Coping strategies of healthcare professional students for stress incurred during their studies: a systematised review

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Background

Stress in healthcare professional students is well-documented, however coping strategies and their relationship with stress has not been comprehensively reviewed. It is important for students to use positive coping strategies to effectively reduce stress levels.

Aims

The aim of this review is to identify coping strategies of healthcare professional students and their consequences.

Methods

Studies conducted from 2010-2020 on coping strategies utilised by healthcare students were reviewed. An electronic database search was performed in January 2020 of three databases, CINAHL, SCOPUS and PubMed.

Results

Twenty-two studies were included in this review, using a wide range of survey instruments including the Brief Coping Orientation to Problems Experienced (Brief COPE) Inventory and the Coping Behaviour Inventory Common coping strategies utilised by healthcare students include problem-focused strategies such as planning, problem-solving and active coping. Coping strategies tended to vary depending on student's location, year of their course, gender and age. Positive coping strategies, such as problem-solving, planning and instrumental support, were associated with reduced stress levels and improved psychological health. Emotion-focused coping strategies identified included acceptance, self-distraction, and

optimism.

Conclusions

Findings may provide direction for third-level institutions in designing interventions (such as promoting exercise) promoting the use of positive coping strategies.

Keywords: Coping strategies; Stress; Third-level education; Healthcare students; Review

This paper is not submitted as a systematic review and as such partially follows PRISMA guidance as much as possible. A review protocol was not developed and was not registered with Prospero due to the circumstances of the study.

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Introduction

In order to deal with high levels of stress, it is important for healthcare professional students to employ effective coping strategies. Coping strategies have been broadly categorised as being problem-focused or emotion-focused (S. Folkman & R. S. Lazarus, 1988). Problem-focused coping strategies include situation support and planning, while emotion-focused coping strategies aim to control feelings related to stress and include minimisation and utilisation of activities to self-distract (S. Folkman & R. S. Lazarus, 1988; Hampel & Petermann, 2006). Problem-focused coping strategies are adaptive or 'positive' strategies (Hampel & Petermann, 2006). Emotion-focused strategies are considered to be less effective in dealing with stress, with some being grouped as maladaptive strategies [1]. Maladaptive coping includes passive avoidance, resignation and aggression (Hampel & Petermann, 2006).

Maladaptive coping strategies are associated with less favourable outcomes in young people (Jalbrzikowski et al., 2014). They are related to anger control problems and emotional distress (Hampel & Petermann, 2006). High levels of stress have been associated with lower academic performance in students (Struthers, Perry, & Menec, 2000). Stress in healthcare professionals can promote burnout and depressive episodes (Meszaros, Cserhati, Olah, Perczel Forintos, & Adam, 2013). Additionally, high levels of stress are associated with a decrease in empathy that can affect a healthcare professional's relationship with patients and reduce the quality of healthcare the patient receives (Neumann et al., 2011). Therefore, it is important for healthcare students to use adaptive coping strategies in order to maintain overall health and provide the best quality of care to patients.

There have been numerous studies conducted internationally on the implementation of positive coping programmes, such as yoga and mindfulness, with the aim of reducing student stress levels. These studies show varying degrees of success, with some studies showing reductions in stress scores and anxiety (Phang et al., 2015; Warnecke, Quinn, Ogden, Towle, & Nelson, 2011). However, one of these studies showed no long-term effect of the intervention programme on perceived stress and distress (Phang et al., 2015). In addition, other studies have noted no significant differences in stress following an intervention (Kuhlmann, Huss, Burger, & Hammerle, 2016). While these stress management courses can be beneficial, they are challenged by time, personnel and resource shortages (Frank, Hedgecock, & Elon, 2004). Furthermore, these interventions have been associated with high drop-out rates (Kuhlmann et al., 2016), and the duration of stress-management effects remains unclear (Shapiro, Shapiro, & Schwartz, 2000).

Thus to guide the development of interventions that can encourage the use of positive coping strategies, it is important to first understand students' own coping mechanisms. The continuance of negative coping strategies after entry into the healthcare system may additionally have an impact on their patients. As the healthcare system relies on the recruitment of newly-qualified healthcare professionals, it is necessary to understand the coping strategies healthcare professional students implement and encourage the use of positive coping strategies during their higher education. This will help them to provide quality care to their patients and protect their own well-being throughout their future careers and reduce the risk of burnout.

The aim of this review is to identify coping strategies employed by healthcare professional students and the consequences of those strategies.

Methods

Search Strategy

An electronic search of original articles published from 2010 onwards was carried out in January 2020 using three databases: CINAHL, SCOPUS and PubMed. For each database, search terms were combined using Boolean logic (AND, OR). A detailed report of the search terms used is outlined in Table 1. Two additional studies were included as a result of searching citations of already included studies.

Inclusion/Exclusion Criteria

Articles were included if (1) identifying coping strategies was a primary objective, (2) the study was based on medical, pharmacy, dental and/or nursing students, (3) published in English language, (4) the full text was available, (5) coping strategies were employed by students of their own accord and (6) stress or psychological wellbeing was measured in the study.

