Assessing intervention effectiveness for reducing stress in student nurses: quantitative systematic review

Galbraith, N.D. and Brown, K.

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ABSTRACT

Aims

To identify the types of interventions that are effective in reducing stress in student nurses, and to make recommendations for future research.

Background

Student nurses experience significant stress during their training and this may contribute to sickness, absence and attrition. Given the global shortage of nurses and high drop-out rates amongst trainees, the importance for developing stress management programmes for student nurses is becoming more evident. To date, only one review has examined the effectiveness of stress interventions for student nurses, but the emergence of recent literature warrants a new review.

Data Sources

Research papers published between April 1981 and April 2008 were identified from the following databases: Medline, CINAHL, Behavioral Sciences Collection, IBSS and Psychinfo.

Review Methods

A systematic review with narrative analysis was conducted. Key terms included 'nurses OR nursing OR nurse', 'student OR students', 'intervention', 'stress OR burnout'. In addition to database searches, reference lists of selected papers were scanned, key authors were contacted and manual searches of key journals were conducted.

Results

The most effective interventions provided skills for coping with stressful situations (typically relaxation) and skills for changing maladaptive cognitions. Interventions which promoted skills to reduce the intensity or number of stressors were also successful. In most cases, stress interventions did not improve academic performance.

Conclusion

The design of stress interventions should be driven by theory. Future studies should focus on interface and organisational factors and the long-term benefits of interventions for student nurses are still to be demonstrated.

Summary Statement

What is already known about this topic

- Student nurses suffer significant course-related stress and this may contribute to the high rates of attrition observed in the UK, USA and other countries.

- The evidence suggests that stress management programmes can significantly reduce the stress experienced by student nurses.

What this paper adds

- The types of interventions that are most successful commonly incorporate skills to enable cognitive reappraisal of maladaptive cognitions, as well as relaxation, and such interventions are underpinned by a strong theoretical rationale.

- There is little evidence that stress interventions for student nurses can improve academic performance.

Implications for practice and/or policy

- Nurse educators may significantly reduce the stress in their students by including stress interventions which combine cognitive reappraisal with relaxation and which take into account theories of stress.

- The success of stress interventions in addressing organisational outcomes such as attrition and absence has not yet been reliably demonstrated.

INTRODUCTION

There is a considerable body of evidence suggesting that nurses experience job-related stress (Tyson & Pongruengphant 2004; Sveinsdottir et al. 2006). In one international study, which included the UK, 40 percent of hospital nurses were found to have levels of burnout that were higher than the norms for healthcare staff (Aiken et al. 2001) and in the US, job dissatisfaction in nurses was four times higher than that of the average worker. Stress within the trained nursing workforce can also lead to patient dissatisfaction (Leiter et al. 1998) and reduced quality of care (Leveck & Jones 1996).

Stress in student nurses has also been widely demonstrated (e.g. Parkes 1982). Jones and Johnston (1997) report stress in more than 50 percent of a cohort, and greater than the prevalence in senior medical students and the general population. Academic pressures, practical demands and death and suffering in patients, have been identified as sources of stress for student nurses (Rhead 1995). For many health professionals, training may be the time when they form enduring negative attitudes towards help-seeking for stress (Chew-Graham et al. 2003; Ross & Goldner 2009). Many studies (although not all e.g. Sanders & Lushington 2002) report a negative relationship between stress and academic performance - mediated by coping style (e.g. Struthers et al. 2000; Shields 2001) or self-efficacy (Chemers et al. 2001). Evidence for the relationship between stress and attrition is also strong (see Deary et al. 2003). These potential negative effects of stress have implications for nurse education programmes and for nurse employers given the global shortage of nurses (Stephenson 2004) and with many trained nurses choosing to leave the profession within their first year (Evans 2001). Overall this suggests that the assessment of stress interventions during

the formative training period is especially pertinent, and there is evidence that such interventions may help tackle some of the problems identified (Jones & Johnston 2000a).

Calls have been made for healthcare employers to implement stress management interventions for both student and qualified nurses (Jones & Johnston 2000a). In their review of this literature, Jones and Johnston (2000a) found that numerous studies reported success with regard to outcomes such as problem-solving, self-management skills including relaxation and interpersonal skills, affective well-being, and work performance. However, weaknesses in methodology and evaluation were common, including lack of randomisation, failure to control for confounds and failure to report effect sizes. The Jones and Johnston review also reports a scarcity of programmes which target work or organisational stressors.

