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AN EXPLORATORY STUDY OF PSYCHOLOGICAL ADJUSTMENT AND COPING AMONG INFORMATION TECHNOLOGY PERSONNEL IN AUSTRALIA

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Abstract

Practitioners who work with information technology (IT) are reported to be experiencing rising levels of worked related stress. The origins of the stress coming from increasing demands from system users, advances in technology, and the growing use of information and communication technologies to improve the efficiency and effectiveness of intra and inter-organizational business activities. While a considerable amount of research has been undertaken on work-related stress in the information systems literature, a void has appeared and centres on the need to explore how IT personnel cope with stress. The research presented in this paper investigates whether coping and affect (both negative and positive) influence adjustment (anxiety, depression and stress) among IT personnel. A sample of 100 IT personnel from Australia completed a questionnaire, which contained measures for adjustment, affect state, and coping strategies. The use of hierarchical regression analyses demonstrated that specific individual characteristics influenced the psychological adjustment of the IT personnel sampled. Information technology personnel who engaged in a more problem-focused style of coping, such as active coping were found to be better adjusted than those who engaged in a more emotion-focused styles of coping, such as cognitive avoidance coping, social coping, accepting responsibility, and self-controlling coping. The research concludes that the psychological adjustment of IT personnel is influenced by the types of coping strategies they use, specific individual demographics, and their affect state.

Keywords: Australia, adjustment, anxiety, coping, depression, IT personnel, stress

1 INTRODUCTION

As businesses embrace the 'New Economy' a plethora of new information and communication technologies and software solutions are continually becoming available to them, all of which espouse to ameliorate a firm's competitive advantage, be it by adding value or simply reducing the costs associated with activities and processes. This has resulted in many firms increasing their investments in information and communication technologies to improve the efficiency and effectiveness of inter and intra-organizational business systems and processes [Irani and Love, 2002]. Yet, according to Baldwin et al. [2001] and Currie [1998] some firms have adopted a less engaging business strategy and sought to outsource their dependency on information technology (IT). This has placed increasing pressure on IT personnel as they jockey for their position within organisations. According to Gartner [2001] many businesses have been expecting more (i.e. longer working hours) from their IT personnel without a commensurate increase in remuneration. Not being able to take a vacation or having it cut short due to IT related problems has been identified as a major problem relating to the retention of employees [Gartner, 2001].

Organizational utilization and dependence on IT continues to grow, as information systems (IS) become the fabric that links business processes together [Moore, 2000]. However, as firms adapt their business strategies, particularly their IT strategy, to changes in the external environment, IT personnel are often subjected to increased user demands, role ambiguity, role conflict and work overload. Much of this pressure comes from active or passive strategies to downsizing and/or re-structuring and/or the supply-demand gap for IT professionals [Bartol and Martin, 1982; Ivancevich et al. 1983; Guimaraes and Igarria, 1992; Li and Shani, 1991; McGee, 1996; Sethi et al. 1999; Moore, 2000]. Similarly, Baroudi [1985] and Guimaraes and Igarria [1992] have reported that boundary spanning is a contributing factor to role conflict and ambiguity among IT personnel. According to Cartwright and Cooper [1996] the changing nature of work and uncertainties inherent in the business environment are the primary determinants of stress among IT personnel.

Work-related stress can be defined as the inability to cope with the pressure in a job [Rees, 1997]. In contrast, Lazarus and Launier [1978] state that stress is any internal or environmental demand that exceeds the normal adaptive resources of an individual. Hitherto there is widespread belief that work-related stress is a causal agent of physical and mental disorders. The impact of this can often be far reaching and result in organizational outcomes such as absenteeism and reduced productivity [Ganster, 1991; Cartwright, 2000]. Yet not everyone is affected by stress in the same way. Some individuals thrive on stress (known in its positive form as eustress) and therefore appear to cope better with it than others. How an individual copes with the stress determines how they will in turn be affected by the stress [Billings et al. 2000]. Thus, to effectively manage IT personnel it is important that senior managers understand how they can provide assistance and support for their employees to cope more effectively with the pressures and demands being imposed upon them.

Coping [the ability to do so, or not] is an area that has received limited attention in the IS literature, even though IT personnel prone to experiencing high levels of stress (Haurng, 2001). The aim of the research reported in this paper is to therefore identify coping strategies and affect state that influence adjustment in terms of depression, anxiety, and stress among IT personnel. Prior to the presentation of the research in this paper, a brief review of the developments in coping theory are presented.