Articles were excluded from the review if (1) identifying coping strategies was not a primary objective, (2) the study did not include students other than medical, pharmacy, dental or nursing students, (3) burn-out scale(s) or anger scale(s) were used, (4) the study was intervention-based, and (5) the study did not investigate stress levels or psychological wellbeing.

Search Outcome

The search identified 629 papers, following duplicate removal, of potential relevance to this review. Based on the inclusion criteria, titles and abstracts were screened resulting in thirty-four studies being identified. After assessing full texts for eligibility, in line with the inclusion

and exclusion criteria, twenty-two studies were identified as relevant to this review. Figure 1 shows the flow diagram utilised when searching and selecting the relevant literature (Moher, Liberati, Tetzlaff, Altman, & Group, 2009).

Data from included studies was extracted onto a customised data extraction form by KF which was used for subsequent analysis in the review.

Results

Research Setting and Design

Twenty-two studies are included in this review. Nine of these studies were conducted in Asia (Al-Sowygh, 2013; Alzayyat & Al-Gamal, 2016; An et al., 2012; Imran et al., 2016; Madhyastha, Latha, & Kamath, 2014; Shaban, Khater, & Akhu-Zaheya, 2012; Tada, 2017; Yamashita, Saito, & Takao, 2012; Zhao, Lei, He, Gu, & Li, 2015), seven in Europe (Ersan, Fisekcioglu, Dolekoglu, Oktay, & Ilguy, 2017; Fornés-Vives, Garcia-Banda, Frias-Navarro, & Rosales-Viladrich, 2016; Gibbons, Dempster, & Moutray, 2011; Gurkova & Zelenikova, 2018; Karaca, Yildirim, Cangur, Acikgoz, & Akkus, 2019; Masiak, Kuspit, Surtel, & Jarosz, 2014; Zvauya, Oyebode, Day, Thomas, & Jones, 2017), two in North America (Garber, 2017; Hirsch et al., 2019), two in South America (Bassols et al., 2015; Domingues Hirsch, Devos Barlem, Tomaschewski-Barlem, Lerch Lunardi, & Calçada de Oliveira, 2015), one in Australia (Rogers, Creed, Searle, & Nicholls, 2016) and one was multinational (Labrague, McEnroe-Petitte, Papathanasiou, et al., 2018). A tabular method was used to describe study characteristics, shown in Table 2.

A cross-sectional design was used by 19 studies (Al-Sowygh, 2013; An et al., 2012; Bassols et al., 2015; Domingues Hirsch et al., 2015; Ersan et al., 2017; Garber, 2017; Gibbons et al., 2011; Gurkova & Zelenikova, 2018; Imran et al., 2016; Karaca et al., 2019;

Labrague, McEnroe-Petitte, Papathanasiou, et al., 2018; Madhyastha et al., 2014; Masiak et al., 2014; Rogers et al., 2016; Shaban et al., 2012; Tada, 2017; Yamashita et al., 2012; Zhao et al., 2015; Zvauya et al., 2017) and three studies used a longitudinal design (Alzayyat & Al-Gamal, 2016; Fornés-Vives et al., 2016; Hirsch et al., 2019). Most studies utilised a convenience sample and sample sizes ranged from 65 to 1,324 students. All of the studies included were questionnaire-based, while two of the studies also used interviews (An et al., 2012; Masiak et al., 2014). Half of the studies (n=11) were based on nursing students (Alzayyat & Al-Gamal, 2016; Domingues Hirsch et al., 2015; Fornés-Vives et al., 2016; Gibbons et al., 2011; Gurkova & Zelenikova, 2018; Karaca et al., 2019; Labrague, McEnroe-Petitte, Papathanasiou, et al., 2018; Shaban et al., 2012; Tada, 2017; Yamashita et al., 2012; Zhao et al., 2015), seven on medical students (An et al., 2012; Bassols et al., 2015; Imran et al., 2016; Madhyastha et al., 2014; Masiak et al., 2014; Rogers et al., 2016; Zvauya et al., 2017), two on dental students (Al-Sowygh, 2013; Ersan et al., 2017) and two on pharmacy students (Garber, 2017; Hirsch et al., 2019).

