

Coping strategies of undergraduate students in health sciences: a
scoping review

By

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Declaration

I, Tlholohelo Kataza, declare that the Master's degree research dissertation that I herewith submit for the Master's Degree qualification in Nursing at the University of the Free State is my independent work, and that I have not previously submitted it for a qualification at another institution of higher education.

30 November 2022

T Kataza

Signature

Date

Acknowledgments

“Ebenezer - Thus far the Lord has helped me”

First and foremost, I would like to express my deepest gratitude to my Heavenly Father, through whom all of this was possible.

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“Ora et Labora”

Abstract

Introduction and background

Students enrolled at higher education institutions experience an immense amount of stress which may result in high drop-out rates. Stress is an integral part of everyday life. However, when stress accumulates over time and no effective coping strategies are applied to manage stress, it tends to disrupt the everyday functioning of an individual, negatively affecting their health, productivity, relationships, physical well-being, quality of life and academic performance. Students without adequate coping strategies and problem-solving skills are more vulnerable, as they are unable to use the resources at their disposal to find sufficient ways to cope with their problems. They are at risk of resorting to maladaptive coping strategies such as substance and alcohol abuse. Students in health sciences programmes enroll in both theoretical and practical modules, which include a high number of work-integrated learning hours. In addition to the heavy workload, students also often experience a negative clinical learning environment when placed for work-integrated learning. Therefore, these students need additional support to cope in an evolving healthcare environment. Despite higher education institutions claiming to have support strategies in place, a high drop-out rate is still experienced, with reports of maladaptive coping strategies. Students need adequate support and adaptive coping strategies to manage stressors encountered during training. Available literature can provide insight into such coping strategies to better support undergraduate students in health sciences.

Aim

This study aimed to explore the existing knowledge regarding the coping strategies of undergraduate students in health sciences programmes.

Methodology

The researcher used the nine-step scoping review framework by Peters *et al.* (2020a:412) as a guide to conduct this scoping review. Using boolean operators, the researcher and an information specialist searched for literature using fifteen databases. The screening process commenced with three individuals first reviewing the titles and abstracts, followed by the full-text articles.

From the initial 1432 records, a total of 319 full-text articles were screened according to the inclusion and exclusion criteria. One hundred and sixty three full-text articles did not meet the inclusion criteria and were excluded. Thus, 156 articles were included in the study. The data were then extracted using Google forms and transferred onto a Microsoft Excel spreadsheet. Data were analysed and coded. Similar codes were grouped into categories presented in tables and figures.

Results

The main findings of this review indicate that most studies on the coping of undergraduate students in health sciences programmes were conducted in high-income countries with a lack of literature for the African context. Majority of the literature referred to the nursing and medical profession, and a lack of research on other health sciences professions such as dentistry, dietetics, sport and exercise science, occupational therapy, optometry, paramedicine, pharmacy, physiotherapy and radiography were noted. Only nine of the included studies reported on theoretical underpinnings, models and frameworks. Emotion-focused coping strategies were mostly used by students to cope with the stressors they encountered. Most studies were descriptive in nature, conducted in a single site, with limited intervention studies. Most of the articles did not report on the sampling techniques used to select participants.

Conclusion

It is imperative for Health Sciences Education Institutions to develop support programmes to assist students in coping effectively with the stressors they encounter. The findings of this scoping review indicate a need for further research on the coping of undergraduate students in health sciences, especially focusing on all healthcare professions implementing such strategies. Suggestions to train nurse educators and clinical facilitators on providing adequate support for students to enable them to cope efficiently are among the recommendations of this study.

Keywords

Coping strategies, higher education, health sciences stress, undergraduate programmes.

Abbreviations/Acronyms

Abbreviations/Acronyms	Description
AFSP	American Foundation for Suicide Prevention
APA	American Psychological Association
CLE	Clinical Learning Environment
HEI	Higher Education Institution
HSREC	Health Sciences Research Ethics Committee
HSEI	Health Sciences Education Institution
HPSCA	Health Professions Council of South Africa
NEI	Nursing Education Institution
SADAG	South African Depression and Anxiety Group
SANC	South African Nursing Council
SAPC	South African Pharmacy Council
SPRC	Suicide Prevention Resource Center
UFS	University of the Free State

Concept clarification

This study makes use of a number of concepts that should be clarified for the reader. These concepts include coping strategies, health sciences and undergraduate health sciences students. The researcher further operationalises the concepts by stating how they will be applied in the current study, as stated by Botma *et al.* (2010:56-57). The concepts used in this study will be presented in alphabetical order.

Coping strategies

Smith *et al.* (2016:318) define coping strategies as the "cognitive and behavioural efforts to modulate internal and external demands, appraised as exceeding personal resources." In return, coping styles are strategies that people use in the face of stress, and how they react to and handle difficult situations (American Psychological Association [APA], 2019a; Baqutayan, 2015:484-485). Coping strategies help people to adjust to stressful events (Amanya *et al.*, 2017:4-6; APA, 2019a). Different people have different ways of coping with stress, and these may be both adaptive and maladaptive. Maladaptive coping strategies include denial, aggression, excessive substance abuse, emotional numbing, avoidance and social withdrawal. Adaptive strategies include seeking social support, prayer, exercise and finding ways to solve the problem (Baqutayan, 2015:484-485). For this study, coping strategies refer to the adaptive or maladaptive ways in which health sciences students attempt to manage the stressful situations they encounter throughout their undergraduate years of study such as academic, social, emotional, financial and clinical practice-related stressors.

Health sciences

Health sciences are the study, research, and gaining and applying of knowledge of health in order to improve health, cure diseases and understanding how humans function (Dewey, 2016:online; SANC, 1995:online; ScienceDaily, 2019:online). For this study, health sciences include professions such as dentistry, dietetics, sport and exercise science, medicine, nursing, occupational therapy, optometry, paramedicine, pharmacy, physiotherapy and radiography.

Undergraduate health sciences student

An undergraduate health sciences student is any person who is enrolled at a higher education institution (HEI) for a health sciences programme (HPCSA, 2008:21-58; South Africa, 2018:2). Such a student performs any professional actions under the direct supervision of a qualified healthcare practitioner (HPCSA, 2008:21-58; SAPC, 2020:online). For this study, an undergraduate health sciences student is a person who is enrolled in an undergraduate health sciences programme at an HEI.

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Chapter 1 Overview of the study

1.1. Introduction and background

Many students experience an immense amount of stress when enrolled at a higher education institution (HEI), which may result in significant drop-out rates (Stăiculescu & Richițeanu-Năstase, 2018:72-24).

A recent study revealed that the dropout rates in South African Universities is extremely high, as about 50-60% of students drop-out in their first year at university (Dyomfana, 2022:online; Karimi, 2022:online). A local news report highlights that out of a 100 matriculants who gain access to a HEI, only six graduate (Dyomfana, 2022:online). Another study revealed that six out of ten students who are enrolled at an HEI would not graduate, even after being at an HEI for six years (Nadworny, 2019:online). This evidence is indicative that students are unable to cope with the stressors they face at HEIs, which contribute to the high drop-out rates (Karimi, 2022:online; Nkosi, 2015:online), resulting in financial implications.

The National Treasury annually issues grants and subsidies to students to the value of R4,5 billion, but due to the high drop-out rate, there is no return on investment, which in turn negatively impacts the country's economy (Moodley & Singh, 2015:93). Unemployment is a global challenge and an even greater challenge in South Africa with its unemployment rate of 30,8%. Students dropping out of HEIs also contribute to the alarming unemployment rate in South Africa (Du Toit *et al.*, 2018:1; Eyewitness News, 2020). As students continue dropping out of HEIs it creates a visible shortage in the number of skilled professionals in a country (Larsen *et al.*, 2013:6-7). Stressors to students that might contribute to the worrying drop-out rate are not only academic in nature but have also been identified as financial and social, including the inability to find and utilise the necessary support services (Majiet, 2018:online; Ndlazi, 2018:online). Some students who experience HEIs as stressful may either drop out or resort to adaptive or maladaptive strategies such as substance abuse. Several of them even commit suicide as a last resort (Oduaran & Akanni, 2019:17; Sawahel, 2019). However, stress is not always perceived as bad (Pietrangelo & Watson, 2019).

Moderate amounts of stress allow human beings the ability to function at their full capacity (Aschbacher *et al.*, 2013:1700; APA, 2019b). Furthermore, stress is what keeps everyone on their toes. However, when stress builds up over time, and a person does not develop appropriate coping strategies, it is no longer considered to be helpful as it begins to take its toll on an individual's health, mood, productivity, relationships, physical wellbeing and quality of life. This, in turn, can have a disruptive effect on the typical day-to-day activities of students (Segal *et al.*, 2019:online; Shahsavarani *et al.*, 2015:230).

Literature has highlighted that stress forms part of a student's life at an HEI (Oduaran & Akanni, 2019:17; Ribeiro *et al.*, 2017:2). Eight out of ten students enrolled at an HEI in the United Kingdom were diagnosed with stress and anxiety (Szteliga, 2018:online). It seems that a large portion of HEI students cannot cope with the excessive stress related to their studies (Amanya *et al.*, 2017; Reddy, Menon & Thattil, 2018:531). In addition, students are reported to be overwhelmed by a new environment, and having to engage with unfamiliar people of a different race, culture, religious background, and social and financial status (College Parents of America, 2019:online; Bashir *et al.*, 2019:5-6). Being in a new environment and meeting new people may lead to increased temptations and a swift transformation in their value system, which may lead to the development of harmful coping strategies (Suicide Prevention Resource Center [SPRC], 2014:online).

Students who enter the HEI setting without adequate coping strategies and problem-solving skills are more vulnerable, as they are unable to use the resources at their disposal to find effective ways to cope with their problems. This may lead to mental health issues (South African Depression and Anxiety Group [SADAG], 2018:online). According to literature, students who lack the necessary coping strategies tend to resort to maladaptive coping strategies such as substance abuse and alcohol consumption to ease their levels of stress (Bohn, 2017:online). Studies by Leonard *et al.* (2015:5-11) and Reddy *et al.* (2018:532) concur with the previous authors, indicating that 38% of students at HEIs admitted to using an illegal substance, and 34% of those students also admitted to consuming alcohol to the point of intoxication, which then lulls them into perceiving that they can effectively handle the stressors they

encounter at HEIs. Shockingly, suicide is one of the major causes of death among HEI students worldwide (Farabaugh *et al.*, 2015:78).

Globally, HEIs have been forced to confront the ongoing crisis of students attempting to or committing suicide (Sawahel, 2019:online). SafeColleges (2019:online) reveal that in the United States, suicide is the second-highest cause of death among college and university students. The high suicide rate can be due to the vast range of challenges HEI students are faced with, such as academic challenges, adapting to a new environment and financial stress (Dachew *et al.*, 2018:1-2). Annually, one thousand students commit suicide on HEI campuses in the United States, and more than 80% of the students who committed suicide were not making use of the available support services at their HEIs (SafeColleges, 2019:online). In the United Kingdom, one HEI student commits suicide every four days, with male students being the majority (TopUniversities, 2018:online). Suicide among students is a major concern in Africa as well.

A local news report from Kenya stated that twenty HEI students committed suicide between 2014 and 2018 (Sawahel, 2019:online). A study conducted in Ethiopia recorded that one in five students admitted that they had suicidal thoughts (Dachew *et al.*, 2018:1-2). TimesLive reports that South Africa has the eighth-highest suicide rate in the world, and young adults are the highest risk group for this (Govender, 2017:online). In 2018, the University of Witwatersrand reported that three students had committed suicide in that year (Sobuwa, 2018:online). A student from the Central University of Technology in Bloemfontein, South Africa, chose to end his life by jumping off a building in the same year (Malingo, 2018:online). One reason for this extreme behaviour may be the immeasurable amount of stress, and often unrealistic expectations related to academic performance, which increase as students progress through their years of study. This stress is exacerbated if students don't implement appropriate support strategies (Hill *et al.*, 2018:1; Monama, 2019:online).

Students often find themselves overwhelmed with anxiety, and the pressure becomes so great that they are unable to cope. Some of them eventually commit suicide as a way to escape (SADAG, 2018:online). Throughout their training, health sciences students face several additional stressors in addition to the stress faced by other HEI students. Most of this stress can be attributed to the increased clinical workload they

are faced with in relation to other non-clinical professions (Balapala & Indla, 2017:99; Govender, 2017:online).

Health sciences programmes have a strong aspect of theoretical and practical integration (Salifu *et al.*, 2019:72-83; Farzi *et al.*, 2018:1). Students are placed in clinical facilities as part of their work-integrated learning (Govender *et al.*, 2015:34-35). As part of their daily duties in work-integrated learning when placed in clinical facilities, health sciences students can experience a vast range of emotions. They encounter negative experiences while in the clinical environment, which may include tragic illnesses or trauma which leads to the death of patients (Morgan, 2015:online; Weurlander *et al.*, 2018:75). Health sciences students come across ethically ambiguous situations when attending to patients, rude behaviour from other members of the healthcare team, and errors related to patient management, all of which create a negative clinical learning environment (CLE) (Weurlander *et al.*, 2018:78). A negative CLE impedes students' motivation to transfer their learning, which consequently affects their competence (Botma *et al.*, 2015:499-500). Farzi *et al.* (2018:1-3) concur that increased stress levels in the CLE impair students' learning and performance. It is imperative that students be equipped with sufficient coping skills in order to promote the transfer of learning despite the stressors they encounter during their training (Sattar *et al.*, 2022:2).

The majority of HEIs state that they offer psychological support services that their students can access (Julal, 2013:420; American Foundation for Suicide Prevention (AFSP), 2017:online). However, it seems that students are not utilising such support systems (Perry *et al.*, 2020:616; Rhodes University, 2018:online). One reason may be that students are not aware of such services (Perry *et al.*, 2020:616-617). Other possible reasons for students not seeking help from available support services may be their own perception of what it means to be diagnosed with a mental health illness (Caddell, 2019:online) or not being able to cope, the negative perceptions related to mental illnesses in society (Ciobanu, 2013:172:online ; Wolf, 2018:online), or even the fear of being found out that they have mental health issues (Rhodes University, 2018:online). Students entering HEIs after previously being diagnosed with mental health illnesses, face an additional set of challenges with regard to coping, which might lead to using adaptive and maladaptive coping strategies (Royal College of

Psychiatrists, 2011:19-20). Maladaptive coping strategies include excessive alcohol consumption, smoking, eating disproportionately, partying every night, and channelling frustration in the form of anger toward others (Yikealo & Tareke, 2018:7-10). In addition, students who enter HEIs with poor coping skills are more likely to develop mental health issues due to the academic and clinical stressors they encounter throughout their years of study (Pedrelli *et al.*, 2015:504-505)

It seems that students may lack the necessary knowledge related to coping strategies, managing mental health issues and the supportive services that most HEIs offer (Goodman, 2017:31-34). Studies reveal that even developed countries face challenges with mental health care, as only 24% of students receive the treatment they need with regard to mental health. In developing countries, only 8-11% of students receive the necessary mental health care. Students who do not receive adequate treatment for mental health illnesses are at risk of dropping out, which causes an additional burden to themselves, their families, as well as the HEI itself (Bashir *et al.*, 2019:5-7; Rhodes University, 2018:online).

Identifying and applying effective coping strategies is crucial for any undergraduate health sciences student. When stress is allowed to expand to excessive levels, it can have a harmful impact on a person's emotional wellbeing and may lead to anxiety, depression and even suicide as a last resort (Campus Mind Works, 2019:online). Increased stress levels may cause harm to an individual's physical functioning, and prevent the student from functioning at maximum capacity physically (Pietrangelo, 2020:online). Adequate stress management in the early stages is important as it can help students to have a complete varsity experience (Lavhelani *et al.*, 2020:138; Malik, 2018:online). Students in the health sciences are the future of healthcare, so effective coping strategies are necessary to be able to deal with the stressors they face (Balapala & Indla, 2017:99; Govender, 2017:online).

It would seem that, despite all the recommendations that previous research has generated on the coping strategies of undergraduate health sciences students and the implementations that are made, undergraduate health sciences students still seem not to be coping. Therefore, this scoping review aimed at exploring the coping strategies of undergraduate health sciences students from the body of knowledge that exists to

identify key concepts, knowledge gaps, and underpinning theories supporting the coping strategies, to mention a few.

1.2. Problem statement

The World Health Organization reports on a shortage of health care workers, particularly nurses and midwives who make up 50 % of the shortage noted in health care workers (WHO, 2022:online). Another study indicates a shortage of medical doctors where approximately 6.4 million doctors are needed to address the ongoing physician shortage (Payerchin, 2022:online). Therefore, health sciences education institutions should do their best to support their students. Nkutu and Seekoe (2018:80) reveal that students are dropping out of health sciences faculties, which contributes to the existing shortage of health professionals.

Although stress is seen as part of the everyday life of undergraduate health sciences students, it remains important to establish current and adequate coping strategy practices that may assist them in coping with the large amounts of stress experienced both academically and clinically (Szteliga, 2018:online). It is stated that health sciences students experience more stress than other non-clinical professions students (Hill *et al.*, 2018:1; Zivanovic *et al.*, 2018:179). When a student struggles to cope academically, the chances of dropping out increase (Vergel *et al.*, 2018:1) despite available resources.

Worldwide, HEIs have recognised and implemented functional support systems to assist students with their academic and personal needs, which include financial support, counselling services, learning support and healthcare services (Muzanechita, 2022:online; Shabani and Maboe, 2021:26). Higher Education Institutions are constantly reminding students of the resources available to them to cope with stress (Anderson, 2019:online). However, it seems as if students do not always make use of these services during times of stress and distress (Johnson *et al.*, 2022:1-2; Simpson & Ferguson, 2014:1-2).