In the decade since this review, governments around the world have emphasised the need to address the shortage in the nursing workforce and the importance of addressing stress and organisational stressors has been recognised (American Nurses Association 2000; Department of Health 2002a, 2002b). Perhaps due to the increasing importance for tackling nurses' stress early in their careers, the number of investigations into the effectiveness of interventions for student nurses has grown since Jones and Johnston's (2000a) review. Although stress interventions for this population can be successful (Jones and Johnston 2000a), published studies vary in approach and effectiveness. No review of stress interventions for student nurses has been conducted since Jones and Johnston's (2000a) paper, which itself did not focus exclusively trainees. Furthermore, a review by McVicar (2003) suggests that sources

of stress for nurses are ever changing. For these reasons a new review of the effectiveness of stress interventions for student nurses is warranted.

THE REVIEW

Aims

This review seeks to provide an up-to-date examination of studies which report on stress management interventions for student nurses and in doing so will address the following aims:

1. Identify which types of interventions are effective in reducing stress in student nurses.
2. Identify the direction for future research on stress in student nurses.

Design

A quantitative systematic review with narrative synthesis was conducted (see Higgins & Green 2006; Popay et al. 2006).

Search Methods

Key terms included 'nurses OR nursing OR nurse', 'student OR students', 'intervention', 'stress OR burnout'. Research papers published between April 1981 and April 2008 were identified via searches from the following databases: Medline, CINAHL, Behavioral Sciences Collection, IBSS and Psychinfo. In addition to this, reference lists from selected papers were scanned for further relevant studies, and requests were sent to key authors in the field for unpublished studies. Finally, a

manual search of key journals in nursing, health and nursing education was also carried out.

The inclusion criteria were as follows. The paper had to have been published in the English language between January 1980 and March 2009. All studies had to be empirical research reporting an evaluation of a stress intervention for student nurses. The paper had to include a detailed description of the intervention and details of the outcome measures used.

Search Outcome

The search produced 186 studies which were individually assessed against the inclusion criteria. The first author initially selected the papers by reading abstracts, in some cases the full paper was required in order to determine if the study met the inclusion criteria. One hundred and sixty-nine studies which failed to meet the criteria were excluded, leaving 17 (see Table 1). Other reasons for exclusion included double hits, and absence of an abstract in the database. Correspondence with key authors and searches of reference lists yielded no additional studies.

Quality Appraisal

The quality appraisal was based on a set of key conditions for non-randomised studies (see Table 1) (Rochon et al. 2005; Mamdani et al. 2005; Normand et al. 2005). All but one of the 17 studies (Manderino & Yonkman 1985) met at least three of the five conditions and were selected for inclusion in the review. The final set of studies are summarised in Table 2.

Table 1 about here

Data Abstraction

From the 16 selected studies, the following data were abstracted and inserted into Table 2: author, year of publication, country, intervention techniques, number of participants, length of intervention, design, which of the three targets were adopted by the interventions (in line with Jones & Johnston 2000b) and finally the improved outcomes, if any. The process of selecting the final 16 studies is outlined in Figure 1.

Figure 1 about here

Table 2 about here

Data Synthesis

Heterogeneity in study methodology precluded a formal meta analysis, hence a narrative analysis of the literature was conducted. After preliminary synthesis of the studies, they were organised according to design, methods and effects. A theoretical framework of intervention type provided a structure to the analysis of the studies' effectiveness. Robustness and trustworthiness of the analysis was assessed through discussion between the authors.

RESULTS

Occupational stress interventions can be categorised in a number of ways. Firstly, they may be grouped as either, primary (remove or reduce the stressors), secondary (modifying an individual's response to stress) or tertiary (psychological assistance to those who are already experiencing severe stress) (Murphy 1988; Cooper et al. 2001)

The majority of interventions for student nurses are secondary programmes, and this is perhaps because until recently, there has been a relative lack of data on the interface and organisational factors contributing to stress in student nurses (Jones & Johnston 2000a). Perhaps a simpler system of categorisation is provided by DeFrank and Cooper (1987), who conceived of interventions and outcomes across three levels: the individual, the individual-organisational interface and the organisational. However, as Jones and Johnston (2000a) note in their review, the majority of interventions for student nurses are based at the individual level. Hence the systems proposed by Cooper et al (2001) or by DeFrank and Cooper (1987) would not allow for discrimination between the interventions in the current review. Therefore it is argued here that the most meaningful system for grouping the interventions in the current review is by the techniques that were employed in the interventions themselves.