Research Instruments

A variety of scales were used to measure stress in the students studied. The Perceived Stress Scale (PSS) by Sheu et al was used by five studies (S Sheu et al., 1997) (Alzayyat & Al-Gamal, 2016; Gurkova & Zelenikova, 2018; Labrague, McEnroe-Petitte, Papathanasiou, et al., 2018; Shaban et al., 2012; Zhao et al., 2015) and four studies used the Perceived Stress Scale by Cohen et al (Cohen, Kamarck, & Mermelstein, 1983) (Al-Sowygh, 2013; Ersan et al., 2017; Garber, 2017; Hirsch et al., 2019). Two of these studies also used the Dental Environment Stress Scale (Al-Sowygh, 2013; Ersan et al., 2017; Grandy, 1984). Each of the following scales were used by one study: Index of Sources of Stress in Nursing (Gibbons, Dempster, & Moutray, 2009) (Gibbons et al., 2011), Medical Stress Scale (Vitaliano, Maiuro,

Mitchell, & Russo, 1989) (An et al., 2012), Professional Student Stress Survey (Murphy, Gray, Sterling, Reeves, & DuCette, 2009) (Madhyastha et al., 2014), Lipp Inventory for Stress Symptoms (Lipp, 2000) (Bassols et al., 2015), Instrument for Assessment of Stress in Nursing Students (Domingues Hirsch et al., 2015), Stressful Life Event Scale (Fornés-Vives et al., 2016), Nursing Education Stress Scale (Rhead, 1995) (Karaca et al., 2019). One study devised its own scale for assessing training stress (Rogers et al., 2016), while four studies did not use a stress scale (Imran et al., 2016; Masiak et al., 2014; Tada, 2017; Yamashita et al., 2012).

Diverse scales were used to assess coping strategies used. Ten studies used the Brief Coping Orientation to Problems Experienced (Brief COPE) Inventory (C. S. Carver, 1997) (Al-Sowygh, 2013; Ersan et al., 2017; Garber, 2017; Gibbons et al., 2011; Hirsch et al., 2019; Imran et al., 2016; Madhyastha et al., 2014; Tada, 2017; Yamashita et al., 2012; Zvauya et al., 2017) and five studies used the Coping Behaviour Inventory (Sheila Sheu, Lin, & Hwang, 2002) (Alzayyat & Al-Gamal, 2016; Gurkova & Zelenikova, 2018; Labrague, McEnroe-Petitte, Papathanasiou, et al., 2018; Shaban et al., 2012; Zhao et al., 2015). Each of the following scales were used by one study: Coping Response Inventory (Moos & Moos, 1988) (An et al., 2012), Coping Strategies Inventory (Savóia, Santana, & Mejias, 1996) (Bassols et al., 2015), Ways of Coping Questionnaire (Susan Folkman & Richard S Lazarus, 1988) (Domingues Hirsch et al., 2015), Coping Orientation to Problems Experienced (COPE) Inventory (Charles S Carver, Scheier, & Weintraub, 1989; Fornés-Vives et al., 2016), 15-item Coping Strategy Indicator (Amirkhan, 1990; Rogers et al., 2016), Coping Behaviour Inventory for Nursing Students (Karaca et al., 2019; Sheila Sheu et al., 2002), Coping Inventory for Stressful Situations (Endler & Parker, 2008) (Masiak et al., 2014).

Nine studies in this review included scales other than stress and coping scales. Five of these studies utilised the 12 item-General Health Questionnaire (GHQ-12) (Gibbons et al.,

2011; Imran et al., 2016; Tada, 2017; Yamashita et al., 2012; Zvauya et al., 2017) and two used the Generalised Self-Efficacy scale (Gibbons et al., 2011; Zhao et al., 2015). Other scales utilised include: Marlowe-Crowne Social Desirability Scale (Gibbons et al., 2011), Temperament and Character Inventory (An et al., 2012), Hamilton Rating Scale for Depression (An et al., 2012), Beck Depression Inventory (An et al., 2012), NEO Five Factor Inventory (NEO-FFI) (Fornés-Vives et al., 2016), Brief Life Events Questionnaire (Zvauya et al., 2017), Eysenck Personality Questionnaire (Zvauya et al., 2017), Physio-Psycho-Social Response Scale (Gurkova & Zelenikova, 2018), Short-Form 36 Health Assessment (Hirsch et al., 2019), Multidimensional Scale of Perceived Social Support (Karaca et al., 2019), Rosenberg Self-Esteem Scale (Karaca et al., 2019).

Primary Findings of the Review

Most Common Coping Strategies

Of the twenty-two studies included in this review, ten studies identified the most common coping strategies used by their sample of students (Al-Sowygh, 2013; Ersan et al., 2017; Fornés-Vives et al., 2016; Garber, 2017; Imran et al., 2016; Labrague, McEnroe-Petitte, Papathanasiou, et al., 2018; Shaban et al., 2012; Tada, 2017; Yamashita et al., 2012; Zhao et al., 2015). Problem-focused coping strategies were identified as common coping strategies in nine studies (Al-Sowygh, 2013; Ersan et al., 2017; Garber, 2017; Imran et al., 2016; Labrague, McEnroe-Petitte, Papathanasiou, et al., 2018; Shaban et al., 2012; Tada, 2017; Yamashita et al., 2012; Zhao et al., 2015). These included problem-solving (Labrague, McEnroe-Petitte, Papathanasiou, et al., 2018; Shaban et al., 2012; Zhao et al., 2015), planning (Al-Sowygh, 2013; Ersan et al., 2017; Garber, 2017; Imran et al., 2016; Tada, 2017), active coping (taking action to make the situation better) (Al-Sowygh, 2013; Garber, 2017; Imran et al., 2016) and instrumental support (seeking tangible assistance from others) (Yamashita et