A wide spectrum of literature exists on the coping strategies of undergraduate health sciences students. The majority of HEIs, both locally and globally, have support services in place to assist students with coping. However, Johnson *et al.* (2022:1-2) reported 90% of students experience various stressors, but only 15% made use of the

student support services available at the HEI. Also, it seems as if students still resort to maladaptive coping strategies (Govender *et al.*, 2015:34-35). A significant amount of literature is available on the coping strategies of undergraduate health sciences students; however, the researcher could not find a scoping review on the coping strategies of undergraduate health sciences students. The researcher chose a scoping review, as this type of review would enable her to map out literature on the coping strategies of undergraduate health sciences students and identify key concepts and gaps that exist regarding the coping strategies of undergraduate health sciences students.

1.3. Review question

Pollock *et al.* (2020: 2106) report that one of the most important aspects of producing a scoping review is the formulation of a review question. The review question is related to the overall objective of the review (Pollock *et al.*, 2020:2106).

The review question which guided this study was:

What is known from literature regarding the coping strategies of undergraduate students in health sciences programmes?

1.4. Review aim

This study aimed to explore the existing knowledge regarding the coping strategies of undergraduate students in health sciences programmes.

1.5. Conceptual framework

Lobiondo-Wood and Haber (2018:509) define a conceptual framework as a group of interlinked concepts that represent a phenomenon in research. The conceptual framework (in Figure 1.1) represents the systemic model of transfer of learning as adopted from Botma *et al.*, (2013:39) and Donovan and Darcy (2011:online). It explains the relationship between student characteristics, educational design, transfer climate, clinical facilitator support and the work environment on students' motivation to transfer learning. The systemic model of transfer of learning assists the researcher in answering the research question which is: What is known from literature regarding the coping strategies of undergraduate students. Students often enter an HEI with an

inadequate set of coping strategies (Pather *et al.*, 2017:163-165) and poor time-management skills (Van der Meer *et al.*, 2010:786-788), which falls under student characteristics in the systemic transfer of learning model.

This lack of coping strategies and time-management skills make it difficult for undergraduate students to handle the stress from the academic content as well as the challenges they face during their work-integrated learning (Pather *et al.*, 2017:163-165). If an educational design is poorly formulated and students feel overloaded by the amount of content that is covered in a short period, it impedes their motivation to transfer their learning as they are unable to cope.

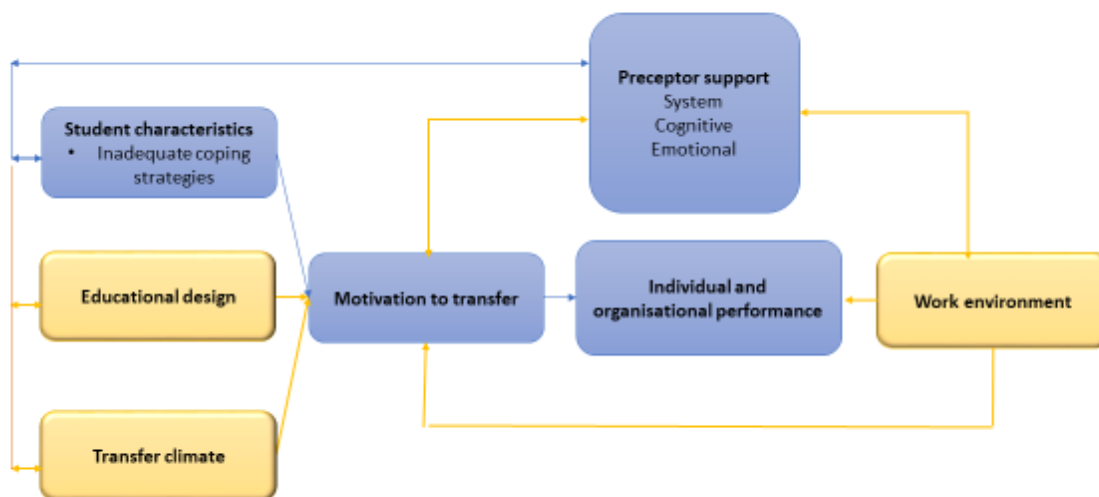


Figure 1.1: The adapted systemic model for the transfer of learning (Botma *et al.*, 2013:39)

Similarly, if the transfer climate is not conducive, such as an unfriendly and hostile attitude of staff towards students (Jamshidi *et al.*, 2016:3), it may leave them feeling stressed and demotivated to learn (Baraz *et al.*, 2015:2). The clinical working environment can also impact on the students' ability to transfer their skills as practiced at the HEI. Students often experience a mismatch between what is taught in the classroom and what is being done by healthcare professionals in the clinical setting due to a lack of adequate consumables and equipment in the clinical setting

(Jahanpour *et al.*, 2019:401). This in turn causes learning confusion and creates stress and frustration within students (Gemuhay *et al.*, 2019:5). Clinical facilitators are employed by HEIs to support students' learning in clinical settings. However, clinical facilitators may fail in supporting the students as they are often just monitoring them and are untrained in accompaniment (Hugo & Botma, 2019:198). This leaves students stressed and unsupported, which has a negative impact on their ability to transfer learning (Hugo & Botma, 2019:198).

1.6. Scoping review methodology

The Canadian Institutes of Health Research (in Peters *et al.*, 2020b:2121) define scoping reviews as “exploratory projects that systematically map the literature available on a topic, identifying key concepts, theories, sources of evidence and gaps in the research”. This study presents a scoping review to identify the body of knowledge which exists on the coping strategies of undergraduate health sciences students. For the purpose of this research, the researcher made use of the nine-stage scoping review framework by Peters *et al.* (2020a:412), as depicted in Figure 1.2, to guide the study.

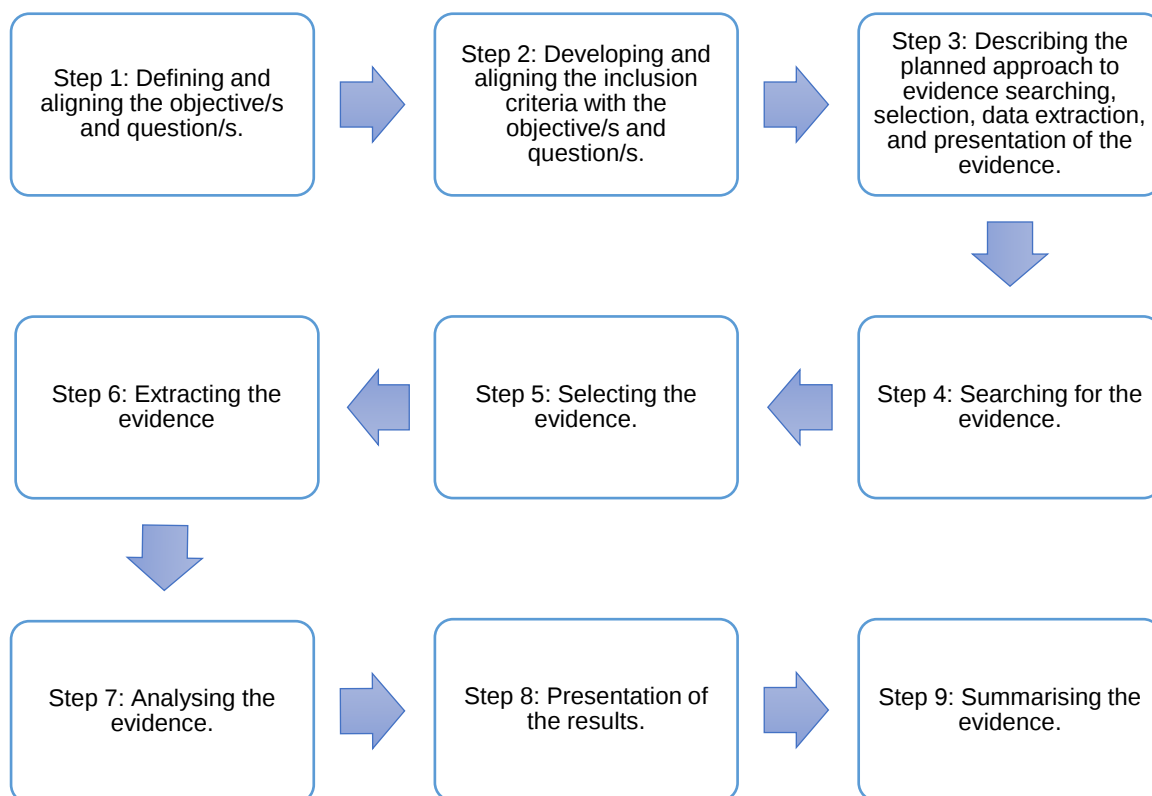


Figure 1.2: Scoping review framework by Peters et al. (2020a:412)

More detail on a scoping review and the framework will be unpacked in Chapters 2 and 3. At this point, the researcher will give an overview of the research process followed, as seen in Figure 1.2 above.

1.7. Scoping review framework

For this research, the researcher used the nine-step framework by Peters *et al.* (2020a:412).

1.7.1. Step 1: Defining and aligning the objective/s and question/s

Peters *et al.* (2020b:2122) state that the review question should be aligned with the title of the study, and guide the generation of the inclusion criteria. To facilitate this

integration, the elements of the PCC mnemonic were used. Table 1.1 describes the PCC applied to this study.

- P (Participants) - specific important characteristics of the review's participants (population)
- C (Concept) - intervention, phenomenon of interest, or outcomes
- C (Context) - varies depending on the objective and question(s), and may include details regarding geographic location and/or specific social, cultural, or gender-based factors

A clear scoping review question that incorporated the elements of the PCC guided the development of the inclusion criteria, facilitated the literature search, and provided a vigorous structure for the development of the scoping review (Peters *et al.*, 2020b:2122).

Table 1.1: The PCC applied to the study

Participants	Undergraduate students
Concept	Coping strategies
Context	Health sciences

The researcher was able to derive the following research question based on the PCC formulation in Table 1.1:

- What is known from the literature regarding the coping strategies of undergraduate students in health sciences programmes?

Only articles from the year 1990 onward were included, as the exploratory search indicated that literature on the coping strategies of health sciences students began from the 1990s. In this study, articles from 1 January 1990 until 31 December 2020 were included to ensure that sufficient data were obtained.

1.7.2. Step 2: Developing and aligning the inclusion criteria with the objective/s and question/s

According to the Joanna Briggs Institute (JBI) (2015:9), the inclusion criteria determine which articles are included in the study. There should be an alignment between the title, research question, and the inclusion and exclusion criteria of a scoping review

(JBI, 2015:9; Peters *et al.*, 2020b:2122). Table 1.2 summarises the inclusion and exclusion criteria that were used to select articles in this study and to facilitate the alignment of the study.

Table 1.2: Inclusion and exclusion criteria

	Inclusion Criteria	Exclusion Criteria
Sources	Electronic databases of the University of the Free State (UFS) library	Articles unobtainable through the UFS library
Participants	Undergraduate students	Post-graduate students
Area of focus	Coping strategies	Other areas and articles focusing on coping strategies related to the COVID-19 pandemic
Time frame	Articles from the year 1990	Articles before the year 1990
Context	Health sciences	Higher education, schools

Articles were searched on the electronic databases of the UFS library, and articles that could not be obtained through the library were not included. Only articles focusing on the coping of undergraduate health sciences students were included, while those on post-graduate students were excluded. Literature highlights that health sciences student's experienced increased levels of stress during the COVID-19 pandemic as opposed to before the pandemic (Awadalla *et al.*, 2022:6; Broks *et al.*, 2022:6-8). Therefore articles on the coping strategies of students during the COVID-19 pandemic were also excluded, as the researcher intended to examine the literature available on the coping strategies of students irrespective of the pandemic, so as to examine whether the existing support services available for students pre-pandemic were effective. The selection of the articles based on the inclusion and exclusion criteria is described in Chapter 2. The section below describes the planned approach to searching, selecting, extracting and presenting the data.

1.7.3. Step 3: Describing the planned approach to evidence searching, selection, data extraction, and presentation of the evidence

Scoping reviews begin with an *a priori* protocol, which details how each step of the framework is to be used (Sargeant & Connor, 2020:2). The researcher used the nine steps of a scoping review framework to conduct the research (Peters *et al.*, 2020a:412). The researcher began writing this research proposal during the year

2020. It was registered on the Open Sciences platform after a committee evaluated its quality and after obtaining ethical clearance (UFS-HSD2021/0084/2505). The next section entails how the researcher searched for data.

1.7.4. Step 4: Searching for the evidence

The approach to searching for studies for this scoping review followed the same three-step method as for standard JBI systematic reviews as described by Khalil *et al.* (2016:3). The researcher and an information specialist conducted an exploratory search on two online databases to determine the extent of the literature available on the research topic. The outcome of this assisted the researcher in refining the inclusion and exclusion criteria. Using the PCC mnemonic, the researcher formulated the search string used in this study as shown in Table 1.3.

Table 1.3. Search string

Participants: undergraduate students	(freshman* or freshmen* or "first year" or undergrad* or student* or sophomore*)
Concept: Coping strategies	(cope or coping)
Context: health sciences	("Health Science*" or medicine or medical or nursing or "occupational therap*" or pharmac* or optometr* or physiotherap* or "physical therap*" or paramedic* or biokinetic* or dietetic* or dental* or dentis*)

The researcher made use of fifteen electronic databases with the assistance of the information specialist at the Faculty of Health Sciences, UFS. A description of the data selection process follows.

1.7.5. Step 5: Selecting the evidence

According to the Joanna Briggs Institute [JBI] (2015:9), the inclusion criteria determine which articles are included in the study. There should be an alignment between the title, research question, and the inclusion and exclusion criteria of a scoping review (JBI, 2015:9; Peters *et al.*, 2020b:2122). Table 1.2 summarises the inclusion and exclusion criteria that were used to select articles in this study. Chapter 2 provides a detailed explanation of the selection of evidence.

Peters *et al.* (2020b:2124) mention that all the articles used in a scoping review must be reported on. Using the Systematic Reviews and Meta-Analyses extension for Scoping Review (PRISMA-ScR) flow diagram (Prisma, 2021:online), the researcher was able to determine the number of studies to be included.

1.7.6. Step 6: Extracting the evidence

The extraction of data for a scoping review is referred to as 'charting the data' and presents a logical and descriptive summary of the results that align with the research question of the study (Peters *et al.*, 2020b:2124). There are various options for charting the data, such as using a tabular format, diagrammatic format or a descriptive format that aligns with the objective and the scope of the review (Peters *et al.*, 2020b:2125). The researcher extracted the data using Google forms, after which the data were converted to an Excel spreadsheet. The extracted data were verified by the supervisors, as explained in Chapter 3. Data analysis follows on data extraction.

1.7.7. Step 7: Analysing the evidence

Peters *et al.* (2020b:2125) report that the planned approach to data analysis should be clearly stated in the protocol, to ensure transparency and justification of the chosen method. The author chooses a data analysis method best suited to the research objective (Peters *et al.*, 2020b:2125). The researcher decided to code the data and group similar codes into categories. In Chapter 3, the researcher presents the analysed data in the form of tables or charts to note the frequencies in each category. How the data were presented follows below.

1.7.8. Step 8: Presentation of the results

When conducting a scoping review, the results can be presented as a 'map' of the data in a logical, diagrammatic, or tabular format and/or in a descriptive narrative format that is in alignment with the research question. The table or diagram should contain the information obtained in the extraction table (Peters *et al.*, 2020b:2125).

A narrative summary should accompany the tabulated and/or charted results, and describe how the results relate to the research question (JBI, 2015:15). The reviewer therefore made use of a table to display the results obtained in the extraction sheet in

a detailed format. The table was formulated by the researcher once the process of analysing the data had been completed. Presenting the results in a suitable and detailed format allows the reviewer to identify gaps in the literature and map the available evidence (Peters *et al.*, 2020b:2125). The next step entails how the researcher planned to summarise the evidence.

1.7.9. Summarising the evidence

The key findings from each category will be evident after the data presentation, making it easier to identify any gaps in the literature.

The researcher aimed to disseminate the findings from the scoping review in the form of recommendations to HEIs, particularly the Faculty of Health Sciences at the UFS, which could guide policy changes regarding the coping strategies of health sciences students. The outcome of this review includes recommendations for further research on the coping strategies used by health sciences students at HEIs. This will be elaborated on in the final chapter, Chapter 4. The researcher elaborates on how rigour was ensured in the next section.

1.8. Rigour

In a scoping review, rigour is ensured by the researcher following the nine steps of a scoping review framework by Peters *et al.* (2020a:412). The four criteria for ensuring rigour in a study, identified by Botma *et al.* (2010:292) and applied in this study, are truth value, applicability, consistency and neutrality.

1.8.1. Truth value

Truth value means that the data on which the researcher reports are the actual views of the participants or the knowledge they have regarding the relevant topic (Botma *et al.*, 2010:292). The researcher made use of a detailed record (PRISMA-ScR available at Prisma, 2021:online) of the abstracts and titles and full-text articles that met the inclusion criteria, as well as the articles that were excluded. The reviewed abstracts, titles and articles were reviewed by the researcher and her two supervisors. Once this process was complete the researcher and her two supervisors then discussed the final

selection. Additionally, the information extracted by the researcher was verified by the supervisors.

1.8.2. Applicability

Applicability refers to how data can be transferred from one context to another (Botma *et al.*, 2010:292). A detailed description of the nine steps of a scoping review by Peters *et al.* (2020a:412) was given. The study included articles that met the inclusion criteria, as stated in Table 1.2.

1.8.3. Consistency

Consistency implies that the quality of the results from the collected data remains the same, irrespective of the time of data collection or the conditions under which data were collected (Botma *et al.*, 2010:292). The nine steps of a scoping review by Peters *et al.* (2020a:412) were followed to further ensure consistency. The search method was followed as explained above, and the review was done by the researcher and her two supervisors. The inclusion criteria were applied to select the relevant articles.