2 DEVELOPMENTS IN COPING THEORY

Coping is any conscious effort by an individual to manage or overcome a stressful event [Holahan, and Moos, 1987]. Coping strategies may be oriented towards confronting and overcoming the stressor, or may entail efforts to reduce tension by evading the problem. The type of coping strategies adopted may depend on how the individual appraises the stressful event, their negative and positive affect,

personality differences and environmental factors, which may result in an enhanced or decreased psychological adjustment. Adjustment is identified as psychological well being, and for the purpose of the research presented includes depression, anxiety, and stress. Recent development in this area have recognised the importance of positive psychological states, and has highlighted the necessity of assessing both positive and negative affect in relation to coping [Folkman, 1997; Folkman, and Moskowitz, 2000].

Lazarus and Folkman's [1984] cognitive theory of stress and coping originates with the everyday appraisal and reappraisal of one's transactions with one's environment. The appraisal process involves the immediate cognitive and physical identification of the stress, the immediate reaction (primary appraisal), the evaluation of the individual's internal and external resources, and their availability (secondary appraisal) [Lazarus and Launier, 1978]. Appraisals are influenced by an individuals beliefs, values, goals and emotions, and the event is understood in terms of the personal significance it has for the individual [Stein et al. 1997]. This then determines whether the individual feels threatened, challenged, or harmed. When a transaction is appraised as stressful, coping is required. Lazarus and Folkman [1984] identified two types of coping: *emotion-focused coping* and *problem-focused coping*.

Emotion-focused coping attempts to regulate emotional distress and return to normal social and physiological functioning. Whereas, problem focused-coping is goal directed, and includes strategies such as decision-making and planning to resolve conflicts or to manage the problem. Here either type of coping can lead to an event outcome that may be favorable, unfavorable or involve no resolution at all. Unfavorable outcomes or outcomes with no resolution do not alleviate distress and require reappraisal and additional coping. In contrast, a favorable outcome results in positive emotion, and the termination of any coping activity [Folkman, 1997]. Theories of coping have generally focused on the *negative* effects of stress and the regulation of distress. Positive affect, defined as positively toned emotions including mood, emotion or psychological state, have been largely omitted from most contemporary theories of stress and coping [Lazarus, 2000].

Research undertaken by Folkman [1997] has identified the co-occurrence of positive and negative psychological states. Folkman [1997] revealed that affect, positive or negative, may influence appraisal of the stress-situation and psychological well being. Similarly, Stein *et al.* [1997] found that positive appraisals predicted psychological well being and was significantly correlated with positive morale whereas negative appraisals were associated with depression. Recognising the need for coping theory to be modified, Folkman [1997] revised the widely accepted model of the cognitive theory of stress and coping, previously developed by Lazarus and Folkman [1984], incorporating positive psychological.

Folkman [1997] integrated meaning-based coping as a response to distress involving the activation of beliefs, values and goals that help search for and find positive meaning in the stress-event, which leads to renewed or sustained coping. Meaning-based coping relates to both problem and emotion-focused coping. Folkman [1997] found those who engaged in meaning-based coping reported a more positive psychological state. In essence, meaning-based coping can activate beliefs, values, or goals can help redefine an event with positive significance. Folkman [1997] also introduce a sustained coping process, which results from the outcome of positive emotion and enables to take re-appraisal to take place. This process may help the individual to redefine the stressor and re-engage in coping efforts to manage an on-going stressor.

3 ADJUSTMENT AND COPING AMONG IT PERSONNEL

A considerable amount of research pertaining to the antecedents and consequences of work-related stress, burnout and the exhaustion among IS professionals can be found in the normative literature [eg, Weiss, 1983; Li and Shani, 1991; Sethi et al. 1999; Moore, 2000; Huarng, 2001]. Burnout is a chronic affective response to stressful work conditions where there are high levels of interpersonal contact [Shinn, 1982] whereas exhaustion (otherwise known as *tedium*) is a state of physical, emotional and

mental exhaustion caused by long-term involvement in demanding situations [Pines et al. 1981]. Both burnout and exhaustion are outcomes of work-related stress and therefore their antecedents and consequences that have been reported in the IS literature are drawn upon in this paper.