Drawing on the theoretical work of Lazarus and Folkman (1984) and Ivancevich et al. (1990), Jones and Johnston (2000b) argue that interventions may adopt one or more of three targets: Target 1. reduction in intensity or number of stressors; Target 2. cognitive reappraisal of potential stressors; Target 3. more effective coping with the consequences of stress. The following analysis applies this system for categorising the interventions but provides a more detailed break-down of the techniques employed to reach these targets. There was only one intervention which addressed just target 1 (Jones & Johnston 2006). Those studies addressing only target 3 (six studies: Charlesworth et al.1981; Mancini et al. 1983; Severtsen & Bruya, 1986; Forbes & Pekala, 1993; Bittman et al. 2004; Consolo et al. 2008) tended to adopt a combination of biological (e.g. breathing) and psychological techniques (e.g. imagery, desensitisation) to prepare individuals to cope with stressors. The distinguishing

feature between these studies and those which addressed both targets 2 and 3 (six studies: Wernick, 1984; Johansson, 1991; Russler, 1991; Stephens, 1992; Heaman, 1995; Beddoe & Murphy, 2004) was that the latter included some cognitive reappraisal of stressful situations. Finally, there were three studies which addressed all three targets (Godbey & Courage, 1994; Jones & Johnston, 2000b; Sharif & Armitage, 2004) (Table 2 includes data on the targets addressed by each study). The majority of interventions in this review were delivered in group sessions, normally lasting for one hour and ranging over a period of two to twelve weeks.

Findings from the single intervention addressing only target 1.

Jones and Johnston (2006) describe the introduction of problem-based learning to replace a traditional nursing degree programme. The problem-based curriculum was designed in part to increase student-centred learning, to increase the clinical relevance of the course content and to reduce student distress. The problem-based learning cohort reported improved well-being and coping. However, they did show increased sickness absence and poorer academic performance compared to a cohort tutored by traditional teaching methods.

Findings from the six interventions addressing only target 3.

The majority of the interventions in this category were not underpinned by theoretical models of stress (apart from Mancini et al, who cited Lazarus and Folkman's (1984) transactional model). Instead designs were justified on the basis of previously successful techniques. Most of the studies addressing only target 3 combined a variety of techniques to address stress, however, all interventions employed either relaxation/meditation or breathing exercises. Imagery was used in three of the studies

(Charlesworth et al. 1981; Mancini et al. 1983; Bittman et al. 2004). A range of other techniques were used, namely systematic desensitisation (Charlesworth et al. 1981), hypnosis (Forbes & Pekala 1993), exercise, awareness and music-making (Bittman et al. 2004). All of the interventions were focused upon providing student nurses with the skills to alleviate the effects of stress however, none of them provided explicit guidance on reappraising maladaptive thinking.

Only two of the studies within this category reported significant improvements in psychometric measures of stress: Charlesworth et al. (1981) found improvements in both trait and state anxiety (as measured by the State-Trait Anxiety Inventory (STAI), Speilberger et al. 1983) despite a low sample size, and Bittman et al. (2004) reported improvements on the Maslach measure of burnout (Maslach et al. 1996) and on a measure of mood disturbance (Profile of Mood States; McNair et al. 1992). Severtsen and Bruya (1986) measured self-reported stress but failed to find a significant decrease post intervention.

On physiological measures, only two studies demonstrated an improvement. Forbes and Pekala (1993) report increases in skin temperature and reductions in pulse rate, both of which indicate reduced psychophysiological responsivity. Unfortunately subjective measures of stress were not tested. Elsewhere, improvements in heart rate were not observed (Consolo et al. 2008). Mancini et al. (1983) failed to observe improvements in diastolic and systolic blood pressure, however they did find lower Palmar sweat prints (PSP) in their intervention group, an indication of reduced anxiety. However, even this finding should be noted with caution, as the control group also showed some improvement in PSP levels. Finally, Severtsen and Bruya (1986)

predicted that their intervention group would show an increase in the proportion of alpha to beta waves, thus indicating a reduction in stress, however such a change was not observed. Only two studies measured academic performance (Charlesworth et al. 1981; Consolo et al. 2008), and neither of these demonstrated enhanced student grades. Overall, the studies by Mancini et al. (1983), Severtsen and Bruya (1986) and Consolo et al. (2008) showed little evidence for the efficacy of the interventions, although the null effects may have been masked by very low statistical power. Few of the studies addressing only target 3 report data sufficient for the computation of effect sizes.

Findings from the six interventions addressing targets 2 and 3

In the previous section, the interventions focused upon skills which would enable student nurses to cope with the consequences of stress. In this section, the interventions included an additional feature: cognitive reappraisal of stress-related thinking. All of the studies in this section however combined cognitive reappraisal with other techniques. Traditional relaxation training was included in all interventions, often augmented with more advanced techniques such as biofeedback (e.g. Wernick 1984; Heaman 1995) or Stroebel's (1983) Quieting Response (Heaman 1995). Some combined relaxation with imagery (Johansson 1991; Stephens 1992). Other techniques included assertiveness training (Russler 1991) and yoga and walking (Beddoe & Murphy 2004).