1.8.4. Neutrality

Neutrality refers to the ability of a particular study to be replicated by other researchers, and obtaining the same research results (Polit & Beck, 2017:559-560). Although the researcher does not have any preconceived ideas or hypotheses regarding the study, mechanisms were put in place to prevent bias, which included the following:

- Three reviewers consisting of the researcher and her two supervisors, were used to enhance neutrality
- The framework provided by Peters *et al.* (2020a:412) was followed, which allowed the researcher to remain objective throughout the study
- The researcher was guided by a research question to search for information on specific information databases for the participants, concept and context as elaborated upon in the PCC mnemonic in the research design and method as suggested by Dogson (2017:115)
- Data were charted *literatim*. Therefore, the authors' voices were captured, and categories were reported with citations.

1.9. Ethical considerations

Research ethics deals with beliefs and morals regarding what is right and wrong (McMillan & Schumacher, 2014:129). Although this study did not involve human participants, ethical principles need to be adhered to when conducting research in any form. The researcher adhered to the ethical underpinnings of respect, justice and veracity during the research process. These principles are important as they are essential in any research, even in studies which do not involve any human participants. Addendum A presents the ethics clearance from the Health Sciences Research Ethics Committee (HSREC) at the UFS.

1.9.1. Respect

Respect for persons in research involving human participants means adhering to the principles of confidentiality and anonymity of the participants involved in the data gathering process (Botma *et al.*, 2010:17). However, since this study did not involve human participants, the researcher ensured respect by acknowledging the authors of the various articles from which the data were collected by referencing each author's work during the data analysis process.

1.9.2. Justice

Justice implies that the participants in research should be treated fairly (Polit and Beck, 2017:141). The participants in this study were literature sources, therefore, the researcher enhanced justice by clearly stating the inclusion and exclusion criteria. Articles meeting the inclusion criteria had a fair chance of being included in the study, as elaborated by Polit and Beck (2017:141). The search for articles was guided by an information specialist at the library of the Faculty of Health Sciences at the UFS.

1.9.3. Veracity

Veracity refers to the truth or telling the truth (Botma *et al.*, 2010:26). The researcher enhanced veracity by not fabricating or misinterpreting any data, and an accurate record was kept through the PRISMA-ScR (Prisma, 2021:online) of the number of studies that were included and excluded, according to the inclusion criteria determined prior to the commencement of the study. The researcher included titles of the articles,

the authors and year of publication of all the sources used in the Microsoft Excel data extraction table, as Addendum B. The research followed the nine-step research approach framework for a scoping review as provided by Peters *et al.* (2020a:412). The researcher extracted data *literatim*.

1.10.Risk/benefit ratio

All research has risks, however, it is essential for the benefits to outweigh the risks (Botma *et al.*, 2010:24). The researcher identified the following risks and stated how each risk would be addressed.

1.10.1. Human error

Human error was rectified by co-checking with experienced supervisors. The charted data were checked to identify any discrepancies.

1.10.2. Researcher bias

The researcher avoided bias by following the framework provided by Peters *et al.* (2020a:412), on how to conduct a scoping review. The involvement of supervisors as reviewers to co-check the data further decreased bias (Pollock *et al.*, 2020:2109).

This type of review enabled the researcher to map the literature on the coping strategies of undergraduate health sciences students and identify key concepts and gaps that exist regarding knowledge on the coping strategies of undergraduate health sciences students. The findings from the scoping review identified which methods are commonly used when researching the coping strategies of undergraduate health sciences students, and their underpinning theories. The researcher could make recommendations to health sciences programmes at HEIs based on the findings.

As indicated above, the benefits of this study outweighed the risks. The researcher promoted that each risk was addressed as the study progressed, to ensure that the collected data were of high quality.

1.11. Chapter layout

The study will be presented in four chapters that include:

Chapter 1: Overview of the study

Chapter 2: Methodology

Chapter 3: Data analysis and interpretation

Chapter 4: Conclusions, limitations and recommendations.

1.12. Summary of this chapter

This chapter presented an overview of the study by elaborating on the background and selection of a scoping review as the methodology. The researcher described how rigour was achieved in this study, and the ethical considerations applied to the study. In the next chapter, the researcher will elaborate on the literature search as guided by the Scoping Review Framework by Peters *et al.* (2020a:412).

Chapter 2 Methodology

2.1. Introduction

The previous chapter provided an overview of the planned approach to this study. This methodology chapter is an elaboration of the first five steps of a scoping review, namely defining and aligning the objective(s) and question(s), developing and aligning the inclusion criteria with the objective(s) and question(s), describing the planned approach to evidence searching, and selection. Data extraction, presentation of the evidence, and summarising the evidence will be described in the next chapter.

The methodology guides the researcher on how to conduct the research and collect the data necessary for the study (Creswell, 2014:16; Polit & Beck, 2017:735). Sileyew (2019:1) describes the research methodology as “the path through which researchers need to conduct their research”. The researcher chose a scoping review as methodology to guide the research. The researcher followed the scoping review framework, consisting of nine steps by Peters *et al.* (2020a:412). Pollock *et al.* (2020:2110) highlight that there should be an alignment between the data collected for the review and the review's aim to ensure cohesion. A scoping review was deemed the most suitable methodology to answer the review question, which was to find out what is known from the literature regarding the coping strategies of undergraduate students in health sciences programmes.

2.2. Scoping review methodology

Peters *et al.* (2020b:2120) describe a scoping review methodology as an “...approach to evidence synthesis...” and elaborated on Arksey and O'Malley's framework that they developed in 2005 (Arksey & O'Malley, 2005; Munn *et al.*, 2018:2-6). A scoping review is also sometimes referred to as a “scoping study”. In 2005, Arksey and O'Malley (Munn *et al.*, 2018:2) formulated the first framework for conducting a scoping review. A scoping review was selected for this study because it allows the researcher to:

- synthesise literature which implies describing the body of literature available on a specific topic (Sucharew & Macaluso, 2019:416).

- make use of data from various sources and is not limited to one particular study design (e.g. quantitative research). For this study, all types of study designs in published articles were used to answer the review question.
- collect recommendations for future research (Munn *et al.*, 2018:1-2) and summarise the evidence available on the topic (Munn *et al.*, 2018:1-2; Pollock *et al.*, 2020:2105).
- serve as a precursor for conducting a systematic review (Peters *et al.*, 2020a:408; Tricco *et al.*, 2016:2).
- clarify key concepts and identify knowledge gaps relating to an area of research (Pollock *et al.*, 2020:2105), and often generate a hypothesis (Munn *et al.*, 2018:2).
- explore how research on a specific topic is conducted (Munn *et al.*, 2018:2).

There are also disadvantages associated with scoping reviews. Researchers may decide that certain research designs are not appropriate for their review (Peters *et al.*, 2020a:408), which may also serve as a limitation (Sucharew & Macaluso, 2019:417). Also, a scoping review tends to address a broad research question, leading to broad results (Hanneke *et al.*, 2017:6). Another disadvantage is that scoping reviews do not assess the rigour and quality of studies (Hanneke *et al.*, 2017:6).

Despite the mentioned disadvantages associated with a scoping review, the researcher concurred with her study supervisors that this type of review would be best to answer the review question. The next section contains a description of the scoping review framework that was used to align the various sections.

2.3. Scoping review framework

Arksey and O'Malley formulated the first scoping review framework in 2005, comprising six steps. They highlighted the need for further research to guide the scoping reviews process. Years later, Levac and colleagues formulated new extensions (Munn *et al.*, 2018:2; Peters *et al.*, 2020:2220; Sargeant & Connor, 2020:2). In 2014, the JBI International Scientific Committee (JBIC) convened a Scoping Review Methodology Group from members of the JBI and the JBIC (JBI Collaboration), which changed in 2017, and again in 2020, which led to the nine steps of a scoping review framework for systematic guidance on how to conduct a scoping

review (Munn *et al.*, 2018:2; Peters *et al.*, 2020a:412). Figure 2.1 depicts the adopted scoping review framework as described by Peters *et al.* (2020a:412) in the JBI manual. The execution of steps one to five of the Peters *et al.* (2020:412) scoping review framework, as coloured in Figure 2.1, is discussed in this chapter.

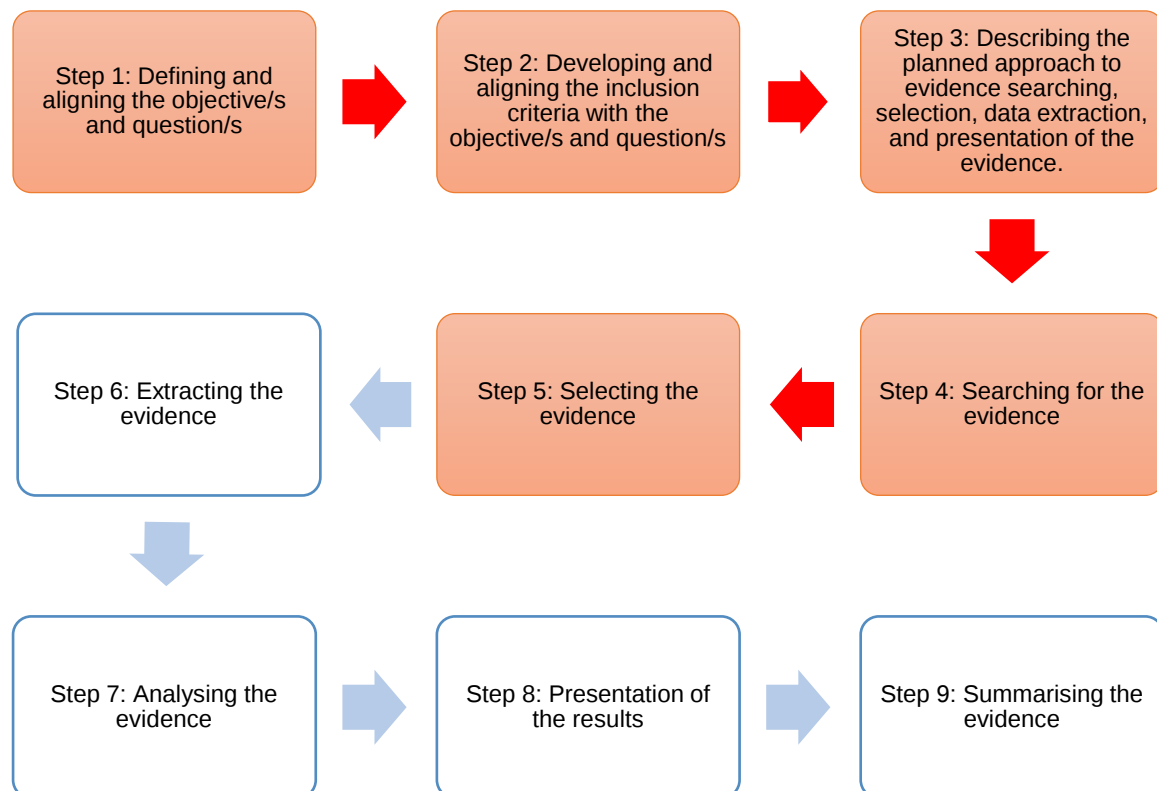


Figure 2.1: Scoping review framework. (Peters *et al.*, 2020a:412)

2.3.1. Step 1: Defining and aligning the objective/s and question/s

Peters *et al.* (2020b:2122) state that the title, review question and inclusion criteria should be well aligned. The review question is often broad and in congruence with the aim and objectives of the review (Sargeant & Connor, 2020:2). The PCC (Participants, Concept and Context) mnemonic was used to guide the formulation of a review question (Munn *et al.*, 2018:5; Lockwood *et al.*, 2019:289-290). From the review question, the participants for this review can be clearly identified as “undergraduate

students”, the concept is “coping strategies”, and the context is “health sciences”. Therefore, the review question which guided this review was:

What is known from the literature regarding the coping strategies of undergraduate students in health sciences programmes?

The following section describes how the researcher developed the inclusion criteria and ensured alignment with the research question.

2.3.2. Step 2: Developing and aligning the inclusion criteria with the objective/s and question/s

Inclusion criteria assist the researcher in identifying what sources of literature to include or exclude and they help the researcher to understand the scope of the review (Peters *et al.*, 2020b:2123; Pollock *et al.*, 2020:2107). Therefore, the review question and the inclusion criteria should be well aligned (Pollock *et al.*, 2020:2107). Table 2.1 is a summary of the inclusion and exclusion criteria used to identify sources to include or exclude from the study.

Table 2.1: Inclusion and exclusion criteria

	Inclusion Criteria	Exclusion Criteria
Sources	Primary research articles available through the University of the Free State (UFS) library electronic databases	Thesis, dissertations, grey literature and theoretical articles
Participants	Undergraduate students	Post-graduate students, qualified healthcare professionals
Area of focus	Coping strategies	Other areas, and coping strategies of students related to the COVID-19 pandemic

Time frame	Articles published from January 1990 – December 2020	Articles published before 1 January 1990 and after 31 December 2020
Context	Health sciences	Any other faculties in higher education, schools

Thesis, dissertations and theoretical papers were excluded from the study. The researcher, after consultation with her study supervisors, made this decision, as the search generated a large number of peer reviewed articles. However, this was noted as a limitation in the study. Only articles focusing on the coping of undergraduate health sciences students were included, while those on post-graduate students or papers on higher education or schools were excluded. Only articles from the year 1990 onward were included, as the exploratory search indicated that literature started focusing on the coping strategies of health sciences students from the 1990s. Articles on the coping strategies of students during the COVID-19 pandemic were also excluded, as the researcher intended to examine literature available on the coping strategies of students irrespective of the pandemic. Peters *et al.* (2020b:2124) recommend that the language of the article is not specified as part of the inclusion criteria unless limitations occur or retrieving articles is not feasible. Therefore, language was not set as a criterion for exclusion. There were four articles which the researcher was unable to obtain the English version for, even after the researcher contacted the authors of the articles with the intent to find an English version of such articles, if available. In the next section, the researcher explains the planned approach to searching for evidence, and the selection of sources.

2.3.3. Step 3: Describing the planned approach to evidence searching and selection

Similar to any research, a scoping review should be well thought out and planned to ensure that those involved understand what a scoping review is, how it should be conducted, and what to expect from the collected data (Lockwood *et al.*, 2019:287). A scoping review begins with a protocol (*a priori*), which details how each step of the framework should be applied (Sargeant & Connor, 2020:2). Peters *et al.* (2020a:413) state that the protocol should be thoroughly planned, well structured, transparent and unbiased.

An *a priori* protocol is important for a review as it predefines the research question, objectives and method (Peters *et al.*, 2020b:2122). During the year 2020, the researcher began this study by developing a research protocol. Developing the protocol gave the researcher an opportunity to formulate the review question and select the appropriate study methods with the aim of answering the review question, and carefully plan how every step of the study would be conducted. An expert panel of five evaluated the protocol. The panel consisted of the research supervisor, a co-researcher, an expert in methodology, an information specialist from the library of the Faculty of Health Sciences, and an expert in protocol development, who gave recommendations to refine the protocol. The amended proposal was submitted to the Health Sciences Research Ethics Committee (HSREC) at the University of the Free State (UFS) and received ethics clearance (UFS-HSD2021/0084/2505).

Scoping review protocols are not necessarily published; however, after ethics approval the researcher registered the protocol on the Open Science Framework platform during 2022, (<https://osf.io/nb59g/>) to ensure that it was freely available, as suggested by Peters *et al.* (2020:2122) and Lockwood *et al.* (2019:288). The next section describes how the researcher searched for evidence.

2.3.4. Step 4: Searching for the evidence

Search components are created in alignment with the research question, such as the participants, concept and context (Sargeant & Connor, 2020:2-3). Based on the PCC mnemonic, the researcher, assisted by the same information specialist who is an experienced librarian at the UFS, who formed part of the evaluation committee, derived the search string as shown in Table 2.1.

Table 2.2: Search string

Participants	(freshman* or freshmen* or "first year*" or undergrad* or student* or sophomore*)
Concept	(cope or coping)
Context	("Health Science*" or medicine or medical or nursing or "occupational therap*" or pharmac* or optometr* or physiotherap* or "physical therap*" or paramedic* or biokinetic* or dietetic* or dental* or dentis*)
Comprehensive (PCC combined)	ti (cope or coping) and (freshman or freshmen or "first year*" or undergrad* or student* or sophomore*)

The initial search was conducted in June 2021, where the researcher, together with the information specialist, used the search string derived from the inclusion and exclusion criteria to complete the abstract and title search on the following fifteen EBSCOHost databases: Academic Search Ultimate (n=311), Africa-Wide Information (n=25), CINAHL with Full Text (n=257), Health Source: Nursing/Academic Edition (n=81), MEDLINE (n=364), SPORTDiscus with Full Text (n=39), APA PsycArticles (n=2), APA PsycInfo (n=271), Communication & Mass Media Complete (n=1), ERIC (n=21), Humanities Source Ultimate (n=5), Sociology Source Ultimate (n=39), OpenDissertations (n=16). The 13 databases rendered 1432 records (abstracts and titles). Although the OpenDissertations database was included in the search, none of the articles generated from this database were included following the inclusion and exclusion criteria. A description of the process the researcher followed in selecting evidence for the study follows.

2.3.5. Step 5: Selecting the evidence

Peters *et al.* (2020b:2124) report that the selection of evidence to be included in a review study should be formulated based on the inclusion and exclusion criteria. Selection usually begins with screening the records (title and abstract). A description of the study selection process is presented as a narrative and flow diagram on the PRISMA-Scr (Prisma, 2021:online) (See Figure 2.2).