Using the Maslach Burnout Inventory [Maslach and Jackson, 1986], which seeks to elicit a respondent's level of burnout using three dimensions namely *emotional exhaustion*, *depersonalization*, and *personal accomplishment*, Huarng [2001] found that IS professionals reported higher levels of emotional exhaustion than police and nurses. In particular, their emotional exhaustion was found to be lower than that of teachers, welfare managers and hospitality employees. Similarly, for depersonalisation, it was revealed that IS professionals had higher burnout tendencies than teachers and welfare workers but, lower than police and nurses. When it came to assessing personal achievement, Huarng [2001] found that IS professionals recorded the highest burnout scores for this dimension. Huarng's [2001] study suggested that interpersonal contacts contributed to the burnout of IS professionals. However, Huarng [2001] suggests that such contacts seem unavoidable, as IT personnel are invariably required to serve an increasing number of users in the organization, albeit with limited resources.

Increased workload has been identified as a basic cause of stress among IT personnel [Fischer, 1998; Shore, 1998; Moore, 2000]. According to Moore [2000], IT personnel are often expected to keep technologies and computer applications functioning around the clock and remain on-call 24 hours, seven days a week. The frequent expectation that IT personnel can do more and more with less and less can cause them to try and do the impossible as user and organisational demands increase [Shore, 1998]. A likely consequence of this is random prioritization, with accompanying feelings of inadequacy, failure and guilt [Cartwright and Cooper, 1996].

According to Pines [1993] only highly motivated individuals who feel strong commitment to their work can burnout. Thus, Moore [2000] suggests that the 'best' and highly motivated IT personnel may be the most vulnerable to work exhaustion and therefore it is imperative that manager provide acknowledgement, support and additional resources when needed. Otherwise, according to Moore [2000], IT personnel may become trapped in prolonged situations of high pressure and demands and burnout. Cartwright and Cooper [1997] note that when an employee is experiencing exhaustion, a manager must initiate dialogue with the employee to solve the problem at hand.

While strategies for coping with stress such as relaxation, time management and assertiveness are effective in some instances an employee who is subjected to continuous pressure is not always able to rely on individual coping strategies to mitigate stress [Schabracq and Cooper, 2000]. To reduce the pressure often imposed upon IT personnel, Moore [1999] states that managers need to be aware of the individual's workload, sentiments and provide social support when necessary. In particular, Moore [1999] suggests that managers should use direct face-to-face interaction with individual IT employees, rather using e-mail or the telephone and provide acknowledgement and appreciation to those performing their jobs well.

Folkman and Lazarus [1980] have suggested that men and women differ in their coping strategies when dealing with stressful situations. McDonald and Korabik [1991] found male managers embraced coping strategies which were categorized as 'avoidance/withdrawal' whereas female managers reported that they were more likely to talk to others and seek social support. Lim and Teo [1996] examined stress and coping strategies among IT personnel in Singapore. Their research found that women more likely to seek social support than their male counterparts when dealing with stress. Male IT personnel, on the other hand, were likely to engage in 'logic' i.e., suppress their emotions and deal with stress in an objective and unemotional manner. In addressing the issue of coping among IT personnel the following research question is examined: *How do coping strategies and affect state influence the psychological adjustment of IT personnel?*

4 RESEARCH METHOD

A questionnaire survey (containing valid and reliable scales) was mailed to 200 randomly selected firms from a wide range of industry sectors (eg, banking, manufacturing, construction, and pharmaceutical) throughout the State of Victoria, Australia. For the purposes of the research reported in this paper, IT personnel were defined as those “whose job component includes or involves the acquisition, processing, storage of vocal, pictorial, textual, and numerical information by means of computers and telecommunications” [Meadows and Gordon, 1985]. Each firm was asked to select an employee from their IT department or somebody who dealt specifically with day-to-day IT related issues of the firm to complete the questionnaire survey. Responses were received from 100 IT personnel, which equates to a response rate of 50%. The questionnaire included demographic information and information related to sources of stress and their intensity, plus psychometrically reliable and valid inventories in the following categories: *coping strategies*; *affect*, and *adjustment*. Noteworthy, the sources of stress experienced by IT personnel are not identified in the findings presented below as they are outside the scope of this paper. The scales used in the questionnaire were: The Bradburn Affect Balance Scale (BABS), which was used to assess negative and positive *affect* [Bradburn, 1969]. The Depression Anxiety Stress Scales (DASS) was used to assess *adjustment* of IT personnel [Lovibond and Lovibond, 1995]. The DASS consists of three sub-scales, depression, anxiety, and stress; and finally *coping* was assessed with the Ways of Coping Questionnaire (WAYSS) [Folkman and Lazarus, 1988].