al., 2012). Eight studies identified emotion-focused strategies as common strategies (Al-Sowygh, 2013; Fornés-Vives et al., 2016; Garber, 2017; Imran et al., 2016; Shaban et al., 2012; Tada, 2017; Yamashita et al., 2012; Zhao et al., 2015). These included acceptance (Al-Sowygh, 2013; Garber, 2017; Imran et al., 2016; Tada, 2017; Yamashita et al., 2012), self-distraction (Imran et al., 2016; Tada, 2017; Yamashita et al., 2012), staying optimistic (Shaban et al., 2012; Zhao et al., 2015), religion (Al-Sowygh, 2013; Imran et al., 2016), transference e.g. watching TV (Shaban et al., 2012; Zhao et al., 2015) and positive reframing (Imran et al., 2016).

Coping Based on Gender

Six studies included in this review found significant differences between gender and coping styles (Al-Sowygh, 2013; Ersan et al., 2017; Fornés-Vives et al., 2016; Labrague, McEnroe-Petitte, Papathanasiou, et al., 2018; Madhyastha et al., 2014; Masiak et al., 2014). Two studies found that females used social support-seeking coping strategies more than males (Madhyastha et al., 2014; Masiak et al., 2014), while another study found females used instrumental support more than males (Ersan et al., 2017). Males were found to use humour and self-blame strategies more than females in one study (Madhyastha et al., 2014).

Coping Based on Stage in Degree

Two studies evaluated differences between coping strategies in different degree years (Fornés-Vives et al., 2016; Hirsch et al., 2019) and one study investigated differences in coping between undergraduate and graduate-entry students (Zvauya et al., 2017). One study found coping changed positively during the degree programme, with an increase in problem-focused coping at the end of studies (Fornés-Vives et al., 2016). Another study found an increase in maladaptive coping across curriculum years (Hirsch et al., 2019). The study investigating differences in coping between graduate-entry and undergraduate students found

that graduate-entry students were more likely to use active coping, positive reframing and substance use strategies (Zvauya et al., 2017).

Coping in Relation to Living Area

Three studies in this review analysed coping strategy in relation to living area (Gurkova & Zelenikova, 2018; Labrague, McEnroe-Petitte, Papathanasiou, et al., 2018; Masiak et al., 2014). One study investigated students from Slovakia compared to students from the Czech Republic (Gurkova & Zelenikova, 2018). It found that Slovakian students used avoidance behaviours more frequently and problem-solving behaviours less frequently than Czech students. Another study investigated coping strategy differences in students from three different countries; Greece, the Philippines and Nigeria (Labrague, McEnroe-Petitte, Papathanasiou, et al., 2018). It found that the degree of stress experienced by students and their coping strategies differed based on country of origin. However, it also identified that the most common coping strategy across the three countries, problem-solving coping, was the same.

By contrast, another study investigated the coping mechanisms of students of rural and urban origin (Masiak et al., 2014). This study found no significant differences in coping strategies used by students of urban origin compared to those of rural origin. However, it found that students from big cities used task-orientated coping and avoidance strategies more often than those from smaller cities.

Coping Differences Between Students in Different Healthcare Courses

In this review, studies looked at healthcare students in different courses. Nursing students were found to commonly use acceptance (Tada, 2017; Yamashita et al., 2012), self-distraction (Tada, 2017; Yamashita et al., 2012), problem-solving (Labrague, McEnroe-

Petitte, Papathanasiou, et al., 2018; Shaban et al., 2012; Zhao et al., 2015) and planning (Tada, 2017) coping strategies. Similarly, medical students commonly used acceptance, self-distraction, planning and active coping (Imran et al., 2016). Dental students were found to use planning, active coping and acceptance most often (Al-Sowygh, 2013; Ersan et al., 2017), while pharmacy students commonly used active coping, acceptance and planning (Garber, 2017).

Coping Strategies and Their Relationship with Stress Levels and Health Outcomes

Most studies in this review investigated the relationship between stress levels or health outcomes and coping strategies. Four studies found that avoidance coping, a maladaptive strategy, was positively associated with stress levels (Alzayyat & Al-Gamal, 2016; An et al., 2012; Bassols et al., 2015; Labrague, McEnroe-Petitte, Papathanasiou, et al., 2018), even with studies using different stress scales such as the MSS (An et al., 2012), LISS (Bassols et al., 2015) and PSS (Alzayyat & Al-Gamal, 2016; Labrague, McEnroe-Petitte, Papathanasiou, et al., 2018). Furthermore, three studies found that students who employ avoidance coping were associated with having increased General Health Questionnaire (GHQ) scores (Gibbons et al., 2011; Karaca et al., 2019; Tada, 2017). GHQ is a measure of transitory distress and higher scores indicate increased risk of developing a temporary stress-related illness (Gibbons et al., 2011). One study also found that avoidance of stressful situations contributed to poorer student physical, psychological and social health (Gurkova & Zelenikova, 2018) and another found that students who were serious about dropping out of medicine displayed avoidance and risky behaviour coping (Rogers et al., 2016).