The inclusion of techniques to encourage cognitive reappraisal, reflect the stronger theoretical basis for the interventions reported in this section. Two of the interventions (Wernick 1984; Johansson 1991) build on the Schachter model of emotion (Schachter

& Singer 1962) whereby maladaptive cognitive interpretation of physiological responses can lead to stress. Similarly, other interventions (Russler 1991; Stephens 1992; Heaman 1995) were based upon Lazarus and Folkman's (1984) transactional model, which also emphasises the importance of interpretation and cognition. One study (Beddoe & Murphy 2004) based its intervention upon mindfulness (Kabat-Zinn 1990), drawing on the notion that stress may be reduced through self-reflection and reappraisal and through meditation and relaxation.

Improvements in state anxiety (STAI) are widely reported (Johansson 1991; Stephens 1992; Heaman 1995) mostly with large effects sizes. Of the studies in this category which measured state anxiety, only one (Russler 1991) reported no improvement, however this may have been due to the very low sample size and low statistical power – there were also null effects on measures of reported emotions and coping but the computation of effect sizes is not possible from the data reported. Elsewhere, post-intervention improvements are also found in depression (Johnasson 1991) as well as attitudes towards stress, time pressure and self-reported stress (Beddoe & Murphy 2004). Only one intervention in this category reported a biological measure. Heaman (1995) found no significant correlation between state anxiety and potassium excretion. The Wernick (1984) study found that attrition rates amongst an intervention group were less than a third of those in a no intervention group. However, in studies where examination performance was included as an outcome measure (Stephens 1992) there was no evidence for improvements in exam results.

Findings from the three interventions addressing targets 1, 2 and 3.

All of the interventions within this category employed relaxation as a method for coping with the consequences of stress, and also incorporated cognitive reappraisal of stress-related thinking. In addition to these approaches, they also employed methods designed to reduce the intensity or number of stressful events or to prevent them from arising. For instance, Jones and Johnston (2000b) introduced problem solving skills to reduce the degree of family-work related stress. Furthermore, time management skills were promoted to try to reduce the number of academic related stressors. Time management as a strategy for reducing the occurrence of stressful situations was also applied by Godbey and Courage (1994) and by Sharif and Armitage (2004).

The theoretical rationale for the interventions which addressed all three targets was mixed. Two of the studies (Godbey & Courage 1994; Jones & Johnston 2000b) drew on Lazarus & Folkman's (1984) transactional model. They emphasise the importance of cognitive reappraisal in strengthening the perception of one's ability to cope with external demands, and furthermore, how this process is mediated by coping style, hence strong justification for targets 2 and 3. However, only one study provides a coherent rationale for addressing target 1 (Jones & Johnston 2000b). Drawing on the work of Ivancevich et al. (1990), Jones & Johnston (2000b) argue that in order for students to achieve congruence with their external environment, interventions should focus on the interface between the individual and their environment as well as on the individual themselves. Hence the design of an intervention which targeted both individual and interface factors.

Reductions in state and trait anxiety as well as improvements in self-esteem were reported (Godbey & Courage 1994; Sharif & Armitage 2004) as were reductions in distress and improvements in well-being (Jones & Johnston 2000b). Depression was reduced in one study (Godbey & Courage 1994). All three studies within this category examined post-intervention academic performance, but only one reported improvements (Sharif & Armitage 2004). Only Jones & Johnston (2000b) measured coping and found improvements in problem-focused coping. At the interface level, Jones and Johnston also found a reduction in the number of situational and course-related stressors. Besides academic performance, only the Jones and Johnston (2000b) study reported additional outcomes at the organisational level: they found no improvements in sickness or absence following their intervention. There was also evidence for sustained improvement in state anxiety at 18 months follow-up by Jones & Johnston (2000b) and in anxiety and self-esteem after 3 months follow-up by Sharif and Armitage (2004). Two of the studies within this category recruited student nurses who had already reported significant stress prior to the intervention (Godbey & Courage 1994; Jones & Johnston 2000b). The positive findings from these two studies may be in part due to the already high levels of stress experienced by these students. This may be particularly pertinent given the very low sample size in the Godbey and Courage study (N=19) and yet mostly large effect sizes.

In summary, only one intervention was based fully at the organisational level (Jones & Johnston, 2006; addressing target 1); an improvement in student well-being and coping was reported. Of the studies addressing only target 3, all interventions utilised either relaxation, breathing or imagery, but those which reported post-intervention improvements used a combination of these techniques. The success of the

interventions in this category was measured across a range of psychometric and physiological outcomes. Of the interventions which addressed targets 2 and 3, all combined relaxation with cognitive re-appraisal, and two included imagery. The most commonly reported improvements were in state anxiety, although reductions in depression, reported stress and attrition were found, as was an improvement in attitudes to stress. Finally, the interventions addressing targets 1, 2 and 3, all combined relaxation and cognitive reappraisal with skills to help prevent or reduce the occurrence of stressors. These interventions demonstrated improvements across a range of psychometric measures particularly state and trait anxiety and self-esteem. Reductions were also found in depression, attitudes to stress, reported stress and the number of stressors experienced. Of the eight studies in this review which examined academic performance, only one produced evidence for an improvement in grades.