5 RESULTS

5.1 Data Reduction

Due to the large number of independent variables, and the low Cronbach’s coefficient alpha (α) for the WAYSS sub-scales [Table 1], the coping variables were reduced from 8 to 5 because of the low alpha values [Table 2]. The scales were combined using *theoretical coherence* as the basis for reduction [Billings et al. 2000]. Confrontive coping and seeking social support were identified as interpersonal approaches to coping and combined to form social coping, displaying a α level of 0.71. Distancing and escape avoidance combined into cognitive avoidance coping, yielding a α level of 0.72. Active coping was formed from positive reappraisal and planful problem solving, and a α level of 0.76 was achieved. While these α levels are still considered low, they are superior to their original values. The demographic variable ‘highest level of education attained’ was reduced into a dichotomous variable of postgraduate degree/undergraduate degree versus TAFE (Tertiary Further Education Institution) qualification.

5.2 Sample Characteristics

No females responded to the questionnaire so the sample consisted of 100 male IT personnel. Thus, no comparisons between gender types could be undertaken. The age of respondents ranged from 23 to 62, with a mean age of 37.74 ($SD = 10.02$). In terms of marital status 75% of respondents were either married or in a de-facto relationship, 21% had never been married, and only 3% were divorced or separated. In terms of educational achievement, 20% were found to have attained a postgraduate degree, 55% had obtained undergraduate degrees or diplomas, 24% indicated they had a TAFE qualification, and 1% of the sample held no tertiary qualifications at all. The mean number tenure in the firm as an IT professional was 114 ($SD = 105.20$), ranging from 6 months to 27 years. The turnover of the firms sampled ranged from A\$5 million to A\$800 million with a mode value of A\$30 million. Means and standard deviations for the sub-scales of WAYSS, Bradburn Affect Balance

Scale, and DASS are presented in Table 1. In addition, the range and Cronbach's alpha (α) for the sub-scales are displayed in the Table 1. Mean scores for depression (6.66) and anxiety (4.30) for the IT personnel sampled were found to be comparable to those provided by the DASS normative male sample [Bradburn, 1969] for depression (6.55) and anxiety (4.60). However, the mean for stress (12.88) for IT personnel was higher than the normative male sample (9.93). This indicates that the IT personnel sampled had a normal to mild severity rating for stress.

Pearson's correlations (two-tailed) was used to determine if correlations existed between positive and negative affect and coping strategies (Table 3). Positive affect was found to be significantly positively correlated with social coping, $r = .26$, $n = 99$, $p < .05$, and active coping, $r = .35$, $n = 99$, $p < .05$, suggesting that higher positive affect would be associated with higher social coping and active coping. Significant positive correlations were displayed between negative affect and social coping, $r = .31$, $n = 99$, $p < .05$, cognitive avoidance coping, $r = .48$, $n = 99$, $p < .05$, self-controlling, $r = .28$, $n = 99$, $p < .05$, and accepting responsibility, $r = .30$, $n = 99$, $p < .05$. This suggests that higher negative affect was associated with higher social coping, cognitive avoidance coping, self-controlling, and accepting responsibility.

Scales	Mean (N=100)	SD	Range	α
Ways of Coping				
Confrontive Coping	6.01	2.77	0-18	0.50
Distancing	4.78	2.73	0-18	0.59
Self-Controlling	9.71	3.53	0-21	0.63
Seeking Social Support	6.94	3.43	0-18	0.68
Accepting Responsibility	3.22	2.10	0-12	0.68
Escape-Avoidance	3.69	3.35	0-24	0.67
Planful Problem Solving	10.91	3.06	0-18	0.66
Positive Reappraisal	5.38	3.28	0-21	0.71
Bradburn Affect Balance Scale				
Positive Affect	8.62	2.83	0-15	0.74
Negative Affect	5.34	3.46	0-15	0.75
Depression Anxiety Stress Scale				
Depression	6.66	7.55	0-42	0.93
Anxiety	4.30	5.38	0-42	0.89
Stress	12.88	8.84	0-42	0.93