Behavioural disengagement and venting, maladaptive coping strategies, were found to be positively associated with stress levels in two studies (Al-Sowygh, 2013; Garber, 2017), with behavioural disengagement associated with high GHQ scores in two studies (Tada,

2017; Yamashita et al., 2012). Self-blame was positively associated with stress scores in one study (Garber, 2017) and increased GHQ scores in two studies (Tada, 2017; Yamashita et al., 2012). Denial was found to be positively associated with stress in one study (Al-Sowygh, 2013). Transference was found to be associated with higher stress scores in another study (Labrague, McEnroe-Petitte, Papathanasiou, et al., 2018). Denial, self-blame and using alcohol and drugs were found to be the main coping strategies of students who had GHQ scores greater than twenty in one study (Imran et al., 2016).

By contrast, two studies in this review found that active coping was negatively associated with stress levels and psychological distress (An et al., 2012; Tada, 2017), with one of these studies also finding that active coping was negatively correlated with GHQ score (Tada, 2017). Furthermore, in another study, active coping and acceptance were found to be negatively associated with GHQ score in those who had GHQ scores higher than 7/8 (Yamashita et al., 2012). Exercise was shown in two studies to be significantly associated with lower stress levels and distress (Garber, 2017; Tada, 2017) and one study found that students who exercise regularly had lower GHQ scores (Yamashita et al., 2012).

One study found that planning and problem-solving coping strategies were good predictors for dealing with stress (Domingues Hirsch et al., 2015). Another study found that problem-solving coping, along with transference and staying optimistic strategies, were used less in those with high GHQ scores than those with lower GHQ scores (Karaca et al., 2019). A reduction in GHQ scores has been seen in students who utilise support and dispositional control strategies (Gibbons et al., 2011), students who use reframing and humour strategies (Tada, 2017) and those who use religion as their main coping strategy (Imran et al., 2016).

Discussion

This review identified the coping strategies used by healthcare students and explored the

relationship between coping strategies and stress levels. An important finding of this review is that healthcare professional students use problem-focused coping strategies most often, with nine studies identifying problem-focused strategies as the most common strategies used. Problem-focused strategies are effective ways of dealing with stress as they target the root cause of stress, offering long-term stress relief (S. Folkman & R. S. Lazarus, 1988). This finding echoes that of a previous review (Labrague, McEnroe-Petitte, Al Amri, Fronda, & Obeidat, 2018), stating that nursing students employ problem-focused coping more than emotion-focused coping. Emotion-focused strategies were also commonly employed, as identified by eight studies. The emotion-focused behaviours common in the studies, including religion, staying optimistic and acceptance, are thought to be less-effective (S. Folkman & R. S. Lazarus, 1988) but not maladaptive.

It was found in this review that coping strategy can be influenced by demographic factors including type of student, living area and gender. Graduate-entry medical students were found to use different coping strategies than those employed by undergraduate students (Zvauya et al., 2017). This is line with other research that suggests more problem-focused coping strategies and less avoidance-focused strategies are used by older students, and older persons in general (Cabras & Mondo, 2018; Nieto et al., 2020). As the majority of studies in this review were cross-sectional in nature, likely due to the being a convenient method, it was only possible to consider variation in strategies over time to a small extent. This would be valuable as coping strategies change throughout the stages of life, as a result of changes in the body, individuals' personal skills, personal adaptations and socio-contextual influences (Aldwin, 2004; S. Folkman & R. S. Lazarus, 1988). There were two longitudinal studies which looked at students across degree years, it was found that coping strategies changed over time (Fornés-Vives et al., 2016; Hirsch et al., 2019). One of these studies found a shift towards more adaptive, positive coping strategies at the end of studies (Fornés-Vives et al.,

2016), while another found that more students were using maladaptive coping strategies in later years (Hirsch et al., 2019). The use of longitudinal studies may be helpful in detecting changes in coping over time.

Coping strategies also differ by living area, including differences between countries (Gurkova & Zelenikova, 2018; Labrague, McEnroe-Petitte, Papathanasiou, et al., 2018), living in a large or small city (Masiak et al., 2014). Even within a given community, differences in coping strategies employed have been observed in groups with differing ethnicities and cultures (Kuo, 2011). Gender differences were also shown to affect coping strategies used, with females using support-seeking measures more than males (Madhyastha et al., 2014; Masiak et al., 2014). This is likely due to females being more willing to ask for help, as identified by a study which found that men were less likely to seek help for psychological issues (Liddon, Kingerlee, & Barry, 2018). Knowing certain demographic factors of healthcare students may help to predict the type of coping strategies they employ.