DISCUSSION

Whilst the review has captured a diverse range of studies, spanning nearly three decades, their diversity may also be a limitation. The variety of methods makes it more difficult to draw valid comparisons between studies and excludes the possibility of meta-analysis. In addition, the generalisability of the review may be limited both by the differences between the various methods and because all but one study was conducted either in North America or the UK. Many of the included studies were not RCTs, which raises a further question mark over their validity. However although RCTs are recognised as the gold standard for health research (see Kaptchuk 2001), it is acknowledged that alternative methods are also necessary and valid (Black 1996; Barton 2000).

Turning firstly to research question 1, the types of interventions most effective in addressing stress in student nurses will be summarised. Of the studies addressing targets 1, 2 and 3, a number of techniques were incorporated but all combined relaxation (addressing target 3), cognitive reappraisal (addressing target 2) and strategies for reducing the number or intensity of stressors (addressing target 1). These techniques led to improvements in anxiety, self-esteem, depression and measures of stress. However, the interventions addressing only targets 2 and 3 were also successful in reporting improvements in psychometric outcomes such as state anxiety, stress and depression. Only one intervention in this category failed to demonstrate positive results, suggesting that target 1 is not necessary for success. By contrast, the interventions which addressed only target 3 produced much less convincing results. These interventions had little or no emphasis on cognitive reappraisal and were instead characterised by combinations of relaxation, imagery and breathing techniques. Therefore, the evidence suggests that a combination of cognitive reappraisal and relaxation is necessary for reliable improvements in stress.

However, one should exercise caution before accepting this conclusion. The mixed success of those interventions addressing only target 3 may be partly due to the small samples and other methodological weaknesses. The studies of Mancini et al. (1983), Severtsen and Bruya (1986) and Consolo et al. (2008), all reported null findings. The size of their intervention groups numbered 11 or less, and one cannot therefore rule out the possibility that null effects were due to low statistical power. Although Mancini et al. and Severtsen and Bruya report some large mean differences, they do not provide enough data for effect size calculation, therefore the effectiveness of their interventions is somewhat uncertain. Indeed, of those studies addressing both targets 2

and 3, the only one not to report significant improvements in the intervention group was also hampered by a relatively low sample size (Russler 1991; 19 in the intervention group) but again no effect size data were provided. In addition to small sample sizes, the studies addressing only target 3 suffered from other methodological weaknesses. Forbes and Pekala (1993), recruited a substantial sample (N=231), but no control group, and only tested physiological measures of stress. The degree to which the purely physiological outcomes correlate with subjective measures of stress is debateable, as authors have shown that such relationships are not always strong (Schonfeld 1992). Only one of the studies within this category randomly assigned participants to groups. Of the studies in the other categories, only three were non-randomised. The Mancini et al intervention was hampered by lack of adherence to the regimen, whilst the Severtsen and Bruya (1986) study installed no system for checking adherence, despite the intervention being largely self-directed. Finally, although the Bittman et al. (2004) study demonstrated strong improvements in burnout and mood disturbance, a facilitator effect cannot be ruled out, as only one facilitator was employed throughout. Therefore, one should be cautious before concluding that cognitive reappraisal is necessary for bringing about reductions in stress. Interventions which rely on a combination of relaxation, imagery and breathing may also demonstrate success if subjected to more methodologically rigorous testing.

The studies in the other categories were not without methodological difficulties either. For example, the Stephens (1992) intervention (targets 2 and 3) was also largely self-directed with no system for checking adherence. Indeed, considering this body of literature as a whole, a number of methodological improvements could be recommended. Firstly, although most studies did consider potential confounds, few

recorded details of the participants' stress-related behaviours prior to the intervention (e.g. alcohol, finance, smoking, relationships, etc.). It has been demonstrated that nurses may turn to alcohol, smoking and drugs to cope with stress (Plant et al. 1992), and this can increase vulnerability to stress and limit the effectiveness of stress management programmes (Fox et al. 2005). External stressors such as family conflict can also be the source of individual stress (Boss 2002), and may also interact with other stressors (e.g. clinical, academic). Consideration of these factors may be particularly important for non-randomised quasi-experimental studies (e.g. Bittman et al. 2004).

The importance of follow-up testing has been emphasised by numerous authors in the stress management literature (e.g. van der Klink et al. 2001). Only two of the studies reviewed here incorporated follow-up testing in their designs (Jones & Johnston 2000b; Shafir & Armitage 2004). Hence one cannot be sure whether the improvements demonstrated by most of the studies would be sustained across time. Furthermore, few of the studies reported effect sizes or provided enough data for a third party to compute them, this should be routine but is particularly important for studies with small samples.