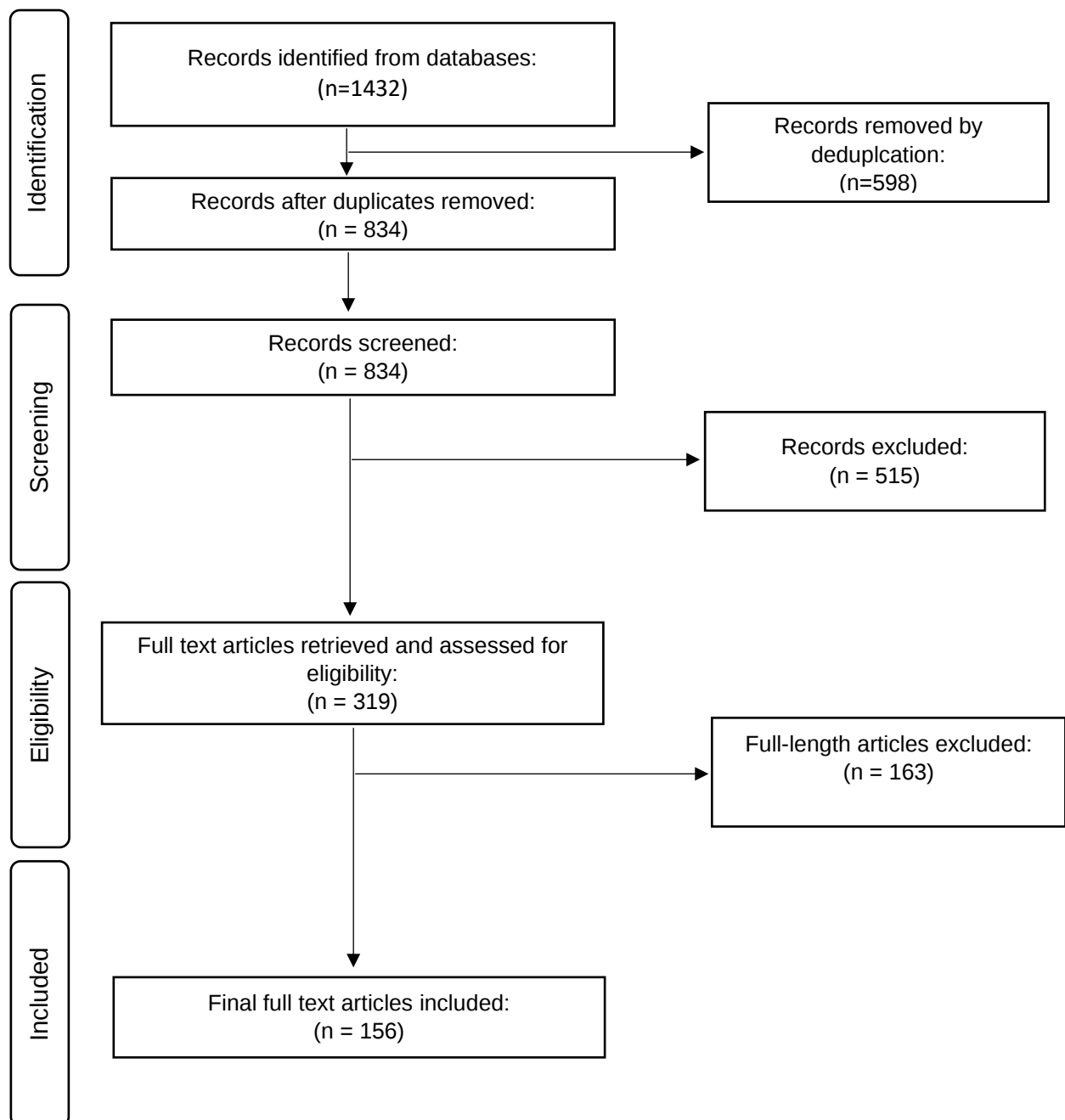


Figure 2.2: PRISMA-Scr flow diagram (Prisma, 2021:online)

Automatic system deduplication reduced the number of records from $n=1432$ to $n=834$, eliminating $n=598$ records. The researcher and her two supervisors individually screened the records and a discussion was held on the records which they did not agree on excluding or including in order to reach a consensus. Consensus was reached through the application of the inclusion and exclusion criteria. Five hundred and fifteen ($n=515$) records were excluded because they did not meet the inclusion criteria. The information specialist assisted in obtaining the remaining $n=319$ full text articles.

Applying the same process, the researcher and her two supervisors first individually screened the n=319 full text articles based on the inclusion and exclusion criteria then after met for a discussion to resolve any disagreements regarding the full text screening. Conflicting decisions were deliberated and resolved through critical discussions. An additional n=163 full text articles did not meet the inclusion criteria and were excluded. Hence, n=156 articles were included in the study. The researcher kept a record of which articles were included and which were not, using an article selection table. See the Excel spreadsheet in Addendum B accompanying this dissertation. A summary of the methodology chapter follows.

2.4. Summary of this chapter

This chapter provided a detailed description of the scoping review methodology, as well as the advantages and disadvantages of the scoping review methodology, which influenced the researcher's choice to follow the scoping review methodology to conduct the study. The nine steps of a scoping review framework were introduced, and steps one to five were explained, which included defining and aligning the research question, developing the inclusion and exclusion criteria and aligning these with the research question, describing the planned approach to evidence searching, selection, data extraction, and presentation of the evidence, searching for data, and the selection of data. The researcher also elaborated on how each step was applied to the study. The next chapter elaborates on the next three steps of a scoping review, which include extracting the evidence, analysis of the evidence, and presentation of the results.

Chapter 3 Data analysis and interpretation

3.1. Introduction

The previous chapter was an elaboration of the study's methodology, which consisted of the first five steps of a scoping review. The researcher adopted the scoping review framework from the JBIC for this research which is depicted in Figure 3.1. Data refers to the information that a researcher collects during the course of a research study (Polit & Beck, 2017:725). This chapter expands on data analysis and interpretation, which are the next three steps (steps 6 - 8) of the scoping review framework suggested by Peters *et al.* (2020a:412).

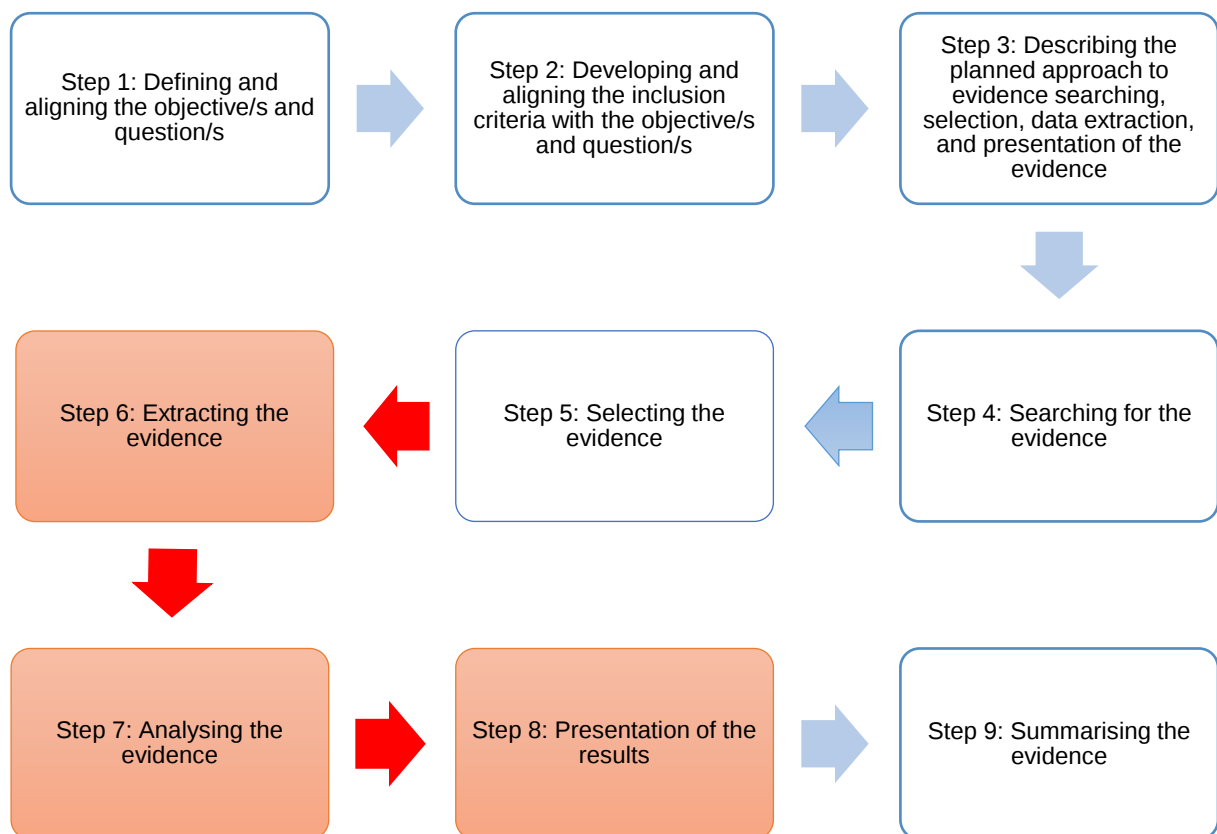


Figure 3.1: Scoping review framework. (Peters *et al.*, 2020a:412)

These steps include extracting the evidence, analysis of the evidence, and the presentation of the results. The next section describes how data were extracted during the study.

3.2. Data extraction

Data extraction is the process of extracting relevant information in terms of the study characteristics, study methods and results from the various data sources included in the study (Polit & Beck, 2017:653). The extraction of data for a scoping review is often referred to as “charting the data” (Peters *et al.*, 2015:144). Peters *et al.* (2020b:2124) highlight that the data extracted from the evidence sources should be well aligned with the research questions and objectives in a scoping review. For the purpose of this study, the researcher ensured congruency by formulating the characteristics in the extraction table based on the aim of this scoping review.

A preliminary extraction table was developed during the protocol development as recommended by Peters *et al.* (2020b:2124). The initial extraction table was initially developed according to the guidance of Peters *et al.* (2020a:55) on what should be included in an extraction table, making sure all the elements of the PCC are present. The table was reviewed by the evaluation committee which constituted of five experts evaluated the protocol for appropriateness. Once the protocol was approved by ethics, the researcher then used six articles to develop the preliminary extraction table. These six articles were also included in the study, provided that they met the inclusion criteria. The preliminary extraction table included the characteristics of the included articles as well as important information related to the review question, such as the authors’ names, article title, country where the study was conducted, year of publication, health sciences profession, methodology (design, data collection approach and data collection instrument), available support services, underpinning theories, the coping strategies used, and study limitations. Table 3.1 shows the preliminary data extraction fields.

Table 3.1: Preliminary extraction table

1.	Author
2.	Article title
3.	Country
4.	Date of publication
5.	Health sciences profession
6.	Methodology (design, data collection approach and data instrument)

7.	Available support services
8.	Underpinning theories
9.	Coping strategies used
10.	Limitations

As part of the pilot study, the researcher and her supervisors extracted the data *literatim* from six articles on a Google form document which was exported to a Microsoft Excel spreadsheet. The supervisors each captured three articles individually as part of the pilot. They then met to discuss the data extraction fields and compare the data extraction sheets to ensure that the data extraction process was consistent. The researcher made adjustments to the preliminary extraction table after noticing information from the articles which were aligned with the research question, but had not been captured. Characteristics such as the aims and purpose of study, study sampling, types of stressors, recommendations of the study, interventions and outcomes of interventions were added to the refined extraction table. Support services available to students were removed as the review question focused on coping strategies and not support services. Table 3.2 depicts a summary of the final extraction fields which were added, and these are presented in bold.

Table 3.2: Data extraction fields in final data extraction table

1.	Article title
2.	Authors
3.	Year of publication
4.	Country where study was conducted
5.	Aim/purpose of the study
6.	Study sampling
7.	Study population (health sciences profession, sample size)
8.	Methodology and study design
9.	Underpinning theories/frameworks and models
10.	Data collection method
11.	Types of stressors identified
12.	Coping strategies used
13.	Limitations of the study

14.	Recommendations of the study
15.	Interventions
16.	Outcome interventions

The researcher charted the data by copying the exact words of the authors on Google forms and sent the extracted data in a Microsoft Excel spreadsheet to the two supervisors for data verification. Adjustments to the Microsoft Excel spreadsheet were made per recommendation by the supervisors. The data extraction Microsoft Excel spreadsheet is included as Addendum B in this study. In the next section, the researcher explains how the data were analysed.

3.3. Data analysis

Polit & Beck (2017:725) define data analysis as the systematic arrangement of data collected during a study. The researcher used a descriptive approach to present the collected data, as recommended by Pollock *et al.* (2020:2109). Textual data were coded descriptively, and those with similar meanings were grouped into specific categories (Peters *et al.*, 2020b:2125). Frequencies were calculated for categorical data. The categories of data analysis included study characteristics such as the year of publication and the country where the study was conducted; aim/purpose of the study; methodology including the study method and design, study sampling technique, population, and data collection instrument(s); underpinning theories/frameworks and models; stressors; coping strategies; interventions (study intervention and outcomes); study limitations; and lastly recommendations. Table 3.3 provides a summary of the data analysis categories and sub-categories.

Table 3.3: Data analysis categories and sub-categories

Data analysis categories	Sub-category
Study characteristics	Year of publication Country study was conducted in
Study aim/purpose	Aim of the study/Purpose of the study
Methodology	Study method and design Study sampling technique Study population (health sciences profession, sample size) Data collection method
Underpinning theories/frameworks/models	Underpinning theories/frameworks/models
Stressors identified	Stressors identified in the study
Coping strategies	Coping strategies used in the study
Interventions	Study interventions Outcome of interventions
Limitations	Limitations of the study
Recommendations	Recommendations of the study

The following section will present the results of this scoping review.

3.4. Presentation of the results

There are various methods for presenting results in a scoping review (Peters *et al.*, 2020b:2125). The most common method is in the form of a table (Lockwood *et al.*, 2019:219; Pollock *et al.*, 2020:2109). For this study, the researcher will use both tables and figures with a description of the categories summarised in Table 3.3. A total of 156 full-text articles were included in the study. The researcher will start with the first category, namely the study characteristics.

3.4.1. Study characteristics

The study characteristics include the year in which the study was published, as well as the country in which the study was conducted. A description of the highest and

lowest frequency in each category follows each figure. Figure 3.2 outlines the year of publication of the included articles.

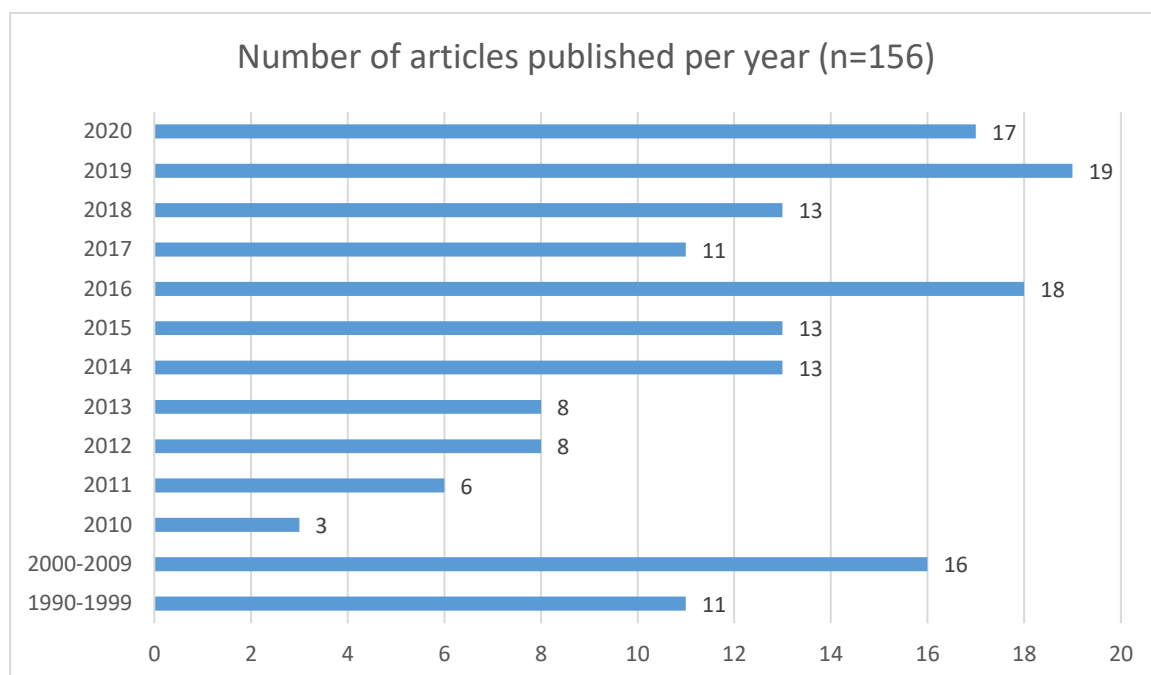


Figure 3.2: Number of articles published per year

Only 11 articles were published during the years 1990 to 1999, whereas 16 articles were published during the years 2000 to 2009. From Figure 3.2, it is noted that there was a steady increase in the number of articles on coping strategies of undergraduate health sciences students each year. Most articles were published between the years 2010 to 2020, and this peaked in 2019 with 19 articles. Naidoo et al. (2014:262) indicate that HSEIs need to become more aware on the mental health status of health sciences students, which may account for the increased research output on the coping strategies of undergraduate health sciences students in recent years. Health sciences students, as part of their curriculum, undergo theoretical as well as practical training at healthcare facilities, which increases their stress (Gregersen *et al.*, 2021:-2; Jamshidi *et al.*, 2016:1-2). This stress has a negative impact on the students in terms of poor academic performance and an increase in the drop-out rate (Melaku et al., 2015:2; Ragab et al., 2021:1).