Table 1. Means and standard deviations for WAYSS, BABS, and DASS

Scales	α
<i>Ways of Coping</i>	
Social	0.71
Cognitive avoidance	0.72
Active	0.76
....Self controlling	0.72
Accepting Responsibility	0.73

Table 2. Revised Coping scales due to theoretical coherence

5.3 Prediction of Psychological Adjustment

Hierarchical multiple regressions was used to identify the predictors for *depression*, *anxiety*, and *stress*. Regression was used in accordance with past research into coping examining the effect of recovery [Scheirer et al. 1989], personal and contextual determinants [Holahan and Moos, 1987], and

affect [Billings et al. 2000]. Regarding the ordering of variables entering the regression equation, individual demographics were entered first holding them constant. Consistent with the previous research, coping and affect were then entered as a block.

5.4 Predictors of Depression

For individual demographics, the equation, $R^2 = .09$, $F(4,94) = 2.32$, $p > .05$, was not significant after step one, which suggests no relationship existed between individual demographics and depression (Table 4). The addition of coping strategies at the second step contributed significantly to $R^2 = .35$, $F(9,89) = 5.36$, $p < .05$, $R^2_{change} = .26$, $F(5,89) = 7.2$, $p < .05$, indicating that the five coping variables explained 26% of the variance in (square root) depression. The significant predictors were avoidance coping and active coping, each adding 8% in unique predictive contribution. This suggests that high depression was associated with higher levels of avoidance coping and lower levels of active coping. The third step, affect, contributed significantly to $R^2 = .70$, $F(11,87) = 18.67$, $p < .05$ and $R^2_{change} = .35$, $F(2,87) = 51.30$, $p < .05$. Affect added an additional 35% of variance with positive affect and negative affect being significant predictors, each adding 5%, and 20% respectively in unique predictive contribution. This implies that when affect is considered in the regression, high depression was associated with lower positive affect, and higher negative affect.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Age	1.00														
2 Martial Status	0.35**	1.00													
3 Education	0.27**	0.09	1.00												
4 Tenure	0.84**	0.26**	0.23*	1.00											
5 Turnover	0.04	-0.05	-0.15	0.08	1.00										
6 Social Support	-0.07	0.14	-0.10	-0.10	-0.20*	1.00									
7 Cognitive Avoidance Coping	-0.12	0.07	0.05	-0.23*	-0.20*	0.44**	1.00								
8 Active Coping	-0.14	0.10	-0.10	-0.18	-0.06	0.58**	0.29**	1.00							
9 Self Controlling Coping	-0.13	0.05	0.14	-0.24*	-0.10	0.50**	0.48**	0.54**	1.00						
10 Accepting Responsibility Coping	-0.02	-0.11	0.22*	-0.04	-0.26**	0.33**	0.38**	0.21*	0.35**	1.00					
11 Positive Affect	-0.04	0.20*	-0.02	-0.03	-0.11	0.26**	0.02	0.35**	0.14	0.00	1.00				
12 Negative Affect	-0.08	-0.06	0.12	-0.13	-0.15	0.31**	0.48**	0.07	0.28**	0.30**	-0.23*	1.00			
13 Depression	-0.09	-0.12	0.10	-0.21	-0.17	0.25*	0.48**	-0.06	0.24*	0.34**	-0.40**	0.76**	1.00		
14 Anxiety	-0.09	0.01	0.11	-0.26**	-0.37**	0.40**	0.54**	0.10	0.41**	0.45**	-0.08	0.66**	0.69**	1.00	
15 Stress	0.02	0.01	0.23*	-0.09	-0.27**	0.34**	0.36**	0.04	0.39**	0.38**	-0.22*	0.68**	0.77**	0.75**	1.00

Significance Level ** $p = 0.01$ (2-tailed) * $p = 0.05$ (2-tailed)

Table 3. Correlations between affect, coping strategies and psychological adjustment