This review confirms the expectation that maladaptive coping strategies lead to negative outcomes for stress and health. Although these maladaptive strategies are not the most employed coping strategies, their use is still prevalent in healthcare students. Evidence from the studies indicates that maladaptive coping strategies lead to higher stress levels (Al-Sowygh, 2013; Alzayyat & Al-Gamal, 2016; An et al., 2012; Bassols et al., 2015; Garber, 2017; Labrague, McEnroe-Petitte, Papathanasiou, et al., 2018), psychological distress (Gibbons et al., 2011; Karaca et al., 2019; Tada, 2017) and negative effects on physical and social health (Gurkova & Zelenikova, 2018). Comparatively, positive coping strategies were shown to reduce stress levels (An et al., 2012; Domingues Hirsch et al., 2015; Tada, 2017) and decrease mental distress (Garber, 2017; Gibbons et al., 2011; Imran et al., 2016; Tada, 2017; Yamashita et al., 2012). This emphasises the importance of healthcare students using

positive coping strategies during college, which can then be utilised in future careers to reduce stress experienced as professionals.

Positive coping mechanisms have been shown to have beneficial effects on stress and mental health in students (An et al., 2012; Domingues Hirsch et al., 2015; Garber, 2017; Imran et al., 2016; Tada, 2017; Yamashita et al., 2012). Through third-level institutions promoting the use of positive coping strategies, students will be better able to deal with stress, resulting in increased learning and positive effects on wellbeing. Furthermore, by identify coping strategies and demographic predictors, third-level institutions may design tailored coping measures and interventions. For example, exercise was shown to reduce stress levels (Garber, 2017; Tada, 2017) and colleges should implement strategies to promote exercise during degree programmes. Additionally, planning was a common coping strategy identified in this review (Al-Sowygh, 2013; Ersan et al., 2017; Garber, 2017; Imran et al., 2016; Tada, 2017). The use of this adaptive strategy could be promoted by third-level institutions giving students notice regarding examinations and assignments, allowing students to organise their time and create study plans.

Students who develop positive coping strategies will be able to implement these strategies as professionals, enabling them to effectively combat stress and provide quality healthcare to patients.

Limitations

Stress and coping are terms and concepts that are difficult to define precisely and thus result in multiple definitions and multiple differing means of measuring them. There were 11 different surveys used to measure stress in this review and nine different surveys used to measure coping strategies. There is a possibility that questions in each questionnaire may have been interpreted differently, meaning that coping strategies may have been judged

differently. The effect of this was not judged to be large as there was a large degree of consistency across studies. Heterogeneity could be further reduced in future studies with the use of fewer survey instruments. It must also be acknowledged that while every effort was used to include all relevant literature in this review, it is possible for studies that may have contributed to the review may have been missed.

Conclusion

It was identified in this review that healthcare professional students use a wide array of coping strategies, most commonly using problem-focused strategies aimed at reducing the source of stress. The use of positive, problem-focused strategies has been shown to reduce stress levels and psychological distress.

The authors recommend that third-level institutions design tailored interventions to promote the use of positive coping mechanisms in healthcare professional students. This would help decrease student stress levels and improve psychological health and well-being.

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None

Declaration of interest statement

Both authors declare no conflict of interest

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Database	Search Terms	Results
CINAHL	((MH "Students, Dental") OR (MH "Students, Medical") OR (MH "Students, Nursing") OR (MH "Students, Pharmacy")) AND (coping strategies or coping skills or coping or cope) AND stress	256
SCOPUS	(coping AND strategies AND (medical OR pharmacy OR dental OR nursing) students AND stress)	289
PubMed	(("Adaptation, Psychological"[Mesh]) AND ("Students, Health Occupations"[Mesh]) AND ("Stress, Psychological"[Mesh]))	286