Figure 3.3 depicts the countries where each study was conducted. The total number of countries where studies on coping strategies were done calculate to n=161, depicted in Table 3.3, while three articles (Felicilda-Reynaldo *et al.*, 2019; Gurvoka &

Zelenikova, 2018; Kupcewicz *et al.*, 2020) mentioned that they conducted their research in more than one country.

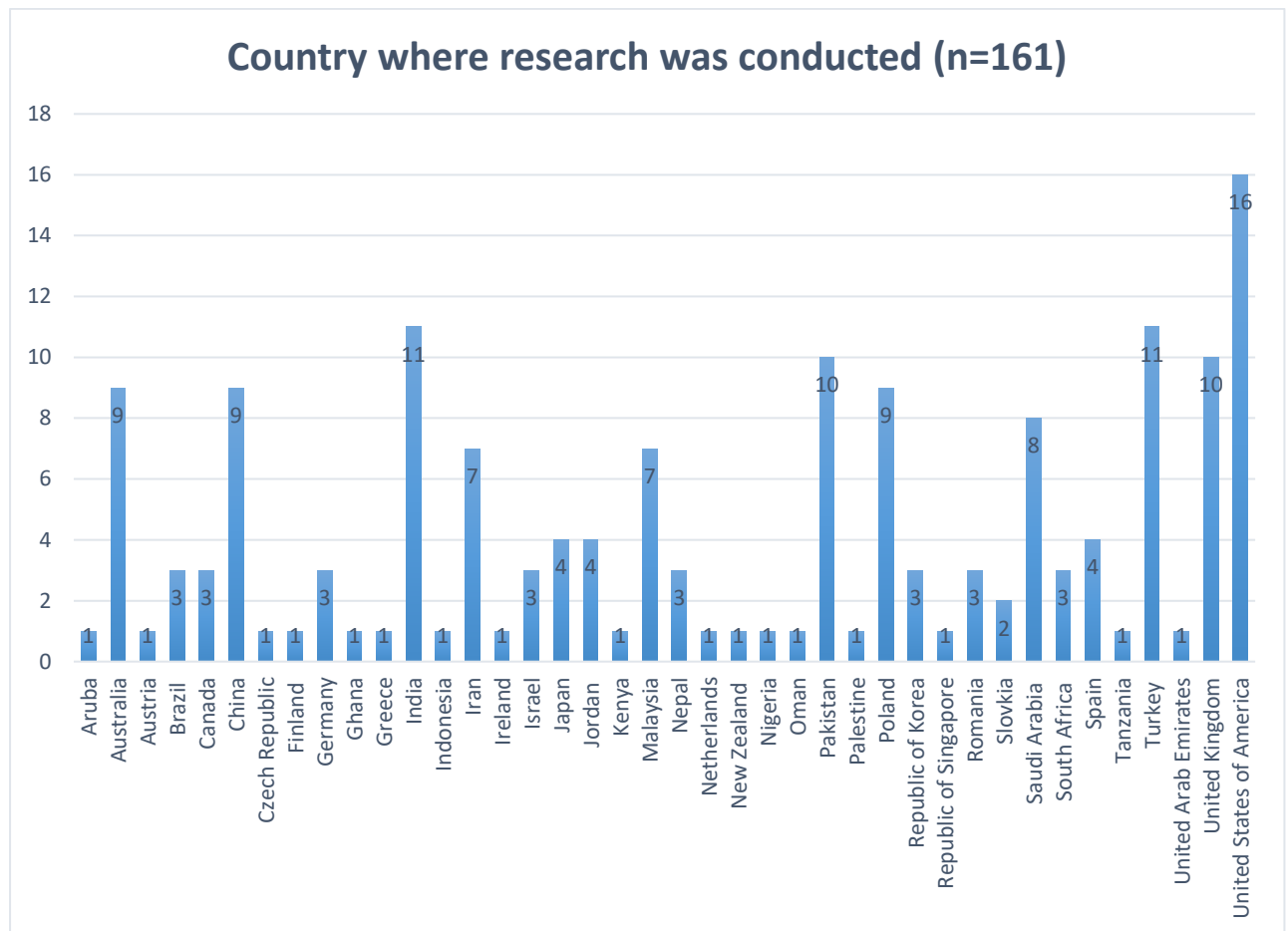


Figure 3.3: Country where research was conducted

The countries in Figure 3.3 have been arranged in alphabetical order. From Figure 3.3, it can be noted that most of the studies were conducted in the United States of America (USA). This could be due to the USA being classified as a country with a developed economy (United Nations, 2020:165). Only seven of the 159 represented studies were conducted in Africa, and this may be due to the fact that Africa is a continent with a developing economy (United Nations, 2020:166). It also has a lack of qualified researchers and a lack of resources to conduct research (Ganderman & Vance, 2021:online; Amerson & Strang, 2015:2). The following section describes the research aims/purposes of the included studies.

3.4.2. Aim/purpose of included articles

The research aims/purpose/objectives guide a researcher and emphasise what needs to be achieved at the end of the research process. Figure 3.4 shows the research aims or purposes of the articles included in the study.

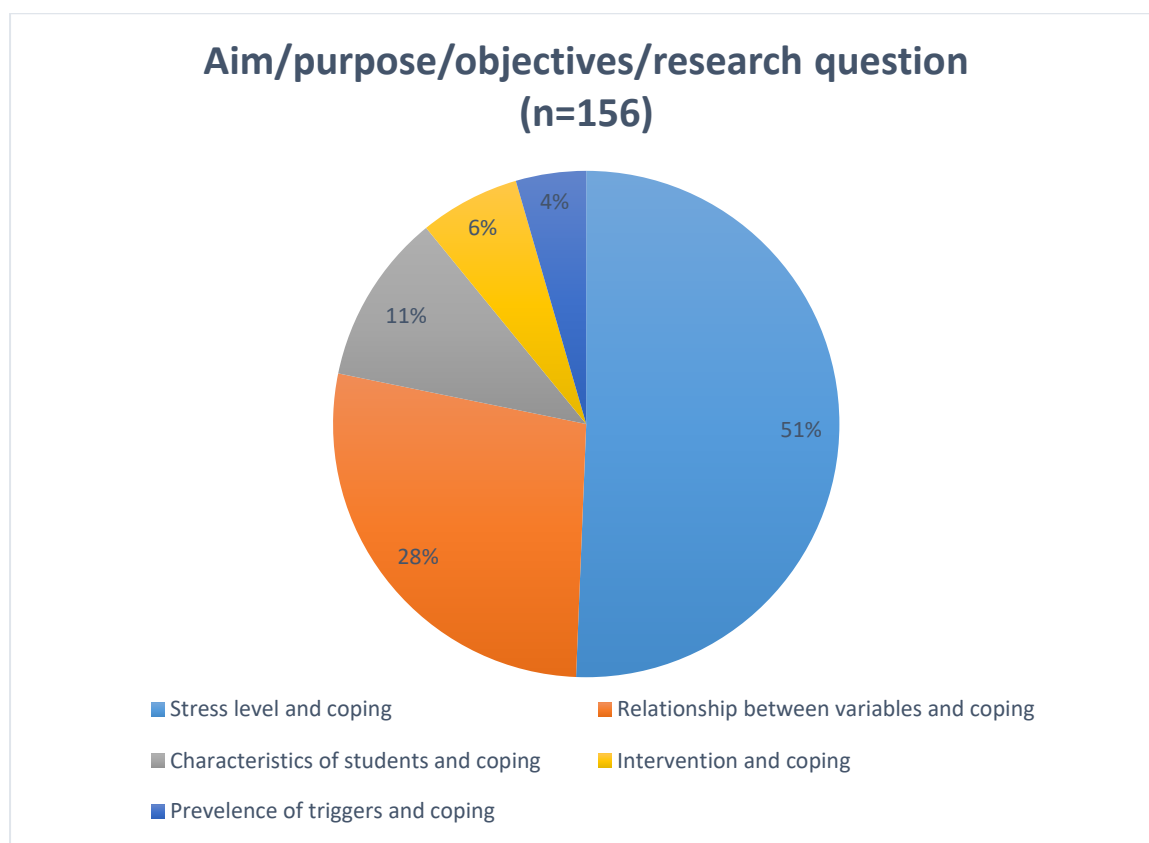


Figure 3.4: Aim/purpose/objective/research question of included articles

According to Grove, Burns and Gray (2013:138-140), research objectives or aims are short clear statements, usually written in past tense, used to specify the study focus, whereas a research question is a concise question, also in past tense, which includes one or more key concepts pertaining to the study. A research purpose is a brief description on the exact reason for conducting a study, usually formulated from the identified problem (Grove *et al.*, 2013:708). From Figure 3.3, it is evident that 51% of the studies aimed to research the stress levels and coping strategies used by undergraduate health sciences students, whereas only 4% aimed to study the prevalence of triggers on the coping strategies that students make use of. The coping strategies used by health sciences students in response to their stress levels is an area which is constantly being studied, as it is important to gain a better understanding

of the stressors that students encounter and the coping strategies that they utilise (Alsaqri, 2017:2; Neufeld & Malin, 2021:2-3). Research on this topic is done so that researchers can make appropriate recommendations to HEIs based on literature, to assist students with functional coping strategies and the necessary support to handle their stressors they come across (Chabane *et al.*, 2021:2; Neufeld & Malin, 2021:2-3). This might be the reason why 51% of the articles aimed to study the stress levels and coping of health sciences students. The researcher elaborates on the methodologies identified in the included articles below.

3.4.3. Methodology of the study

The methodology of the study includes characteristics such as study method and design, study sampling technique, study population (health sciences profession), sample size, and the data collection method. Table 3.4 shows the study methods and designs of the various articles included. Figure 3.5 displays the sampling technique, while Table 3.5 depicts the study population (undergraduate health sciences students) and Table 3.6 the sample size. The data collection methods for the various studies are noted in Table 3.7.

Table 3.4: Study method and design

Research approach	Method and design	Number of studies per method/design (n=156)	Sources
Mixed methods	Mixed methods study	4	Jan & Popescu, 2014; Malau-Aduli, 2011; Wolf <i>et al.</i> , 2015; Yousef <i>et al.</i> , 2018
None described		33	Abramovitch, 2000; Akio, 2017; Cherkil <i>et al.</i> , 2013; Bodys-Cupak <i>et al.</i> , 2016; De Witt <i>et al.</i> , 2016; Duic <i>et al.</i> , 2012; Durkin <i>et al.</i> , 2003; Dzubur-Kulenovic & Muhic, 2017; Ersana <i>et al.</i> , 2017; Everly <i>et al.</i> , 1994; Gibbons, 2010; Harris <i>et al.</i> , 2015; Jones <i>et al.</i> , 2011; Kim, 2019; Ksiazek <i>et al.</i> , 2015; Mahat, 1998; Masiak <i>et al.</i> , 2014; Maynor & Baugh, 2012; Metz <i>et al.</i> , 2020; Muris <i>et al.</i> , 1995; Nechita <i>et al.</i> , 2016a; Nechita <i>et al.</i> , 2016b; Russa & Mligiliche, 2014; Schillera <i>et al.</i> , 2018; Schreim & Abramovitch, 1996; Shankar <i>et al.</i> , 2014; Shankar <i>et al.</i> , 2018; Stern <i>et al.</i> , 2010; Szadowska-Szlachetka <i>et al.</i> , 2020; Tereszko <i>et al.</i> , 2015; Tichy & Means, 1990; Tully, 2004; Wang & Miao, 2009
Quantitative	Quasi-experimental study	4	Demir <i>et al.</i> , 2014; Kim <i>et al.</i> , 2015; McCarthy <i>et al.</i> , 2018; Yüksel & Bahadır-Yılmaz, 2019
	Diagnostic poll and estimation method, surveying and scaling study	2	Bodys-Cupak <i>et al.</i> , 2018; Bodys-Cupak <i>et al.</i> , 2019

Research approach	Method and design	Number of studies per method/design (n=156)	Sources
	Cross-sectional study	76	Abbas <i>et al.</i> , 2020; Al-Dubai <i>et al.</i> , 2011; Al-Gamal <i>et al.</i> , 2017; Ahmed & Mohammed, 2019; Al-Sowygh, 2013; Al-Shloul & Bdair, 2019; Akhtar <i>et al.</i> , 2019; Akram <i>et al.</i> , 2018; Ayed & Amoudi, 2020; Azitaamirfakhraei <i>et al.</i> , 2019; Bodys-Cupak <i>et al.</i> , 2019; Chan, 1991; Chan <i>et al.</i> , 2009; Crego <i>et al.</i> , 2016; Ersana <i>et al.</i> , 2017; Erschens <i>et al.</i> , 2018; Khan <i>et al.</i> , 2016; Felicilda-Reynaldo <i>et al.</i> , 2019; Francis <i>et al.</i> , 2019; Gazder <i>et al.</i> , 2014; Gomathi <i>et al.</i> , 2013; Gurvoka & Zelenikova, 2018; Hammad <i>et al.</i> , 2020; Higuchi & Echigo, 2017; Hirsch <i>et al.</i> , 2014; Huey-Fen & Yeh, 2005; Imran <i>et al.</i> , 2016; Jahan <i>et al.</i> , 2016; Janse van Vuuren <i>et al.</i> , 2018; Jones & Johnston, 1997; Joseph <i>et al.</i> , 2020; Karaca <i>et al.</i> , 2017; Kaya <i>et al.</i> , 2007; Madhyastha <i>et al.</i> , 2014; Mansoori <i>et al.</i> , 2019; Mitchell, 2020; Niknami <i>et al.</i> , 2015; O'Brien <i>et al.</i> , 2012; Odzemir & Kaya, 2013; Onieva-Zafra <i>et al.</i> , 2020; Palupi & Findyartini, 2019; Rahimi <i>et al.</i> , 2014; Rezapour-Mirsaleh & Aghabagheri, 2020; Ruziana <i>et al.</i> , 2018; Salam <i>et al.</i> , 2019; Sam <i>et al.</i> , 2016; Samuel & Kannappan, 2011; Samson, 2019; Sandover <i>et al.</i> , 2015; Sarwar <i>et al.</i> , 2019; Saxena <i>et al.</i> , 2019; Seyedfatemi <i>et al.</i> , 2007; Sen <i>et al.</i> , 2015; Shaban <i>et al.</i> , 2012; Shaikh <i>et al.</i> , 2004; Shao <i>et al.</i> , 2020; Shdaifat <i>et al.</i> , 2018; Sheu <i>et al.</i> , 2002; Shoua-Desmarias <i>et al.</i> , 2020; Shrestha, 2013; Sikander & Aziz, 2012; Singh <i>et al.</i> , 2016; Sreeramareddy <i>et al.</i> , 2007; Steiner-Hofbauer & Holzinger, 2020; Thompson <i>et al.</i> , 2016; Yamashita <i>et al.</i> , 2012; Yehia <i>et al.</i> , 2016; Yigit <i>et al.</i> , 2016; Yusoff <i>et al.</i> , 2011; Yusuff <i>et al.</i> , 2013; Zainah <i>et al.</i> , 2019; Zhao <i>et al.</i> , 2015; Zvauya <i>et al.</i> , 2017
	Ex-post-factor research design	1	Gilbert & Strong, 1997
	Questionnaire-based study	1	Gibbons <i>et al.</i> , 2010

Research approach	Method and design	Number of studies per method/design (n=156)	Sources
	Quantitative study	2	Hoyoung <i>et al.</i> , 2012; Van der Merwe <i>et al.</i> , 2020
	Descriptive study	12	Alzayyat & Al-Gamal, 2014a; Alzayyat & Al-Gamal, 2014b; Bam <i>et al.</i> , 2014; Farnia <i>et al.</i> , 2013; Findik <i>et al.</i> , 2015; Govender <i>et al.</i> , 2015; Hamaideh <i>et al.</i> , 2017; Kanika <i>et al.</i> , 2015; Lo, 2002; Mahfouz & Alsahil, 2016; Nebhinani <i>et al.</i> , 2019; Suliman & Tadros, 2011
	Intervention study	2	Demir & Ercan, 2019; Hicdurmaz & Oz, 2016
	Longitudinal study	3	Fornes-Vives <i>et al.</i> , 2016; Manning-Geist <i>et al.</i> , 2020; Moffat <i>et al.</i> , 2004
	Diagnostic survey study	1	Kupcewicz <i>et al.</i> , 2020
	Randomised controlled trial	1	Kuhlmann <i>et al.</i> , 2016
Qualitative	Qualitative study	4	Hogan <i>et al.</i> , 2018; Niemi & Vainiomaki, 1999; Pau <i>et al.</i> , 2004; Rafati <i>et al.</i> , 2017
	Exploratory study	5	Pereira & Barbosa, 2013; Mitchell & Kampfe, 1992; Mitchell & Kampfe, 1990; Steele <i>et al.</i> , 2005; Wu <i>et al.</i> , 2018
	Phenomenological study	1	Chapman & Orb, 2001
	Descriptive study	3	Cilliers & Terrblanche, 2014; Ching <i>et al.</i> , 2020; Kaur <i>et al.</i> , 2020
	Grounded theory	1	Liu, 2012

The research design is the strategy that a researcher uses to conduct a study (Grove *et al.*, 2013:195). From Table 3.4, it is noted that the most preferred research design was the cross-sectional design, as 76 studies used this. According to Polit and Beck (2017:168-170), a cross-sectional design is deemed the most suitable design for a researcher to study the relationship between a particular phenomenon at a particular time. The majority of the articles, for instance, investigated the relationship between stress and coping strategies of health sciences students. A cross-sectional research design also allows a researcher to make assumptions about different processes evolving over time (Polit & Beck, 2017:168-170). An example would be that a few studies looked at how the coping of health sciences students varies between the different year groups.

The second highest design type used was the descriptive research design. Polit and Beck (2017:206) describe the purpose of descriptive research is to observe, describe and note any significant characteristics of a situation as it takes place. A descriptive research design, similar to a cross-sectional design, can also be used to determine the relationship between two variables (Polit & Beck, 2017:206). The sampling techniques used in the studies are described below.

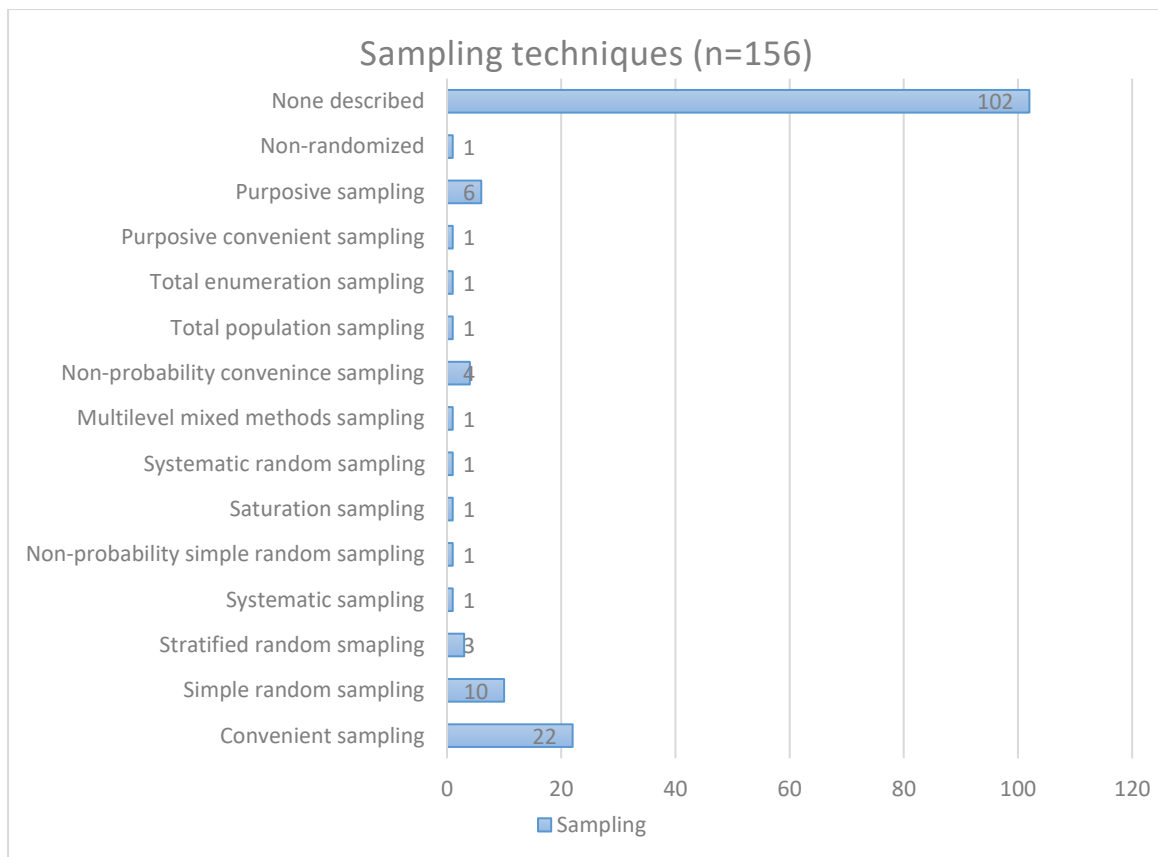


Figure 3.5: Sampling techniques used in included articles

Lobiondo-Wood and Haber (2018:213) define sampling as “the process of selecting representative units of a population in a study”. From Figure 3.5, it is noted that most of the included studies do not specify which sampling methods were used, and this is the case with 102 of the 156 articles included in the study. From the articles where the sampling technique is described, convenience sampling was the most used sampling technique. Convenience sampling makes use of any available participants or objects (Lobiondo-Wood & Haber, 2018:217). The researchers may have chosen convenience sampling as it allows relatively easy access to participants. The health sciences professions identified in the studies follow in the next section.

Table 3.5 illustrates the number of healthcare sciences professions that was represented as part of the population. The total number of health sciences professions represented calculates up to (n=165), as some studies included more than one profession. The sources are also listed per health sciences profession in Table 3.5

Table 3.5: Health sciences profession

Health sciences profession	Number of health sciences professions (n=165)	Sources
Nursing	72	Abbas <i>et al.</i>, 2020; Al-Gamal <i>et al.</i>, 2017; Alshahrani <i>et al.</i>, 2018; Al-Shloul and Bdair, 2019; Alzayyat & Al-Gamal, 2014a; Alzayyat & Al-Gamal, 2014b; Ahmed & Mohammed, 2019; Akhtar <i>et al.</i>, 2019; Akio, 2017; Bam <i>et al.</i>, 2014; Bodys-Cupak <i>et al.</i>, 2016; Bodys-Cupak <i>et al.</i>, 2018; Bodys-Cupak <i>et al.</i>, 2019b; Chan <i>et al.</i>, 2009; Chapman & Orb, 2001; Ching <i>et al.</i>, 2020; Cilliers & Terrblanche, 2014; Demir <i>et al.</i>, 2014; Demir & Ercan, 2019; Felicilda-Reynaldo <i>et al.</i>, 2019; Findik <i>et al.</i>, 2015; Fornes-Vives <i>et al.</i>, 2016; Gibbons, 2010a; Gibbons, 2010b; Gurvoka & Zelenikova, 2018; Hamaideh <i>et al.</i>, 2017; Hicdurmaz & Oz, 2016; Hirsch <i>et al.</i>, 2014; Hirschl <i>et al.</i>, 2015; Hogan <i>et al.</i>, 2018; Huey-Fen & Yeh, 2005; Jan & Popescu, 2014; Jones & Johnston, 1997; Kanika <i>et al.</i>, 2015; Karaca <i>et al.</i>, 2017; Kaur <i>et al.</i>, 2020; Kim, 2015; Kim <i>et al.</i>, 2019 Kupcewicz <i>et al.</i>, 2020; Liu, 2012; Lo, 2002; Mahfouz and Alsahil, 2016; Mahat, 1998; McCarthy <i>et al.</i>, 2018; Mitchell, 2020; Nebhinani <i>et al.</i>, 2019; Nechita <i>et al.</i>, 2016a; Nechita <i>et al.</i>, 2016b; Niknami <i>et al.</i>, 2015; Odzemir & Kaya, 2013; Onieva-Zafra <i>et al.</i>, 2020; Rafati <i>et al.</i>, 2017; Rezapour-Mirsaleh & Aghabagheri, 2020; Samson, 2019; Seyedfatemi <i>et al.</i>, 2007; Shaban <i>et al.</i>, 2012; Shakthivel <i>et al.</i>, 2017; Shankar <i>et al.</i>, 2018; Shdaifat <i>et al.</i>, 2018; Shrestha, 2013; Sheu <i>et al.</i>, 2002; Sikander & Aziz, 2012; Steele <i>et al.</i>, 2005; Suliman & Tadros, 2011; Szadowska-Szlachetka <i>et al.</i>, 2020; Tichy & Means, 1990; Tully, 2004; Wolf <i>et al.</i>, 2015; Yamashita <i>et al.</i>, 2012; Yehia <i>et al.</i>, 2016; Yüksel & Bahadır-Yılmaz, 2019; Zhao <i>et al.</i>, 2015

Health sciences profession	Number of health sciences professions (n=165)	Sources
Medicine	70	Abbas <i>et al.</i> , 2020; Abramovitch, 2000; Akram <i>et al.</i> , 2018; Al-Dubai <i>et al.</i> , 2011; Al-Shloul & Bdair, 2019; Azitaamirfakhraei <i>et al.</i> , 2019; Chan, 1991; Cherkil <i>et al.</i> , 2013; Pereira & Barbosa, 2013; De Witt <i>et al.</i> , 2016; Duic <i>et al.</i> , 2012; Durkin <i>et al.</i> , 2003; Dzubur-Kulenovic & Muhic, 2017; Erschens <i>et al.</i> , 2018; Farnia <i>et al.</i> , 2013; Francis <i>et al.</i> , 2019; Gazder <i>et al.</i> , 2014; Gomathi <i>et al.</i> , 2013; Hammad <i>et al.</i> , 2020; Harris <i>et al.</i> , 2015; Hoyoung <i>et al.</i> , 2012; Imran <i>et al.</i> , 2016; Jahan <i>et al.</i> , 2016; Jones <i>et al.</i> , 2011; Joseph <i>et al.</i> , 2020; Kaya <i>et al.</i> , 2007; Khan <i>et al.</i> , 2016; Ksiazek <i>et al.</i> , 2015; Kuhlmann <i>et al.</i> , 2016; Madhyastha <i>et al.</i> , 2014; Malau-Aduli, 2011; Manning-Geist <i>et al.</i> , 2020; Mansoori <i>et al.</i> , 2019; Masiak <i>et al.</i> , 2014; Moffat <i>et al.</i> , 2004; Muris <i>et al.</i> , 1995; Niemi & Vainiomaki, 1999; Nechita <i>et al.</i> , 2016a; Nechita <i>et al.</i> , 2016b; O'Brien <i>et al.</i> , 2012; Palupi & Findyartini, 2019; Rahimi <i>et al.</i> , 2014; Russa & Mligiliche, 2014; Ruziana <i>et al.</i> , 2018; Salam <i>et al.</i> , 2019; Sandover <i>et al.</i> , 2015; Sarwar <i>et al.</i> , 2019; Schreim and Abramovitch, 1996; Schillera <i>et al.</i> , 2018; Sen <i>et al.</i> , 2015; Shaikh <i>et al.</i> , 2004; Shankar <i>et al.</i> , 2014; Shankar <i>et al.</i> , 2018; Shao <i>et al.</i> , 2020; Shoua-Desmarias <i>et al.</i> , 2020; Singh <i>et al.</i> , 2016; Sreeramareddy <i>et al.</i> , 2007; Steiner-Hofbauer & Holzinger, 2020; Stern <i>et al.</i> , 2010; Tereszko <i>et al.</i> , 2015; Thompson <i>et al.</i> , 2016; Van der Merwe <i>et al.</i> , 2020; Wang & Miao, 2009; Wu <i>et al.</i> , 2018; Yigit <i>et al.</i> , 2016; Yusoff <i>et al.</i> , 2011; Yusuff <i>et al.</i> , 2013; Zainah <i>et al.</i> , 2019; Zvauya <i>et al.</i> , 2017
Dentistry	11	Al-Sowygh, 2013; Cherkil <i>et al.</i> , 2013; Crego <i>et al.</i> , 2016; Ersana <i>et al.</i> , 2017b; Ersana <i>et al.</i> , 2017a; Gomathi <i>et al.</i> , 2013; Harris <i>et al.</i> , 2015; Metz <i>et al.</i> , 2020; Pau <i>et al.</i> , 2004; Saxena <i>et al.</i> , 2019; Steiner-Hofbauer & Holzinger, 2020
Physiotherapy	7	Al-Shloul and Bdair, 2019; Ayed & Amoudi, 2020; Gomathi <i>et al.</i> , 2013; Higuchi & Echigo, 2016; Higuchi & Echigo, 2017; Janse van Vuuren <i>et al.</i> , 2018; Samuel & Kannappan, 2011
Occupational therapy	4	Everly <i>et al.</i> , 1994; Gilbert & Strong, 1997; Govender <i>et al.</i> , 2015; Mitchell & Kampfe, 1990
Paramedics	1	Al-Shloul & Bdair, 2019

The health sciences professions in Table 3.5 have been arranged from the highest occurring profession to the lowest. The total number of health sciences professions depicted in Table 3.5 shows that nursing (n=72) and medicine (n=70) combined comprise 90% of the health sciences population being investigated with regard to coping strategies. Only one study included paramedics, while 11 studies focused on rehabilitation sciences. The World Health Organization (WHO) (2022a:online) reports that nurses make up almost 50% of the workforce in the health sciences, and there are approximately 27 million nurses globally. Due to the immense global shortage of nurses and doctors (WHO, 2022a:online; WHO, 2022b:online), health sciences institutions are under pressure to train qualified and skilled health professionals, such as nurses and medical doctors, to address this global shortage, making it important to address the mental health needs of these students to ensure that they graduate successfully (Flier, 2018:online). The sample size of the participants is discussed next.

Table 3.6: Sample size of participants

Sample size	Sample size of participants (n=156)	Sources
0-49	16	Ching <i>et al.</i> , 2020; Chapman & Orb, 2001; Cilliers & Terrblanche, 2014; Pereira & Barbosa, 2013; Duic <i>et al.</i> , 2012; Kaur <i>et al.</i> , 2020; Kim <i>et al.</i> , 2015; Liu, 2012; Malau-Aduli, 2011; Mitchell & Kampfe, 1990; Pau <i>et al.</i> , 2004; Rafati <i>et al.</i> , 2017; Samuel & Kannappan, 2011; Steele <i>et al.</i> , 2005; Tully, 2004; Wu <i>et al.</i> , 2018
50-99	24	Abramovitch, 2000; Alzayyat & Al-Gamal, 2014a; Alzayyat & Al-Gamal, 2014b; Ayed & Amoudi, 2020; Bam <i>et al.</i> , 2014; Chan, 1991; Gilbert & Strong, 1997; Govender <i>et al.</i> , 2015; Harris <i>et al.</i> , 2015; Higuchi & Echigo, 2016; Higuchi & Echigo, 2017; Jones <i>et al.</i> , 2011; Kuhlmann <i>et al.</i> , 2016; Schreim & Abramovitch, 1996; Madhyastha <i>et al.</i> , 2014; Mahfouz & Alsahil, 2016; Mitchell, 2020; Schillera <i>et al.</i> , 2018; Shankar <i>et al.</i> , 2018; Sikander & Aziz, 2012; Suliman & Tadros, 2011; Yüksel & Bahadır-Yılmaz, 2019; Yusuff <i>et al.</i> , 2013
100-149	24	Ahmed & Mohammed, 2019; Akhtar <i>et al.</i> , 2019; Al-Gamal <i>et al.</i> , 2017; Al-Shloul & Bdair, 2019; Bodys-Cupak <i>et al.</i> , 2018; Demir <i>et al.</i> , 2014; Demir & Ercan, 2019; Ersana <i>et al.</i> , 2017a; Ersana <i>et al.</i> , 2017b; Hamaideh <i>et al.</i> , 2017; Hirsch <i>et al.</i> , 2014; Hirschl <i>et al.</i> , 2015; Lo, 2002; Manning-Geist <i>et al.</i> , 2020; Mahat, 1998; Metz <i>et al.</i> , 2020; Mitchell & Kampfe, 1992; Niemi & Vainiomaki, 1999; O'Brien <i>et al.</i> , 2012; Shakthivel <i>et al.</i> , 2017; Shankar <i>et al.</i> , 2014; Stern <i>et al.</i> , 2010; Singh <i>et al.</i> , 2016; Szadowska-Szlachetka <i>et al.</i> , 2020
150-199	20	Abbas <i>et al.</i> , 2020; Farnia <i>et al.</i> , 2013; Findik <i>et al.</i> , 2015; Fornes-Vives <i>et al.</i> , 2016; Gibbons, 2010; Hicdurmaz & Oz, 2016; Hoyoung <i>et al.</i> , 2012; McCarthy <i>et al.</i> , 2018; Moffat <i>et al.</i> , 2004; Muris <i>et al.</i> , 1995; Onieva-Zafra <i>et al.</i> , 2020; Palupi & Findyartini, 2019; Rahimi <i>et al.</i> , 2014; Russa & Mligiliche, 2014; Sarwar <i>et al.</i> , 2019; Shaban <i>et al.</i> , 2012; Shdaifat <i>et al.</i> , 2018; Shoua-Desmarias <i>et al.</i> , 2020; Thompson <i>et al.</i> , 2016; Zainah <i>et al.</i> , 2019

Sample size	Sample size of participants (n=156)	Sources
200-249	18	Akio, 2017; Chan <i>et al.</i> , 2009; Crego <i>et al.</i> , 2016; Dzubur-Kulenovic and Muhic, 2017; Gazder <i>et al.</i> , 2014; Gomathi <i>et al.</i> , 2013; Hogan <i>et al.</i> , 2018; Jan and Popescu, 2014; Janse van Vuuren <i>et al.</i> , 2018; Jones & Johnston, 1997; Kanika <i>et al.</i> , 2015; Ksiazek <i>et al.</i> , 2015; Maynor & Baugh, 2012; Nebhinani <i>et al.</i> , 2019; Salam <i>et al.</i> , 2019; Tichy & Means, 1990; Wolf <i>et al.</i> , 2015; Zhao <i>et al.</i> , 2015
250-299	9	Durkin <i>et al.</i> , 2003; Gibbons, 2010; Gurvoka & Zelenikova, 2018; Jahan <i>et al.</i> , 2016; Kim, 2019; Shaikh <i>et al.</i> , 2004; Shrestha, 2013; Yehia <i>et al.</i> , 2016; Wang & Miao, 2009.
300-399	12	Al-Dubai <i>et al.</i> , 2011; Bodys-Cupak <i>et al.</i> , 2016; Khan <i>et al.</i> , 2016; Nechita <i>et al.</i> , 2016a; Nechita <i>et al.</i> , 2016b; Rezapour-Mirsaleh & Aghabagheri, 2020; Ruziana <i>et al.</i> , 2018; Sam <i>et al.</i> , 2016; Saxena <i>et al.</i> , 2019; Sen <i>et al.</i> , 2015; Seyedfatemi <i>et al.</i> , 2007; Yusoff <i>et al.</i> , 2011
400-499	7	Cherkil <i>et al.</i> , 2013; Huey-Fen and Yeh, 2005; Joseph <i>et al.</i> , 2020; Sreeramareddy <i>et al.</i> , 2007; Niknami <i>et al.</i> , 2015; Yigit <i>et al.</i> , 2016; Zvauya <i>et al.</i> , 2017
500-599	9	Al-Sowygh, 2013; Bodys-Cupak <i>et al.</i> , 2019; Hammad <i>et al.</i> , 2020; Imran <i>et al.</i> , 2016; Mansoori <i>et al.</i> , 2019; Masiak <i>et al.</i> , 2014; Sandover <i>et al.</i> , 2015; Steiner-Hofbauer & Holzinger, 2020; Van der Merwe <i>et al.</i> , 2020
600-699	5	Francis <i>et al.</i> , 2019; Felicilda-Reynaldo <i>et al.</i> , 2019; Karaca <i>et al.</i> , 2017; Samson, 2019; Sheu <i>et al.</i> , 2002
700-799	3	Bodys-Cupak <i>et al.</i> , 2019; Kaya <i>et al.</i> , 2007; Tereszko <i>et al.</i> , 2015
800-899	1	Erschens <i>et al.</i> , 2018
900-999	1	Azitaamirfakhraei <i>et al.</i> , 2019
≥1000	7	Akram <i>et al.</i> , 2018; De Witt <i>et al.</i> , 2016; Everly <i>et al.</i> , 1994; Kupcewicz <i>et al.</i> , 2020; Odzemir & Kaya, 2013; Shao <i>et al.</i> , 2020; Yamashita <i>et al.</i> , 2012

Sample size refers to the number of participants involved in a study (Polit & Beck, 2017:743). Lobiondo-Wood and Haber (2018:224) state that there are no rules when deciding on a sample size. The general rule is always to ensure that a larger sample size is chosen to generalise the findings to the general population (Lobiondo-Wood & Haber, 2018:225). Therefore, sample sizes are dependent on the type of study. The sample sizes in Table 3.6 have been arranged from the smallest to the largest sample size. From Table 3.6, only a few studies ($n=7$) had a sample size of more than 1000 participants, whereas 16 studies had samples of less than 49 participants. Two types of data collection methods identified were questionnaires and interviews.

Table 3.7: Data collection method

Data collection method	Number of studies utilising a data collection method (n=159)	Sources
Questionnaire	148	Abbas <i>et al.</i>, 2020; Abramovitch, 2000; Ahmed & Mohammed, 2019; Akhtar <i>et al.</i>, 2019; Akio, 2017; Akram <i>et al.</i>, 2018; Al-Dubai <i>et al.</i>, 2011; Al-Gamal <i>et al.</i>, 2017; Alshahrani <i>et al.</i>, 2018; Al-Shloul & Bdair, 2019; Al-Sowygh, 2013; Alzayyat & Al-Gamal, 2014a; Alzayyat & Al-Gamal, 2014b; Ayed & Amoudi, 2020; Azitaamirfakhraei <i>et al.</i>, 2019; Bam <i>et al.</i>, 2014; Bodys-Cupak <i>et al.</i>, 2016; Bodys-Cupak <i>et al.</i>, 2018; Bodys-Cupak <i>et al.</i>, 2019a; Bodys-Cupak <i>et al.</i>, 2019b; Chan, 1991; Chan <i>et al.</i>, 2009; Cherkil <i>et al.</i>, 2013; Cilliers & Terrblanche, 2014; Crego <i>et al.</i>, 2016; Demir <i>et al.</i>, 2014; Demir & Ercan, 2019; De Witt <i>et al.</i>, 2016; Dhama <i>et al.</i>, 2017; Pereira & Barbosa, 2013; Duic <i>et al.</i>, 2012; Durkin <i>et al.</i>, 2003; Dzibur-Kulenovic & Muhic, 2017; Ersana <i>et al.</i>, 2017a; Ersana <i>et al.</i>, 2017b; Erschens <i>et al.</i>, 2018; Everly <i>et al.</i>, 1994; Farnia <i>et al.</i>, 2013; Felicilda-Reynaldo <i>et al.</i>, 2019; Findik <i>et al.</i>, 2015; Fornes-Vives <i>et al.</i>, 2016; Francis <i>et al.</i>, 2019; Gazder <i>et al.</i>, 2014; Gilbert & Strong, 1997; Gomathi <i>et al.</i>, 2013; Govender <i>et al.</i>, 2015; Gurvoka & Zelenikova, 2018; Hamaideh <i>et al.</i>, 2017; Hammad <i>et al.</i>, 2020; Harris <i>et al.</i>, 2015; Hicdurmaz & Oz, 2016; Higuchi & Echigo, 2016; Higuchi & Echigo, 2017; Hirsch <i>et al.</i>, 2014; Hirschl <i>et al.</i>, 2015; Hogan <i>et al.</i>, 2018; Hoyoung <i>et al.</i>, 2012; Huey-Fen and Yeh, 2005; Imran <i>et al.</i>, 2016; Jahan <i>et al.</i>, 2016; Janse van Vuuren <i>et al.</i>, 2018; Jones <i>et al.</i>, 2011; Jones & Johnston, 1997; Joseph <i>et al.</i>, 2020; Karaca <i>et al.</i>, 2017; Kanika <i>et al.</i>, 2015; Kaya <i>et al.</i>, 2007; Khan <i>et al.</i>, 2016; Kim <i>et al.</i>, 2015; Kim, 2019; Ksiazek <i>et al.</i>, 2015; Kuhlmann <i>et al.</i>, 2016; Kupcewicz <i>et al.</i>, 2020; Lo, 2002; Madhyastha <i>et al.</i>, 2014; Mahfouz & Alsahil, 2016; Malau-Aduli, 2011; Mahat, 1998; Manning-Geist <i>et al.</i>, 2020; Mansoori <i>et al.</i>, 2019; Masiak <i>et al.</i>, 2014; Maynor & Baugh, 2012; McCarthy <i>et al.</i>, 2018; Metz <i>et al.</i>, 2020; Mitchell, 2020; Mitchell & Kampfe, 1990; Mitchell & Kampfe, 1992; Moffat <i>et al.</i>, 2004; Muris <i>et al.</i>, 1995; Nebhinani <i>et al.</i>, 2019; Nechita <i>et al.</i>, 2016a; Nechita <i>et al.</i>, 2016b; Niemi & Vainiomaki, 1999; Niknami <i>et al.</i>, 2015; O'Brien <i>et al.</i>, 2012; Odzemir and Kaya, 2013; Onieva-Zafra <i>et al.</i>, 2020; Palupi & Findyartini, 2019; Rahimi <i>et al.</i>, 2014; Rezapour-Mirsaleh & Aghabagheri, 2020; Russa & Mligiliche, 2014; Ruziana <i>et al.</i>, 2018; Salam <i>et al.</i>, 2019; Samson, 2019; Samuel & Kannappan, 2011; Sandover <i>et al.</i>, 2015;

		Sarwar <i>et al.</i>, 2019; Saxena <i>et al.</i>, 2019; Schillera <i>et al.</i>, 2018; Schreim & Abramovitch, 1996; Sen <i>et al.</i>, 2015; Seyedfatemi <i>et al.</i>, 2007; Shaban <i>et al.</i>, 2012; Shaikh <i>et al.</i>, 2004; Shankar <i>et al.</i>, 2014; Shankar <i>et al.</i>, 2018; Shakthivel <i>et al.</i>, 2017; Sheu <i>et al.</i>, 2002; Shao <i>et al.</i>, 2020; Shdaifat <i>et al.</i>, 2018; Shoua-Desmarias <i>et al.</i>, 2020; Shrestha, 2013; Sikander & Aziz, 2012; Singh <i>et al.</i>, 2016; Sreeramareddy <i>et al.</i>, 2007; Steiner-Hofbauer & Holzinger, 2020; Suliman & Tadros, 2011; Szadowska-Szlachetka <i>et al.</i>, 2020; Tereszko <i>et al.</i>, 2015; Thompson <i>et al.</i>, 2016; Tichy & Means, 1990; Tully, 2004; Van der Merwe <i>et al.</i>, 2020; Wang and Miao, 2009; Wolf <i>et al.</i>, 2015; Wu <i>et al.</i>, 2018; Yamashita <i>et al.</i>, 2012; Yehia <i>et al.</i>, 2016; Yigit <i>et al.</i>, 2016; Yüksel & Bahadır-Yılmaz, 2019; Yusuff <i>et al.</i>, 2013; Yusoff <i>et al.</i>, 2011; Zainah <i>et al.</i>, 2019; Zhao <i>et al.</i>, 2015; Zvauya <i>et al.</i>, 2017
Interview	11	Ching <i>et al.</i>, 2020; Chapman & Orb, 2001; Pereira & Barbosa, 2013; Jan & Popescu, 2014; Kaur <i>et al.</i>, 2020; Liu, 2012; Malau-Aduli, 2011; Niemi & Vainiomaki, 1999; Pau <i>et al.</i>, 2004; Rafati <i>et al.</i>, 2017; Steele <i>et al.</i>, 2005

Data collection refers to the gathering of information relevant to the research (Grove *et al.*, 2013:691). From the extracted data, the data collection methods are presented in Table 3.7 arranged from the most popular data collection method to the least popular. Only two methods of data collection were used to collect data in the included articles. A questionnaire was the most preferred method of data collection (n=148), whereas only 11 studies used interviews.

The most common questionnaires adopted by the researchers were the Brief Coping scale (Brief-COPE) (n=38), Perceived Stress Scale (PSS) (n=38), Coping Behaviors Inventory (CBI) (n=17), General Health Questionnaire (GHQ-12 & GH-30) (n=16), Maslach's Burnout Inventory (MBI) (n=8), Ways of Coping Checklist (WCCL) (n=6), General Self-Efficacy Scale (G-SES) (n=6), Ways of Coping Questionnaire (WOC) (n=5), Medical Student Stressor Questionnaire (MSSQ) (n=5) and Ways of Coping Inventory (WCI) (n=5). According to Rahman (2017:online) and Lobiondo-Wood and Haber (2018:255), questionnaires are more economical and time efficient, as the respondents are usually allowed to complete them in their own time, allowing the researcher to collect data from a larger sample, such as a body of students. Studies should have sound theories/frameworks/models underpinnings.

3.4.4. Underpinning theories/frameworks/models

Theories, modules and frameworks should be included in the reporting of studies, as this directs research and assists in drawing meaningful conclusions. Figure 3.6 contains the underpinning theories, frameworks and models used to guide the included studies.

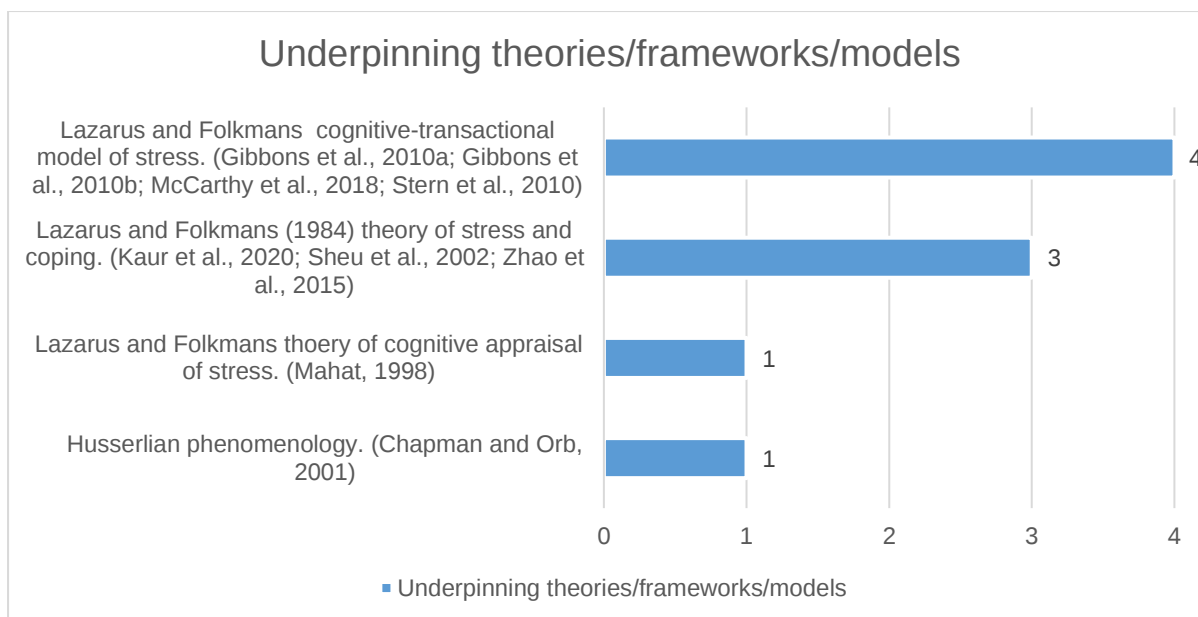


Figure 3.6: Underpinning theories/frameworks/models

Only nine of the 156 studies included had underpinning theories/models/frameworks, whereas 147 studies did not report on the underpinning theories/models/frameworks. The underpinning theories or models in Figure 3.6 have been arranged from the most used theories to the least. Figure 3.6 highlights that the most common underpinning theories or models used in these nine articles are the Lazarus and Folkman's cognitive-transactional model of stress. This theory is the most relevant with regard to studying the stress and coping of health sciences students, as it focuses on the relationship between the person and their environment, and identifies the role that coping plays in this relationship (Kagwe *et al.*, 2018:19; 1Library, 2022:online). This links with the articles included in the study, as the majority of them were done to investigate the stress of health sciences students in relation to clinical practice, and how they cope with the stressors associated with clinical practice. Through this scoping review, the researcher was able to identify specific stressors, which are discussed in the section below.

3.4.5. Stressors identified

The identification of stressors is important for health sciences education institutions to optimally support students. Table 3.9 describes the stressors identified in the studies. The most common to the least common stressors are included in Table 3.8. The total

number of stressors identified (n=208) is depicted, and the sources are listed per stressor.

Table 3.8: Stressors identified

Stressors identified	Number of sources (n=208)	Sources
Academic	71	Abramovitch, 2000; Ahmed & Mohammed, 2019; Al-Dubai <i>et al.</i> , 2011; Al-Shloul & Bdair, 2019; Al-Gamal <i>et al.</i> , 2017; Al-Sowygh, 2013; Alzayyat & Al-Gamal, 2014a; Alzayyat & Al-Gamal, 2014b; Ayed & Amoudi, 2020; Azitaamirfakhraei <i>et al.</i> , 2019; Bodys-Cupak <i>et al.</i> , 2016; Chan <i>et al.</i> , 2009; Cherkil <i>et al.</i> , 2013; Crego <i>et al.</i> , 2016; Demir <i>et al.</i> , 2014; Pereira & Barbosa, 2013; Duic <i>et al.</i> , 2012; Ersana <i>et al.</i> , 2017a; Ersana <i>et al.</i> , 2017b; Everly <i>et al.</i> , 1994; Gazder <i>et al.</i> , 2014; Gibbons, 2010; Gibbons <i>et al.</i> , 2010; Gomathi <i>et al.</i> , 2013; Govender <i>et al.</i> , 2015; Gurvoka and Zelenikova, 2018; Hammad <i>et al.</i> , 2020; Hamaideh <i>et al.</i> , 2017; Harris <i>et al.</i> , 2015; Hirsch <i>et al.</i> , 2014; Huey-Fen & Yeh, 2005; Imran <i>et al.</i> , 2016; Jahan <i>et al.</i> , 2016; Janse van Vuuren <i>et al.</i> , 2018; Jones & Johnston, 1997; Joseph <i>et al.</i> , 2020; Karaca <i>et al.</i> , 2017; Khan <i>et al.</i> , 2016; Ksiazek <i>et al.</i> , 2015; Lo, 2002; Madhyastha <i>et al.</i> , 2014; Malau-Aduli, 2011; Mitchell, 2020; Moffat <i>et al.</i> , 2004; Nebhinani <i>et al.</i> , 2019; Niemi and Vainiomaki, 1999; Russa & Mligiliche, 2014; Sam <i>et al.</i> , 2016; Seyedfatemi <i>et al.</i> , 2007; Shaban <i>et al.</i> , 2012; Shankar <i>et al.</i> , 2014; Shankar <i>et al.</i> , 2018; Shaikh <i>et al.</i> , 2004; Shdaifat <i>et al.</i> , 2018; Sheu <i>et al.</i> , 2002; Singh <i>et al.</i> , 2016; Sikander & Aziz, 2012; Szadowska-Szlachetka <i>et al.</i> , 2020; van der Merwe <i>et al.</i> , 2020; Suliman & Tadros, 2011; Stern <i>et al.</i> , 2010; Steiner-Hofbauer & Holzinger, 2020; Steele <i>et al.</i> , 2005; Sreeramareddy <i>et al.</i> , 2007; Tully, 2004; Wolf <i>et al.</i> , 2015; Wu <i>et al.</i> , 2018; Yamashita <i>et al.</i> , 2012; Yusoff <i>et al.</i> , 2011; Yüksel and Bahadır-Yılmaz, 2019; Zhao <i>et al.</i> , 2015
Psycho-social	59	Abramovitch, 2000; Ahmed & Mohammed, 2019; Al-Dubai <i>et al.</i> , 2011; Al-Gamal <i>et al.</i> , 2017; Al-Sowygh, 2013; Al-Shloul and Bdair, 2019; Alzayyat & Al-Gamal, 2014; Azitaamirfakhraei <i>et al.</i> , 2019; Chan, 1991; Cherkil <i>et al.</i> , 2013; Ching <i>et al.</i> , 2020; Pereira & Barbosa, 2013; Demir <i>et al.</i> , 2014; Duic <i>et al.</i> , 2012; Durkin <i>et al.</i> , 2003; Ersana <i>et al.</i> , 2017a; Ersana <i>et al.</i> , 2017b; Gazder <i>et al.</i> , 2014; Gibbons, 2010; Gomathi <i>et al.</i> , 2013; Govender <i>et al.</i> , 2015; Harris <i>et al.</i> , 2015; Hamaideh <i>et al.</i> , 2017; Hirsch <i>et al.</i> , 2014; Huey-Fen and Yeh, 2005; Imran <i>et al.</i> , 2016; Jahan <i>et al.</i> , 2016; Jones & Johnston, 1997; Karaca <i>et al.</i> , 2017; Khan <i>et al.</i> , 2016; Lo, 2002; Malau-Aduli, 2011; Madhyastha <i>et al.</i> , 2014; Metz <i>et al.</i> , 2020; Mitchell, 2020; Moffat <i>et al.</i> , 2004; Muris <i>et al.</i> , 1995; Nebhinani <i>et al.</i> , 2019; Niknami <i>et al.</i> , 2015; Schreim & Abramovitch, 1996; Yamashita <i>et al.</i> , 2012; O'Brien <i>et al.</i> , 2012; Seyedfatemi <i>et al.</i> , 2007; Shankar <i>et al.</i> , 2014; Shankar <i>et al.</i> , 2018; Sheu <i>et al.</i> , 2002; Sikander & Aziz,