One of the difficulties in comparing the studies reviewed in this paper is the variation in outcome measures. The most commonly used outcome measure was the STAI, and a number of studies reported improvements in anxiety scores on this scale. However, numerous other psychological constructs were tested as indicators of underlying stress including depression, reported stress, attitudes to stress, burnout and coping. Physiological indicators of stress were also tested. The multi-dimensional nature of

stress has been widely reported (Ice & James 2007). This perhaps emphasises the importance for researchers to recognise the various manifestations of stress, and that an intervention which demonstrates improvements in psychometric depression for example, will not necessarily be successful for all other types of stress-related outcomes. Arguably, a more systematic and theory-driven approach needs to be adopted when selecting outcome measures.

The interventions which addressed only target 3 or only target 1, placed less emphasis on the theoretical mechanisms underpinning their designs, instead basing their rationale simply on approaches that were successful in earlier studies. The study by Mancini et al. (1983) cited Lazarus and Folkman's (1984) transactional model as central to the understanding of stress. Yet it did not include cognitive re-appraisal as a fundamental feature of the programme. Furthermore, central to the transactional model, is the notion that the stress response is mediated by coping style, yet only three studies included this as an outcome (Russler 1991; Jones & Johnston 2000b; 2006).

The wider literature suggests that stress management is more effective when the intervention focuses on the individual *and* the organisation and/or the interface between the two (Kompier et al. 2000; McVicar 2003). Of the literature reviewed here, few studies based their interventions or outcomes beyond the individual level. The findings from those studies that did were mixed: Wernick (1984) found improvements in attrition, whereas Jones and Johnston (2006), the only intervention based solely at the organisational level, found an increase in sickness or absence following intervention but did produce improvements in coping and well-being. The intervening

years between the Jones and Johnston (2000a) review and the current paper have seen little change in the paucity of interventions at the organisational or interface levels.

CONCLUSION

In light of the discussion of the studies' findings and their weaknesses, this review can now address research question 2. Firstly, interventions which successfully demonstrate an improvement in a measure of stress tend to have a strong theoretical basis. Therefore future evaluations should aim to design interventions in accordance with a theoretical model of stress (e.g. the transactional model, Lazarus & Folkman, 1984). Secondly, in line with proposals by other authors (e.g. Kompier et al. 2003; McVicar 2003) there is a need for future studies to develop and test interventions at the interface and organisational levels as well as at the individual level. Moreover, the selection of outcome measures should be theory driven, should reflect the multidimensionality of stress and should also be based upon literature reviews of the sources of stress for student nurses (e.g. Jones & Johnston 2000a). Given the global shortage of nurses (Stephenson 2004) and the high drop-out rates (Deary et al. 2003), more research is needed on how to reduce attrition.

It is also important for future studies to collect data on personal factors which may confound the effects of the intervention (e.g. alcohol abuse, family conflict). However asking such questions poses an ethical dilemma: disclosure of such information in an academic or professional context may be very difficult for participants, therefore care must be taken to ensure anonymity or confidentiality and the voluntary nature of such

disclosures must be emphasised. Researchers should also be wary of this when designing group-based interventions. Some participants may be uncomfortable disclosing personal information in the presence of colleagues. Many of the studies in this review were conducted with very small sample sizes and often resulted in null effects. Future studies should carry out statistical power calculations before data collection to ensure that they have the power to detect real effects. Routine reporting of effect sizes should also be the norm. Furthermore, only a minority of the studies reviewed in this paper incorporated significant follow-up periods, future studies should aim to address this so that the sustainability of effects may be assessed. In the stress management literature, follow-up periods typically range from 6 months to two years (Caulfield et al. 2004). With student nurses, the length of the course and the stage of training will also need to be considered.

More research needs to be done to establish whether stress management programmes can improve academic performance in student nurses. Perhaps future studies could examine interventions which include study skills training in addition to other stress management techniques. However, according to the literature reviewed here, nurse educators should be wary of implementing stress management as a means for improving academic performance. The benefits for academic achievement requires further research. Others suggest that the association between stress and academic performance may be mediated by problem-focused coping (Struthers et al. 2000), such that students using problem-focused coping are more motivated and achieve better academic grades. Perhaps the measurement of this and other mediating factors (e.g. self-efficacy, see Chemers et al. 2001) can be factored into future studies. Stress management training will perhaps have little effect on grades for those students who

are not stressed, however the literature suggests that non-stressed trainees are in the minority (Jones & Johnson 1997).

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Tables

Table 1. The quality appraisal criteria for non-randomised studies.