Study	Country	Study Design	Sample	Measures/Instruments Used	Study Aim	Study Findings
Al-Sowygh 2013	Saudi Arabia	Cross-sectional; questionnaire	425 dental students	DES (modified), PSS, Brief COPE	Evaluate the causes of stress experienced by students in dental school, their perceived stress levels and effective coping strategies	• Strong positive correlation between "active coping and planning" and "use of emotional and instrumental support" • Behavioural disengagement, denial and venting showed a weak positive correlation with PSS
Alzayyat and Al-Gamal 2016	Jordan	Longitudinal; questionnaire	65 nursing students	PSS; CBI	Examine relationship between students' characteristics, their stress degrees, stressors and types of coping strategies used during psychiatric nursing training	• Students who utilised avoidance and transference strategies had higher stress levels • Students in fourth year, with a low family income, who did not participate in extracurricular activities, with a low academic grade or who registered in other clinical courses reported higher stress levels
An et al. 2012	South Korea	Cross-sectional; questionnaire and interview	157 medical students	MSS; Temperament and Character Inventory; Hamilton Depression scale; Beck Depression Inventory; Coping response inventory (Korean version); SCID-IV; MINI	Examine the association of various factors, including personality dimensions and coping strategies, with academic stress	• MSS score positively correlated with depression scale scores, novelty-seeking scores and avoidant coping strategy scores • MSS scores negatively correlated with self-directedness scores, cooperative scores, active-cognitive coping scores and active-behavioural coping scores
Bassols et al. 2015	Brazil	Cross-sectional questionnaire	232 first- and sixth-year medical students	Lipp Inventory for Stress Symptoms (LISS) and Coping Strategies Inventory	Assess prevalence of stress and coping in students, comparing groups from the first and sixth years of training	• Stress symptoms were significantly higher in the first-year group than the sixth-year group • Variables significantly associated with stress were year of the training, income, satisfaction with the training • Positive association between stress and use of an escape/avoidance coping strategy
Domingues Hirsch et al. 2015	Brazil	Cross-sectional; questionnaire	146 nursing students	Ways of Coping questionnaire; Instrument for the Assessment of Stress in Nursing Students (ASNS)	Identify predictors of stress and coping-strategies used by nursing students	• Causes of stress identified: professional education, acquired practical knowledge and free time and leisure. These were associated with denial and escape-avoidance strategies • Planning/problem solving aspect of coping: greatest predictor for dealing with stress
Ersan et al. 2017	Turkey	Cross-sectional; questionnaire	100 dental students	DES, PSS and Brief-COPE	Identify sources of stress among preclinical students and evaluate their perceived levels of stress, self-efficacy and effective coping strategies	• Most stress-provoking factor: workload • Most common coping strategy was planning • Female students utilised “Instrumental Support” more than males
Fornes-Vives et al. 2016	Spain	Two-wave longitudinal design; questionnaire	199 nursing students	Stressful Life Events Scale; NEO-FFI; COPE	Examine the main stress coping strategy in nursing students, its relationship with stressful life events and personality traits and changes during their academic training	• Dominant coping style: emotion-focused at beginning and end of studies • Found highly significant correlations between emotional coping and neuroticism personality trait • Coping, stress and personality changed positively during the training programme
Garber 2017	USA	Cross-sectional; questionnaire	298 pharmacy students	PSS; Brief COPE	Assess coping mechanisms used by pharmacy students and their relationship to perceived stress	• Most common coping strategies were active coping, acceptance and planning • Coping strategies of behavioural disengagement, venting and self-blame were associated with higher PSS scores • Exercise associated significantly with lower PSS scores
Gibbons, Dempster, and Moutray 2011	United Kingdom	Cross-sectional; questionnaire	171 nursing students	Index of sources of stress in nursing; Generalised Self-Efficacy scale;	Explore relationship between stress sources and well-being and consider how different sources	• Sources of stress leading to distress were more often predictors of well-being than were sources of stress likely to lead to positive states

				GHQ; Marlowe-Crowne Social Desirability; Brief COPE	of stress and coping strategies might act as moderators on well-being	• Self-efficacy, dispositional control and support were important predictors for stress • Avoidance coping: strongest predictor for worsening effects on wellbeing
Gurkova and Zelenikova 2018	Slovakia and Czech Republic	Cross-sectional; questionnaire	275 nursing students	PSS; Physio-Psycho-Social Response Scale; CBI	Investigate the relationship between supervision approaches in clinical practice, and nursing students' level of experience, perceived stress, coping strategies and physio-psychosocial status	• Slovak students subject to traditional supervision by nursing educators reported higher stress levels related to teachers, peers, lack of professional knowledge and skills • Slovakian students displayed higher frequency of avoidance strategies and less frequency of problem-solving behaviour
Hirsch et al. 2019	USA	Longitudinal (cohort); questionnaire administered over a five year period	145 pharmacy students	PSS; Brief COPE; Short Form 36	Examine perceived stress, coping strategies and health-related quality of life across pre-clinical years and investigate relationships among perceived stress, coping strategies and HRQOL	• Significant increase in PSS, increase in maladaptive coping and worsening in mental HRQOL was detected across curriculum years • PSS had a large negative correlation with Mental Component Summary for each curriculum year
Imran et al. 2016	Pakistan	Cross-sectional; questionnaire	527 medical students	GHQ-12; Brief COPE	Study the prevalence of psychological morbidity, sources and severity of stresses and coping strategies of medical students	• 52.3% of students in the study showed distress • Most common stressors involved academic concerns • Coping strategies showed variations by GHQ scores • Students with GHQ score >20 used self-blaming, denial and alcohol and drugs
Karaca et al. 2019	Turkey	Cross-sectional; questionnaire	516 nursing students	Nursing Education Stress Scale; CBI for Nursing Students; Multidimensional Scale of Perceived Social Support; Rosenberg Self-Esteem scale; GHQ	Investigate relationship between mental health of nursing students and stress experienced during nursing education, their coping strategies, self-esteem, social support and individual factors	• Those who had a high score from GHQ, had a higher score on NESS and "avoidance" coping strategy was employed more than low score group • Use of "remaining optimistic" "transference" and "Problem-solving" strategies was lower in GHQ high score group compared to low score group
Labrague, McEnroe-Petitte, Papathanasiou, et al. 2018	Multinational (Greece, Philippines and Nigeria)	Comparative, cross-sectional; questionnaire	547 nursing students (161 Greek, 153 Filipino, 233 Nigerian)	PSS; CBI	Determine levels of stress, sources and coping strategies among nursing students from three different countries	• Degree of stress, sources of stress and coping strategies differ based on the country that the student is from • Year of study predicted overall stress and advanced age predicted overall coping in nursing students • Most common coping strategy employed across the countries was "problem-solving" coping
Madhyastha, Latha, and Kamath 2014	India	Cross-sectional; questionnaire	94 medical students	Professional Students' Stress Survey, Carver's Brief COPE	Estimate the prevalence of stress and examine gender differences in stress experienced by medical students	• Academic performance and professional identity issues were identified as sources of stress • Females had more academic stress and used instrumental support seeking and emotional support seeking more than males • Humour and self-blame were used more by males
Masiak et al. 2014	Poland	Cross-sectional; questionnaire and semi-structured interview	570 medical students	CISS questionnaire and SCID-II semi-structured interview	Analysis of coping strategies and personality types of medical students of rural and urban origin	• Schizotypal, borderline and narcissistic personality types were most common in big cities, less in small cities, and the least among students of rural origin • Coping strategies based on avoidance and looking for social contacts were more common in females than males • Persons from big cities used task-orientated coping and distraction on a larger scale than those from smaller cities
Rogers et al. 2016	Australia	Cross-sectional; questionnaire	854 medical students and junior doctors	Three questions on dropout (one question analysed qualitatively); four item scale assessing training stress; 15-Item Coping Strategy Indicator	Assess differences in stress and coping strategies between those serious and not serious about dropping out of medicine	• Those serious about dropping out had high levels of training stress, displayed avoidance coping and engaging in risky behaviour, e.g. risky substance use, as a coping strategy • Males had high levels of risky behaviour coping