5.5 Predictors of Anxiety

For individual demographics, the equation, $R^2 = .25$, $F(4,94) = 7.97$, $p < .05$, indicating that 25% of the variance in (square root) anxiety was explained by the five variables after step one. The significant predictors were age, firm turnover and tenure in the firm as an IT professional, each adding 5%, 9% and 11% respectively in unique predictive contribution. This suggests that higher anxiety was associated with higher age, firms with a smaller turnover and the tenure period as an IT employee (Table 5). The addition of coping strategies at the second step contributed significantly to $R^2 = .53$, $F(9,89) = 11.03$, $p < .05$, $R^2_{change} = .27$, $F(5,89) = 10.32$, $p < .05$. Coping added an additional 27% of the variance with social coping, avoidance coping, active coping, and accepting responsibility all being significant predictors. They each added 3%, 5%, 5%, and 3% respectively in unique predictive contribution. This indicates that when coping is considered in the regression, high anxiety was associated with, higher social coping, higher avoidance coping, lower active coping, and higher accepting responsibility. The addition of affect at the third step contributed significantly to $R^2 = .66$, $F(11,87) = 15.24$, $p < .05$ and $R^2_{change} = .13$, $F(2,87) = 16.68$, $p < .05$. Affect added an additional 13%

of the variance. The significant predictor was negative affect, adding 12% in unique predictive contribution. This suggests that when affect is considered in the regression, high anxiety was associated with higher negative affect.

5.6 Predictors of Stress

For individual demographics, the equation, $R^2 = .14$, $F(4,94) = 3.96$, $p < .05$, indicates that 14% of the variance in stress was explained by the five variables after step one. The significant predictors were education, turnover and tenure in the firm as an IT employee, each adding 4%, 4%, and 5% respectively in unique predictive contribution. This suggests that higher stress would be associated with a TAFE qualification, smaller turnover, and the tenure period as an IT employee (Table 6). At the second step coping strategies were added, which contributed significantly to $R^2 = .37$, $F(9,89) = 5.7$, $p < .05$, $R^2_{\text{change}} = .22$, $F(5,89) = 6.24$, $p < .05$. An additional 22% of the variance was added by coping strategies. Significant predictors were social coping, active coping and self-controlling, each adding 4%, 7%, and 4% respectively in unique predictive contribution. This suggests that when coping strategies were considered in the regression, high stress was associated with high social coping, lower active coping, and higher self-controlling coping. The addition of affect at the third step contributed significantly to $R^2 = .62$, $F(11,87) = 12.74$, $p < .05$, with $R^2_{\text{change}} = .25$, $F(2,87) = 28.45$, $p < .05$. Affect added an additional 25% of the variance with negative affect being a significant predictor, adding 18% in unique predictive contribution. It is therefore implied that when affect is considered in the regression, high stress was associated higher negative affect.

6 DISCUSSION

6.1 Individual Demographics

Tenure in the firm was a significant predictor of depression, anxiety, and stress, with less experienced employees at greater risk of adjustment problems than their more experienced counterparts. No previous studies have identified associations between the period of tenure with a firm as an IT employee and psychological adjustment. Schabracq and Cooper [2000] suggest that investment in professional development (vocational and professional skills) can mitigate stress, as IT personnel are able to improve their efficiency and effectiveness, and ultimately their career prospects and even progression. Training and skill development can provide the IT personnel with additional skills to better organize and integrate work within specified constraints, and the ability to deal with technical and environmental developments. Professional development may also take place through hands-on experience of the job, where the learning process coincides within the activity of carrying out the job [Mumford, 1986]. It is likely that the longer IT personnel are employed the more job-related skills they acquire, through either professional development or on the job experience, which enables them to be psychologically better adjusted than those who have spent less time in the job.

Turnover was negatively associated with anxiety and stress, suggesting that higher levels of anxiety and stress were associated with firms with a lower turnover, or vice versa. An explanation for this finding is that smaller firms undertake lesser value IT projects. Here IT personnel may have reduced security of tenure, fewer resources and lower numbers of staff to call on for social support. Larger organisations are likely to offer more training and development activities to their employees than smaller firms.

Age was a significant predictor of anxiety, indicating a positive association between age and anxiety. This may be due to the increasing use of information and communication technology, with younger employees being more knowledgeable and adaptable than their older counterparts. The ability to keep up with advances in technology may be an ongoing concern or pressure for older employees, which can contribute to higher anxiety levels than for their younger colleagues.

Education, identified as either university degree or TAFE qualification, was a significant predictor of stress, but not depression or anxiety. The relationship indicated that IT personnel who had acquired a university education had reduced work related stress. Yet, there appears to be little evidence in the literature that clearly supports one form of education over the other. Depression and anxiety were not influenced by education; however, this was not the case for stress. Stress involves a psychological judgment about the environmental or internal demands that exceed available resources and require mobilization of additional resources [Lazarus and Launier, 1978]. When the particular stressor is overcome or adequately managed the stress dissipates. It therefore appears that a university education can equip IT personnel with the necessary skills to adequately deal with work-related stressors. Lazarus and Launier [1978] identified depression and anxiety as stress emotions that cause pain and distress. These stress emotions may be more enduring and continue after the stress has been overcome, and therefore less influential in relation to type of educational background.

6.2 Coping Strategies

Active coping involves active cognitive and behavioural attempts to manage stress. This includes a meaning-based coping process, in which the individual actively seeks and finds positive meaning in a stressful event, and attempts to engage in activities to alleviate the stress. This form of coping can be equated with problem-focused coping, which is a goal directed strategy including information gathering, decision making and planning, and conflict resolution, in order to manage or solve the problem obstructing the goals and creating distress. Active coping was found to be a significant predictor of adjustment, with this form of coping being associated with lower levels of depression, anxiety, and stress. These findings support previous research, which has demonstrated that problem-focused coping is associated with reduced depression [Mitchell et al. 1983; Folkman, 1997; Stein et al. 1997]. Reappraisal is an expansion of appraisal, incorporating a feedback system of stress-related information, involving subsequent evaluations of reactions to the environment and a process of ongoing reflection. Positively reappraising the event as less stressful or reframing the situation to see it in a positive light, can sustain coping efforts to deal with the ongoing stressor [Folkman, 1997]. Information technology personnel who engage in positive reappraisal may be able to revise their goals and redefine the stressor, generating improved adjustment and the ability to sustain renewed coping efforts.

Cognitive avoidance coping involves blocking or denying thoughts or feelings about the stressor. No association was displayed between avoidance coping and stress. However, a significant positive association was displayed between avoidance coping and depression and anxiety. These results correspond with previous research showing greater use of cognitive avoidance was associated with increases in negative mood [Billings et al. 2000]. Other research has also demonstrated that avoidance coping was associated with fewer personal and environmental resources [Holahan and Moos, 1987].

Avoidance coping may be a type of 'defence mechanism' employed to protect oneself from the unpleasant emotions related to the stressor. The reappraisal process also includes a defensive-type reappraisal, denying or detaching psychologically from the stressor, and reframing the situation defensively as a non-threatening or even a desirable situation [Lazarus and Folkman, 1978]. Information technology personnel working with limited resources may ignore or deny related stressors, as it is unlikely they will be able to improve the availability of resources given the financial and resource constraints they often have to adhere to. Therefore, IT personnel using defensive reappraisal may not experience stress, but the more enduring stress emotions of depression and anxiety, as the denied stressor may not be overcome.

Social coping is an interpersonal approach to coping involving social support and a confrontive approach. Increased use of social coping was associated with high stress and high anxiety. There may be instances when an IT employee's social support may be restricted. Consequently, they may feel isolated from the rest of the organization, and therefore are unable to receive adequate support from other personnel. Thus, this may contribute to higher levels of stress and anxiety being experienced

[Huang, 2001]. Another possible explanation for the positive relationship between stress and anxiety and social coping may be the confrontive element within social coping, involving challenging and confronting persons or situations viewed as the problem. Information technology personnel engaging in a confrontive style interpersonal approach may blame others for the stressful situation, or take chances to rectify the problem without actually dealing with the stressor at hand. As a result, this can also result in higher levels of stress and anxiety.

Accepting responsibility is a type of coping whereby one's role in the problem is acknowledged while simultaneously trying to put things right. No association was displayed between accepting responsibility and stress and depression, but a significant association between with high levels of anxiety was found. Information technology personnel engaging in accepting responsibility may become overwhelmed trying to manage all the work-related stressors, without being able to diffuse responsibility amongst co-workers, which may explain why higher levels of anxiety are experienced.

Self-controlling coping is engaging in efforts to regulate and control one's emotions and behaviours towards a specific stressful situation. Increased use of self-control was associated with increased stress. No previous research has been identified which has examined associations between self-control and psychological adjustment. Again, the male dominated environment within which IT personnel work may promote the attitude of not being able to display one's emotions and share their problems with others. It is therefore proffered that IT personnel engaging in self-controlling strategies inhibit feelings and actions towards a stressor, focussing their attention on controlling their emotions and concealing the situation and their stress rather than managing and overcoming the problem, which increases their stress levels.

6.3 Affect

Findings from this research have demonstrated that negative affect was positively associated with adjustment, indicating higher levels of depression, anxiety, and stress. Positive affect, however, was not significantly related to anxiety or stress, but was associated with lower levels of depression. Appraisals, including beliefs, goal outcomes, and emotional states, have been shown to be associated with well being, demonstrating that positive appraisals are negatively correlated with depressed mood [Stein et al. 1997]. Thus, those IT personnel who displayed positive affect showed better psychological adjustment, whilst those who displayed negative affect were subject to decreased adjustment.

7 LIMITATIONS AND FUTURE RESEARCH

Some limitations in our research need to be acknowledged. The sample is relatively small (100), predominately from the metropolitan area of Melbourne in the State of Victoria, though comparable to other studies that have looked at stress among IT professionals [Li and Shani 1991; Lim and Teo, 1996]. The sample only consisted of males, though it must be acknowledged that IT is a male dominated industry (Lim and Teo, 1996). The respondents therefore may be less likely to admit to problems encountered with anxiety, depression, and stress and display a façade that they are able to cope successfully with work related stressors. A further limitation is the cross-sectional design of the study, which does not capture the process of coping, or changes in affect and adjustment over time. The WAYSS scale used within the questionnaire may be an additional limiting factor. Because of the low alpha levels it may require additional refinement and subjection to further rigorous psychometric tests. In particular, the instrument should be analysed for its applicability to work settings rather than life situations.

As there has been limited research undertaken that has addressed coping and psychological adjustment of IT personnel the findings reported in this paper provide the impetus for future research in this area. It is suggested that future research should focus on determining whether personality and gender type

influence the coping strategies and subsequently the psychological adjustment of IT personnel to work-related stress. A more comprehensive study to examine the validity of the findings in Australia and in an international context should be undertaken. Research efforts should also focus on the determinants and consequences of coping among IT personnel, as well understanding *why* positive affect is associated with increased depression. By including a broader array of factors that influence the selection of coping strategies, future coping research may clarify differences in coping across individuals and within individuals across situations. Thus, management need to understand not only *how* their IT personnel cope with psychological adjustment but also *why* they cope as they do.

8 CONCLUSION

Information technology personnel are active agents who respond to changes in the environment within which they work. This results in a transactional relationship between the individual and their environment, involving several processes. The most regulating process in the stress-related transaction is *cognitive*, involving several factors such as personal beliefs, individual differences, appraisals, and affect, all of which give direction towards the adoption of specific coping strategies. The hierarchical regression analysis has demonstrated that specific individual demographics influenced the psychological adjustment among the IT personnel sampled. Those IT personnel who engaged in a more problem-focused style of coping, such as active coping were better adjusted than those who engaged in more emotion-focused styles of coping such as cognitive avoidance coping, social coping, accepting responsibility, and self-controlling coping. In addition, it was revealed that increased adjustment of IT personnel was associated with positive affect. So it can be concluded that the psychological adjustment of male IT personnel is influenced by the types of coping strategies they use, specific individual demographics and their affect state.

The increasing demands being imposed on firms by customers to deliver services and products more efficiently and effectively is often reliant on IT personnel being able to be adaptive and responsive to the environment within which they work. In addition, IT personnel are also confronted with the demands of users, and increasingly the stakeholders who are reliant on the information system and the data produced. If IT personnel are not able to manage and cope with the job strain that they are confronted with then there is a danger of that customers could be lost to competitors, which are considered more reliable. Consequently, if firms are to improve their performance, then they need to provide their IT personnel with an environment that encourages problem-focused coping through improved training and skills development. As there has been limited research undertaken that has addressed psychological adjustment and coping of IT personnel the findings reported in this paper provide the impetus for future research in this area. For example, determining whether personality and gender type influence the coping strategy and subsequently the psychological adjustment of IT personnel to work-related stress. The degree and pace of change being imposed on businesses by globalization and developments in information and communication technologies will increase the levels of work-related stress among IT personnel. As businesses seek to improve their competitive positioning within their respective marketplaces, they are creating an environment that fosters change, much of which adds to the everyday pressure and stress on employees. It would appear that stress has become an intrinsic feature of the workplace, especially among IT personnel, but how they cope with the pressures of technological change imposed on their work environment will ultimately influence overall business performance.

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