Study	What comparison is being made?	Comparison make clinical sense?	Effort to identify confounds?	Analytical strategies clearly defined?	Do different analytical strategies yield consistent results?	Are results plausible?
Charlesworth et al (1981)	Stress management vs controls	Y	Y	Y	Y	Y
Mancini et al (1983)	Stress management vs controls	Y	Y	Y	Y	Y
Forbes & Pekala (1993)	Pre vs post intervention	Y	Y	Y	NA	Y
Severtsen & Bruya (1986)	Pre vs post intervention	Y	Y	Y	Y	Y
Bittman et al (2004)	Stress management vs controls	Y	Y	Y	Y	Y
Consolo et al (2008)	Pre vs post intervention	Y	Y	N	N	Y
Jones & Johnston (2006)	Student-centred/PBL vs traditional training cohorts	Y	Y	Y	Y	Y
Wernick (1984)	Stress management vs controls	Y	Y	Y	Y	Y
Johansson (1991)	Stress management vs controls	Y	Y	Y	NA	Y
Russler (1991)	Stress management vs controls	Y	Y	Y	NA	Y
Stephens (1992)	Stress management vs controls	Y	Y	Y	Y	Y
Heaman (1995)	Stress management vs controls	Y	Y	Y	Y	Y
Beddoe & Murphy (2004)	Pre vs post intervention	Y	Y	Y	Y	Y
Godbey & Courage (1994)	Stress management vs controls	Y	Y	Y	Y	Y
Jones & Johnston (2000b)	Stress management vs controls	Y	Y	Y	Y	Y
Sharif & Armitage (2004)	Stress management vs controls	Y	N	Y	Y	Y
Manderino & Yonkman, 1985	No formal comparison	NA	N	N	NA	Y

Table 2. Summary of the studies included in the review. Part 1

Study	Country	Intervention techniques	N	Study Period	Design	Targets	Outcomes*	Mean Difference in Improvement and Confidence Intervals	Effect size
Jones & Johnston (2006)	UK	Curriculum development	853	27 weeks	Quasi-experimental	1	**Academic load**	5.86; 4.65 to 7.07	*d*=1.1
							Clinical concerns	3..99; 2.82 to 5.13	*d*=0.8
							Interface worries	2..34; 1.18 to 3.50	*d*=0.4
							Personal problems	4.59; 3.67 to 5.51	*d*=1.1
							General coping	5.85; 4.27 to 7.43	*d*=0.8
							Direct coping	-1.34; -2.04 to -0.64	*d*=-0.4
							Suppression	-0.05; -0.44 to 0.34	*d*=-0.03
							GHQ 30	6.08; 3.39 to 8.77	*d*=0.5
							Essay~	5.60; 3.45 to 7.75	*d*=0.6
							Examination~	-12.44; -15.11 to -9.77	*d*=-1.1
							Sickness absence~	-1.85; -3.31 to -0.39	*d*=-0.3
Charlesworth et al (1981)	USA	Relaxation, imagery, systematic desensitisation	18	5 weeks	Non-randomised experimental	3	**Trait anxiety**	3.9; -5.24 to 1304	*d*=0.4
							State anxiety	4.6; -4.06 to 13.26	*d*=0.5
							Grades	1.4; -36.80 to 39.60	*d*=0.04
Mancini et al (1983)	USA	Relaxation, imagery, breathing reduced caffeine	16	8 weeks	Experimental	3	**Palmar sweat prints**	0.33	NA
							Systolic BP	5.1	NA
							Diastolic BP	66.5	NA
							State anxiety	0.09	NA
Forbes & Pekala (1993)	USA	Relaxation, hypnosis, breathing	231	2 weeks	Pre-post test, no control	3	**Skin temp.**	NA	NA
							Pulse rate	NA	NA
Severtsen & Bruya (1986)	USA	Meditation, exercise	10	7 weeks	Experimental, no control	3	Meditation group:		
							Prop α : β	-2.2	NA
							Social Adj.	0.6	NA
							SUSA	49.4	NA
							Exercise Group:		
							Prop α : β	-2.0	NA
							Social Adj.	2.4	NA
							SUSA	185.0	NA
Bittman et al (2004)	USA	Music, breathing imagery, mind-body wellness exercise	75	6 weeks	Cross-over control	3	**Burnout (Em Ex)**	2.7; -2.13 to 3.18	*d*=0.51
							Burnout (Depers'n)	1.3; -1.01 to 1.69	*d*=0.49
							Burnout (Pers Ac)	0.1; -1.69 to 1.66	*d*=0.03
							Mood disturb.	-2.1; -4.56 to 5.37	*d*=0.21
Consolo et al (2008)	USA	Breathing	21	/	Experimental, no control	3	Heart Rate	NA	NA
							Academic test	NA	NA
Wernick (1984)	Canada	Cognitive reappraisal, breathing, relaxation,	130	9 weeks	Experimental	2 and 3	**Attrition**	Categorical data	*Φ*=0.24
							Examination	NA	NA

*Significant outcomes are in bold . # Where computable. ~ Significant in the direction opposite to that expected.

Table 2. Summary of the studies included in the review. Part 2

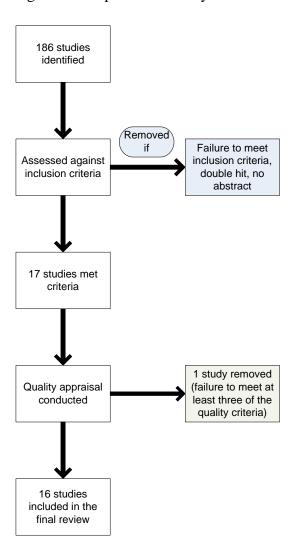| Study	Country	Intervention techniques	N	Study Period	Design	Targets	Outcomes*	Mean Difference in Improvement and Confidence Intervals #	Effect Size
Johansson (1991)	USA	Cognitive reappraisal,	76	3 weeks	Experimental	2 and 3	**State anxiety** **Depression**	10.04; -14.22 to -5.86 9.16; -13.91 to -4.41	*d*=1.1 *d*=0.9
Russler (1991)	USA	Cognitive reappraisal, relaxation, imagery, biofeedback	57	16 hours over two weeks	Experimental	2 and 3	State anxiety Reported emotions Coping methods	NA NA NA	NA NA NA
Stephens (1992)	USA	Cognitive reappraisal, relaxation, assertiveness	159	4 weeks	Experimental	2 and 3	**State anxiety** Test performance	NA NA	NA NA
Heaman (1995)	USA	Cognitive reappraisal, relaxation, biofeedback, quieting response	40	5 weeks	Experimental	2 and 3	**State anxiety** Trait Anxiety	-10.14; -17.41 to -2.87 -2.65; -8.21 to 2.91	*d*=0.9 *d*=0.3
Beddoe & Murphy (2004)	USA	Cognitive reappraisal, relaxation, awareness, yoga	16	8 weeks	Pre-post test, no control	2 and 3	Attitude to stress Total stress Time pressure	NA NA NA	NA NA NA
Godbey & Courage (1994)	USA	Cognitive reappraisal, relaxation, time management, nutrition, exercise	19	6 weeks	Non-randomised experimental	1, 2 and 3	**State anxiety** **Trait anxiety** **Self-esteem** **Depression** GPA	2.69; -14.79 to 9.41 -7.00; -18.06 to 4.06 13.71; -29.69 to 2.27 11.61; -27.55 to 4.33 0.15; -5.64 to 5.94	*d*=0.2 *d*=0.7 *d*=0.8 *d*=0.8 *d*=0.03
Jones & Johnston (2000b)	UK	Cognitive reappraisal, relaxation, interface problem solving, time management, coping	79	6 weeks	Experimental	1, 2 and 3	**GHQ** **State anx.** **Trait anx.** **BDI** Dom'c Sat. (DRS) **Voc'l Sat. (DRS)** **Relax. pot. (DRS)** Gen. Coping **Direct coping** Suppr'n coping Sickness Absence **Sources of stress (BSSI)** Examination	16.8 14.2 5.75 6.7 NA NA 3.1 3.4 1.86 NA 0.7; -1.28 to 2.68 -0.2; -1.47 to 1.07 6.55 -2.2; -7.23 to 2.83	NA NA NA NA NA NA NA NA NA NA 0.2 0.1 NA 0.07
Sharif & Armitage (2004)	Iran	Cognitive reappraisal, relaxation, study skills	100	12 weeks	Experimental	1, 2 and 3	**Anxiety** **Self-esteem** **Grades**	NA NA NA	NA NA NA

*Significant outcomes are in bold
Where computable

Figure 1. The process of study selection.

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┌─────────────────┐
│   186 studies   │
│   identified    │
└─────────────────┘
         │
         ▼
┌─────────────────┐    ╭──────────╮    ┌─────────────────┐
│ Assessed against│    │ Removed  │    │ Failure to meet │
│inclusion criteria│──▶│    if    │    │inclusion criteria,│
└─────────────────┘    ╰──────────╯    │  double hit, no  │
         │                             │    abstract      │
         ▼                             └─────────────────┘
┌─────────────────┐
│ 17 studies met  │
│    criteria     │
└─────────────────┘
         │
         ▼
┌─────────────────┐         ┌─────────────────┐
│ Quality appraisal│        │ 1 study removed │
│    conducted    │────────▶│(failure to meet at│
└─────────────────┘         │ least three of the│
         │                  │ quality criteria) │
         ▼                  └─────────────────┘
┌─────────────────┐
│   16 studies    │
│ included in the │
│  final review   │
└─────────────────┘
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