			(postgraduate years 1-4)			• Reasons for thinking about dropping out of medicine were professional fit, workload, work–life balance, and the medical education training system
Shaban, Khater, and Akhu-Zaheya 2012	Jordan	Cross sectional; questionnaire	181 nursing students	PSS; CBI	Identify the level and types of stress experienced by nursing students in their initial period of clinical training and to identify coping strategies employed that relieve their stress	• Sources of stress: assignment work and clinical environment • Most common coping strategy: problem-solving behaviour followed by staying optimistic and transferring attention from the stressful situation
Tada 2017	Japan	Cross-sectional; questionnaire	181 nursing students	GHQ-12; Brief COPE; health habits subscales	Evaluate the effect of health habits in the relationship between stress coping strategies and psychological distress in nursing students	• Psychological distress positively associated with avoidance coping and negatively associated with active coping, exercise and sleeping • GHQ-12 score positive correlation with disengagement, venting and self-blame and significantly negative correlations with active coping, reframing and humour
Yamashita, Saito, and Takao 2012	Japan	Cross-sectional; questionnaire	1324 nursing students	GHQ-12, Brief COPE (Japanese versions)	Describe the sources of nursing students' stress, examine coping styles and compare coping styles between distressed and non-distressed students	• Most common sources of stress: taking examinations, relationships with friends, engaging in clinical practice and presenting reports • Most common coping strategies: acceptance, self-distraction and using instrumental support • Self-blame, active coping, acceptance and behavioural disengagement were highly associated with GHQ responder (psychologically distressed group)
Zhao et al. 2015	China	Cross-sectional; questionnaire	221 nursing students	PSS; CBI and Generalised Self-Efficacy scale	Explore the coping strategies and the effects of self-efficacy of undergraduate nursing students when they face stress in clinical practice	• During clinical practice, assignments and workload were the most common sources of stress • Most common coping strategy: transference • Self-efficacy had a positive effect on the use of staying optimistic and problem-solving strategies
Zvauya et al. 2017	United Kingdom	Cross-sectional; questionnaire	410 medical students (64 graduate-entry; 346 undergraduates)	GHQ; PSS-10; Brief COPE; Brief Life Events Questionnaire; Eysenck Personality Questionnaire	Compare stress levels, psychological morbidity and coping styles in graduate entry vs undergraduate entry medical students	• Equally high levels of perceived stress and psychological morbidity in both groups • GE students more likely to use active coping, positive reframing and substances (alcohol and drugs) to help them cope

Key:
CBI: Coping Behaviour Inventory; CISS: Coping Inventory for Stressful Situations; COPE: Coping Orientation to Problems Experienced; DES: Dental Environment Stress survey; GHQ: General Health Questionnaire; HRQOL: Health-Related Quality of Life; LISS: Lipp Inventory for Stress Symptoms; MINI: Mini International Neuropsychiatric Interview; MSS: Medical Stress Scale; PSS: Perceived Stress Scale; SCID-IV/SCID-II: Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders