, coordination, and stimulation in relation to scientific achievement. Behavioral Science, 11(2), 89-97.

Redmond, M.R., Mumford, M.D., & Teach, R. (1993). Putting creativity to work: Effects of leader behavior on subordinate creativity. Organizational Behavior and Human Decision Processes, 55(1), 120-151.

Scott, S. G., & Bruce, R.A. (1994). Determinants of innovative behavior: A path model of individual innovation in the workplace. Academy of Management Journal, 37(3), 580-607.

Shalley, C.E. (1991). Effects of productivity goals, creativity goals, and personal discretion

on individual creativity. Journal of Applied Psychology, 76(2), 179-185.

Shalley, C.E. (1995). Effects of coaction, expected evaluation and goal-setting on creativity and productivity. Academy of Management Journal, 38(2), 483-503.

Shalley, C.E., Gilson, L.L., & Blum, T.C. (2000). Matching creativity requirements and the work environment: Effects on satisfaction and intentions to leave. Academy of Management Journal, 43(2), 215-223.

Stone, R.J. (1998). Human Resource Management (3rd edn). Brisbane: John Wiley.

Taylor, J.C., & Bowers, D.G. (1972). Survey of organizations: A machine scored standardized questionnaire instrument. University of Michigan, Institute for Social Research, Ann Arbor, MI.

Unsworth, K.L. (2001). Unpacking creativity. Academy of Management Review, 26(2), 286-297.

Van de Ven, A.H., Angle, H.L., & Poole, M.S. (1989). Research on the Management of Innovation: The Minnesota Studies. New York: Harper & Row.

Wall T.D., Bolden, R.I., Borrill C.S., Carter A. J., Golya D.A., Hardy G.E., Haynes C.E. J.E. Rick, Shapiro D.A., & West M.A. (1997). Minor Psychiatric disorder in NHS Trust staff: Occupational and gender differences. British Journal of Psychiatry, 171, 519-523.

Wall T. D., Clegg C. W., & Cordery J. L. (2002). Empowerment, performance and operational uncertainty: A theoretical integration. *Applied Psychology: An International Review*, 51, 146-169.

Dr Kerrie Unsworth (Ph.D., University of Sheffield) is a lecturer in the School of Management, Queensland University of Technology, Australia. Her research interests include employee creativity and innovation, organisational innovation, deviance, team-working, and positive workplace relationships.

Prof. Toby Wall (Ph.D., University of Nottingham) is the Director of the University of Sheffield's Institute of Work Psychology. His research interests include work design, work stress, the human side of modern manufacturing technologies and techniques, and applied research methodology.

Dr Angela Carter (Ph.D., University of Sheffield) is a Research Fellow at the Institute of Work Psychology, University of Sheffield, UK. Her research interests include interventions to increase health care team well-being, and attitudes in health care workers.

Table 1. Means, Standard Deviations and Intercorrelations.

	Mean (Std Dev.)	1.	2.	3.	4.	5.	6.	7.	8.
1. Product Creativity	1.96 (1.18)								
2. Process Creativity	2.27 (1.09)	.72***							
3. Product Reqt	2.16 (1.09)	.81***	.62***						
4. Process Reqt	2.41 (1.18)	.65***	.90***	.74***					
5. Time Demands	2.79 (1.04)	.27***	.36***	.21***	.32***				
6. Leader Support	3.30 (1.05)	.11***	.17***	.15***	.25***	-.16***			
7. Empowerment	2.91 (1.10)	.46***	.59***	.47***	.63***	.15***	.56***		
8. Support for Innov.	2.72 (0.71)	.07*	.10*	.11***	.11***	-.21***	.31***	.26***	
9. Role Reqt	2.35 (0.56)	-.36***	-.32***	-.37***	-.33***	-.13***	-.20***	-.35***	-.13***

*** Correlation is significant at the 0.001 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Table 2. Results of Structural Equation Modelling Comparisons

Models	**χ^2, df, p**	**$\Delta\chi^2$, df, p**	**RMSEA**	**NFI**	**CFI**
Model 1					
Fully-Mediated	1951.15, 356, p<.001	---	.066	.92	.93
Model 2					
Additional Variance	2451.54, 356, p<.001	500.39[1], 0, p>.05	.075	.90	.91
Model 3					
Partially-Mediated	1887.34, 346, p<.001	63.81[1], 10, p<.01	.066	.92	.94
Model 4					
Reqt as Predictor	4475.71, 359, p<.001	---	.110	.82	.83
Model 5					
Moderated	8618.73, 481, p<.001	---	.110	.76	.77
Model 3a					
Modified Model 3[3]	1940.72, 354, p<.001	14.65[2], 6, p<.05	.066	.92	.93

Notes:

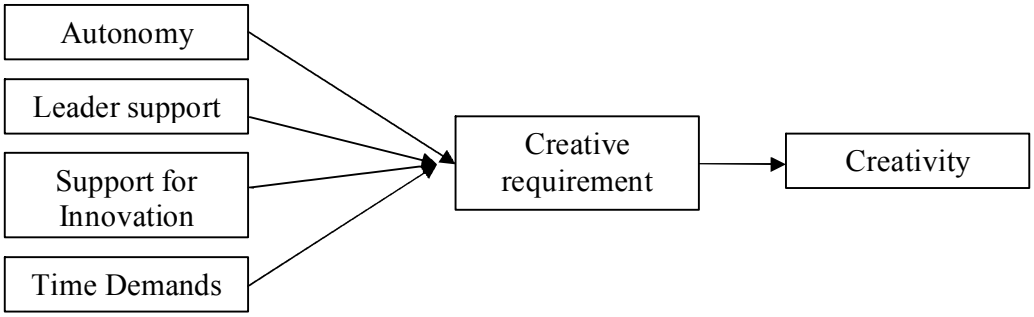
[1] Change from Model 1

[2] Change from Model 3

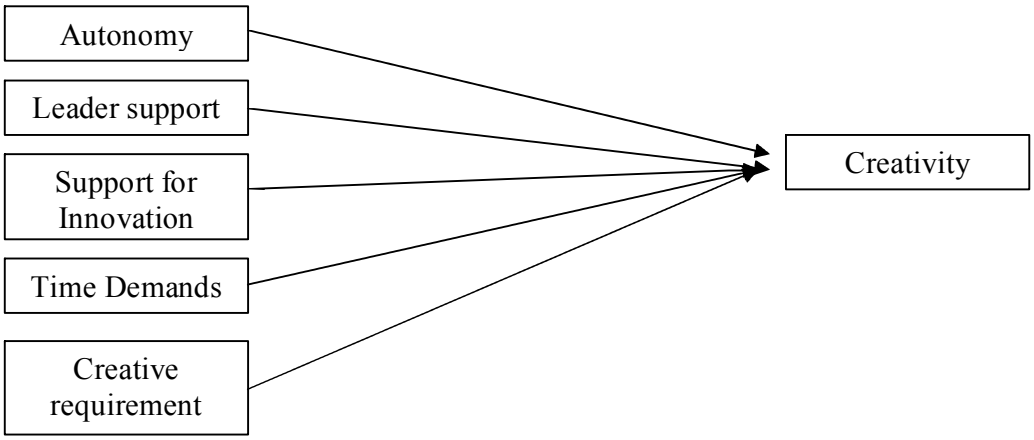
[3] See text p.16.

Figure 1. Hypothesised and Alternative Models

Model 1.Fully-Mediated Model



Model 2. Additional Variance Model



Model 3. Partially-Mediated Model

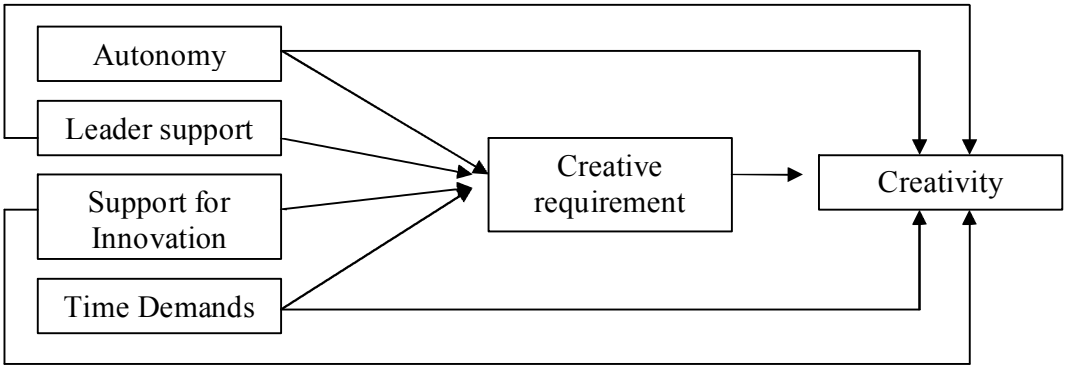
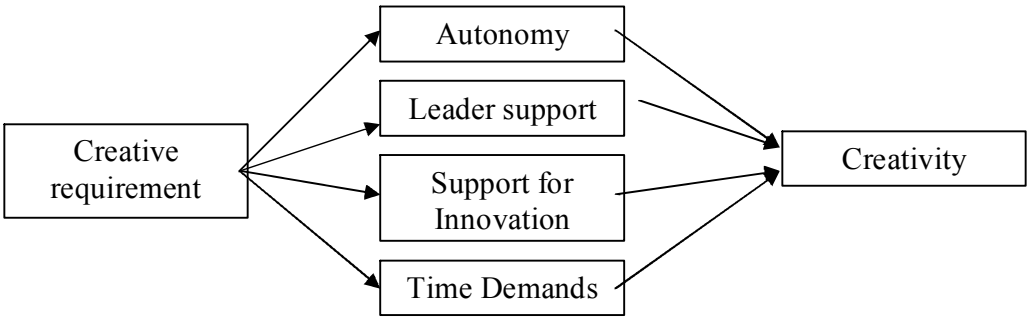


Figure 1 (cont'd).

Model 4. Creative Requirement as Predictor Model



Model 5. Moderating Model.

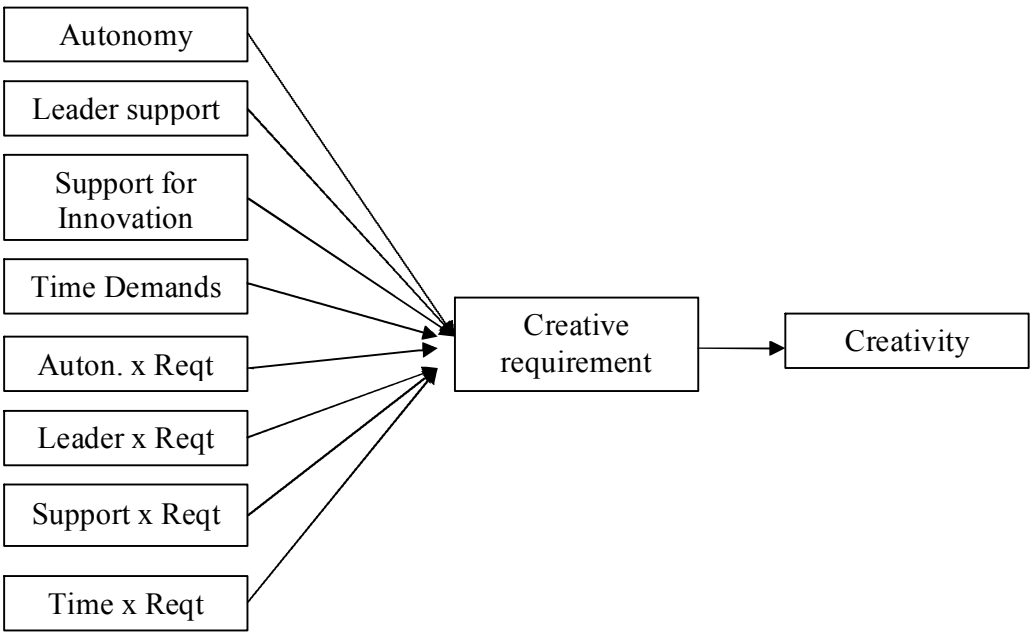


Figure 2. Structural Coefficients of Final Model (3a)