Stressors identified	Number of sources (n=208)	Sources
		2012; Steiner-Hofbauer & Holzinger, 2020; Sreeramareddy <i>et al.</i> , 2007; Steele <i>et al.</i> , 2005; Szadowska-Szlachetka <i>et al.</i> , 2020; Tully, 2004; Van der Merwe <i>et al.</i> , 2020; Wolf <i>et al.</i> , 2015; Wu <i>et al.</i> , 2018; Yüksel and Bahadır-Yılmaz, 2019; Yusuff <i>et al.</i> , 2013; Zhao <i>et al.</i> , 2015
Clinical	50	Abramovitch, 2000; Ahmed & Mohammed, 2019; Al-Gamal <i>et al.</i> , 2017; Alshahrani <i>et al.</i> , 2018; Alzayyat and Al-Gamal, 2014a; Al-Sowaygh, 2013; Alzayyat and Al-Gamal, 2014b; Ayed & Amoudi, 2020; Bam <i>et al.</i> , 2014; Bodys-Cupak <i>et al.</i> , 2016; Bodys-Cupak <i>et al.</i> , 2018; Bodys-Cupak <i>et al.</i> , 2019; Chan <i>et al.</i> , 2009; Ching <i>et al.</i> , 2020; Cilliers & Terrblanche, 2014 Pereira & Barbosa, 2013; Durkin <i>et al.</i> , 2003; Duic <i>et al.</i> , 2012; Ersana <i>et al.</i> , 2017; Findik <i>et al.</i> , 2015; Gibbons, 2010a; Gibbons, 2010b; Gilbert & Strong, 1997; Gurvoka & Zelenikova, 2018; Hamaideh <i>et al.</i> , 2017; Higuchi & Echigo, 2016; Higuchi & Echigo, 2017; Hirsch <i>et al.</i> , 2014; Jahan <i>et al.</i> , 2016; Jan & Popescu, 2014; Janse van Vuuren <i>et al.</i> , 2018; Jones <i>et al.</i> , 2011; Kaur <i>et al.</i> , 2020; Karaca <i>et al.</i> , 2017; Mahat, 1998; Madhyastha <i>et al.</i> , 2014; Mahfouz & Alsahil, 2016; Mitchell & Kampfe, 1992; Mitchell, 2020; Nebhinani <i>et al.</i> , 2019; Rafati <i>et al.</i> , 2017; Shaban <i>et al.</i> , 2012; Sheu <i>et al.</i> , 2002; Shdaifat <i>et al.</i> , 2018; Sikander & Aziz, 2012; Stern <i>et al.</i> , 2010; Szadowska-Szlachetka <i>et al.</i> , 2020; Tully, 2004; Yamashita <i>et al.</i> , 2012; Yüksel & Bahadır-Yılmaz, 2019
Financial	14	Abramovitch, 2000; Al-Dubai <i>et al.</i> , 2011; Al-Shloul and Bdair, 2019; Azitaamirfakhraei <i>et al.</i> , 2019; Durkin <i>et al.</i> , 2003; Jones <i>et al.</i> , 2011; Jones & Johnston, 1997; Malau-Aduli, 2011; Sam <i>et al.</i> , 2016; Schreim & Abramovitch, 1996; Steele <i>et al.</i> , 2005; Shaikh <i>et al.</i> , 2004; Steiner-Hofbauer & Holzinger, 2020; Van der Merwe <i>et al.</i> , 2020
Environmental	9	Abramovitch, 2000; Cherkil <i>et al.</i> , 2013; Demir <i>et al.</i> , 2014; Durkin <i>et al.</i> , 2003; Imran <i>et al.</i> , 2016; Lo, 2002; Schreim & Abramovitch, 1996; Shaikh <i>et al.</i> , 2004; Seyedfatemi <i>et al.</i> , 2009
Physical	2	Lo, 2002; Szadowska-Szlachetka <i>et al.</i> , 2020
Spiritual	1	Szadowska-Szlachetka <i>et al.</i> , 2020
Imposter phenomenon	1	Metz <i>et al.</i> , 2020

Stressors identified	Number of sources (n=208)	Sources
Burnout	1	Erschens <i>et al.</i> , 2018

The stressors in Table 3.8 have been arranged from the most common stressors to the least common stressors identified. Table 3.8 shows that academic stressors are the most common stressor among health sciences students. Psycho-social and clinical stress were also commonly mentioned, with 59 and 50 studies, respectively. Academic stressors include factors such as studying for tests and examinations, heavy workload, frequent tests and examinations, large volumes of study content, and language barriers (Jahan *et al.*, 2016:17). Health sciences education is considered stressful due to high academic demands and work-integrated learning (Hamaideh *et al.*, 2017:197), which could account for academic stress being the most common stressor amongst students. However, academic stress is important for medical students as it enhances learning and assists students in excelling in their academic work. It also exposes them to learning how to work under pressure (Joseph *et al.*, 2020:81). However, students need to utilise coping strategies to cope with stressors.

3.4.6. Coping strategies identified

Coping strategies are essential for undergraduate health sciences students. Figure 3.7 displays the coping strategies identified in this study. The total number of coping strategies (n=382) identified calculated up to 382, as the majority of articles reported on more than one coping strategy. The researcher used the COPE Inventory by Carver (1997) to group the different strategies. Coping strategies can be divided into three categories according to the Brief COPE Inventory by Carver (1997). These are emotion-focused strategies, problem-focused strategies and passive or avoidant strategies (Garcia *et al.*, 2018:2-3).

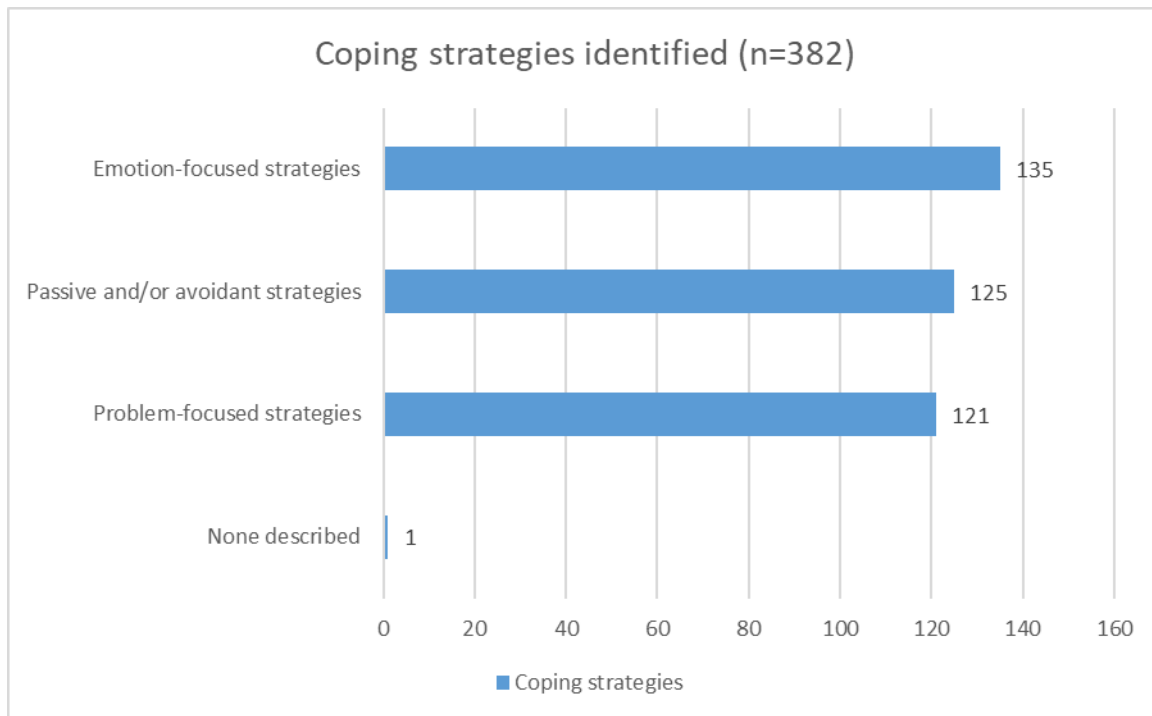


Figure 3.7: Coping strategies identified in included articles

The coping strategies in Figure 3.7 have been arranged from the most common coping strategies to the least common coping strategies identified in the studies. Coping strategies are actions taken in response to a stressful situation or event (American Psychological Association [APA], 2022:online; Freire *et al.*, 2020:2). Figure 3.7 highlights that the most common coping strategies used by students are emotion-focused strategies (n=135). Emotion-focused strategies include acceptance, seeking emotional support, positive reframing, humour and religion. Emotion-focused strategies tend to be used when an individual identifies that they have no control over the stress that they are experiencing, or when an individual lacks the knowledge on how to deal with the stressor (Kamble, 2017:58). Health sciences students encounter a vast range of stressors throughout their training (Henderson *et al.*, 2021:30), which they may perceive as being beyond their control, or they might not know how to deal with certain stressors, which may explain the high prevalence of emotion-focused coping strategies as seen in Figure 3.7.

Problem-focused strategies accounted for n=125 of the studies, and include active coping, planning and seeking instrumental support. Passive or avoidant strategies accounted for n=121 of the studies, and include coping behaviours such as denial,

self-distraction, substance use, behavioral disengagement, venting and self-blame. All studies should report their limitations.

3.4.7. Limitations reported in included articles

Limitations are important for readers to understand the placing of research findings in context as well as for the representation of data. Figure 3.8 depicts that the limitations described in the various reports add up to (n=271) as a number of studies expressed more than one limitation.

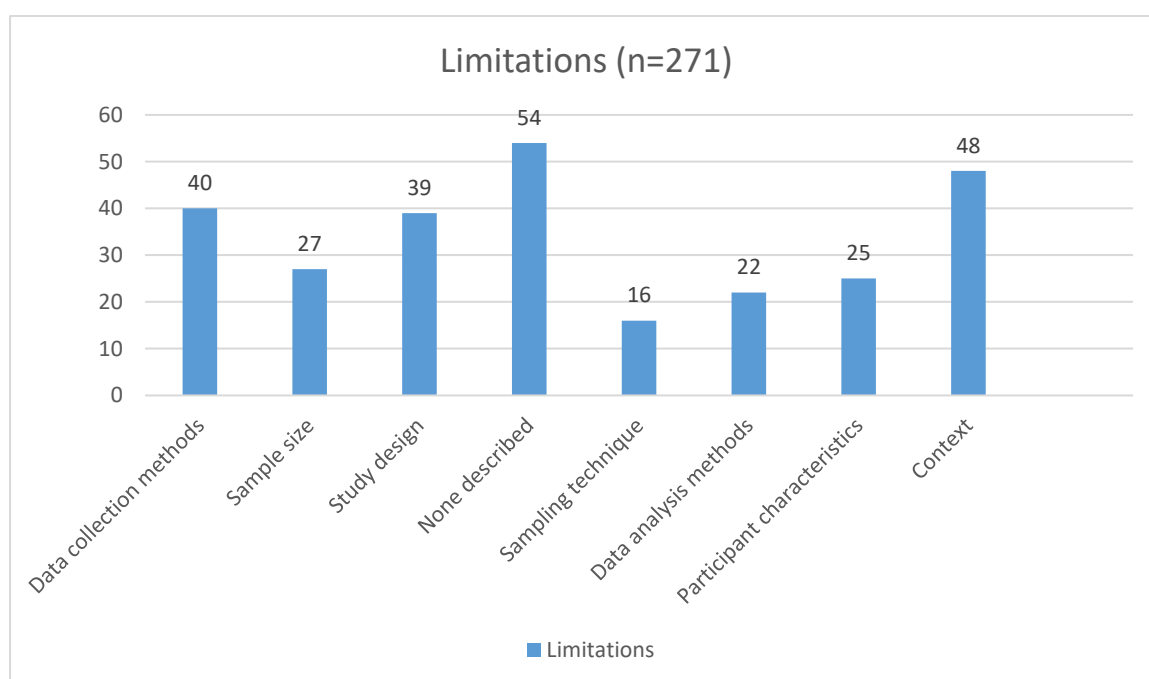


Figure 3.8: Limitations reported in included articles

Limitations in research are any theoretical or methodological weaknesses in a study that may decrease the generalisability of the findings (Grove *et al.*, 2013: 699). Figure 3.8 highlights that 54 of the 156 articles included in the study did not mention any limitations. The context was then noted as the largest aspect of limitation found in the studies.

The context/setting in research provides meaningful information regarding the generalisability of the results. Figure 3.9 demonstrates whether the studies were conducted at a single or at multiple sites.

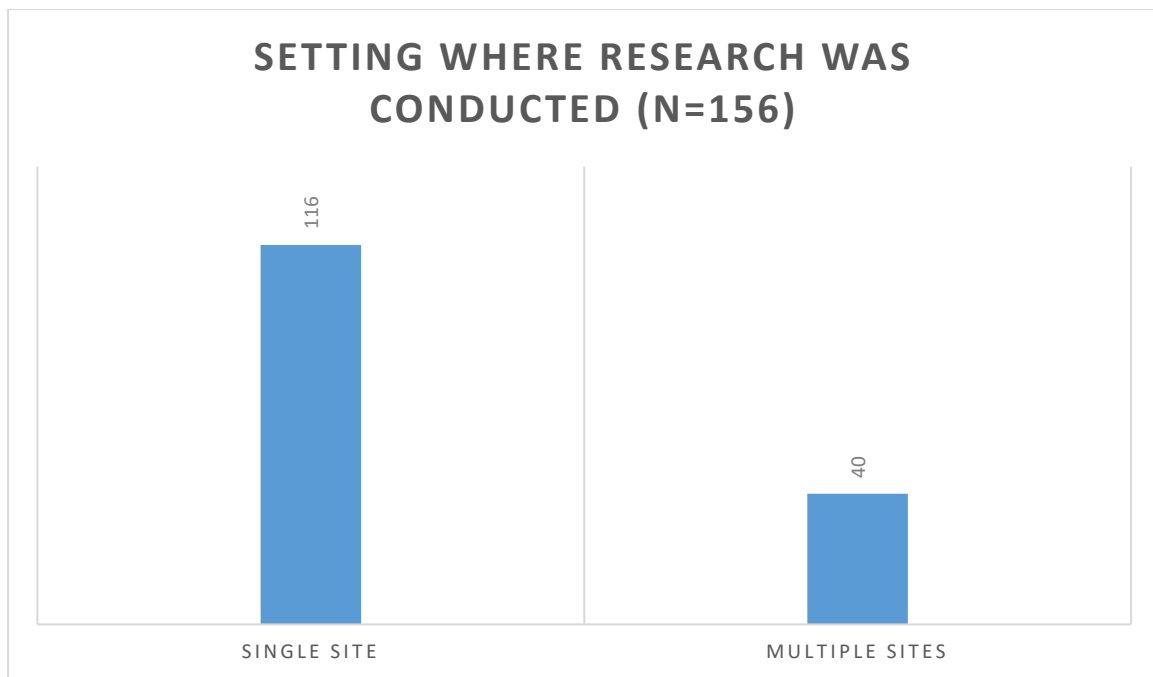


Figure 3.9: Setting where the research was conducted in the included articles

The context, also referred to as the setting, is the location where data were collected (Grove *et al.*, 2013:373). From Figure 3.9 above it is evident that the majority ($n=116$), of the included studies ($n=156$), were conducted at a single site. The researchers reported that data were collected from one university or academic hospital. Only 40 articles reported that the data were collected at more than one site. The financial implications of collecting data at multiple sites could be the reason why 116 of the 156 studies collected data at a single site (Collins, 2022:online). The section below entails a description of the recommendations noted in the articles included in the study.

3.4.8. Recommendations reported in included articles

The recommendations reported in research direct the focus for future studies. Figure 3.10 highlights the recommendations from the reports. The number of recommendations reported in the included articles ($n=221$), in Figure 3.10, does not equal to the number of included studies ($n=156$) as most of the articles presented more than one recommendation.

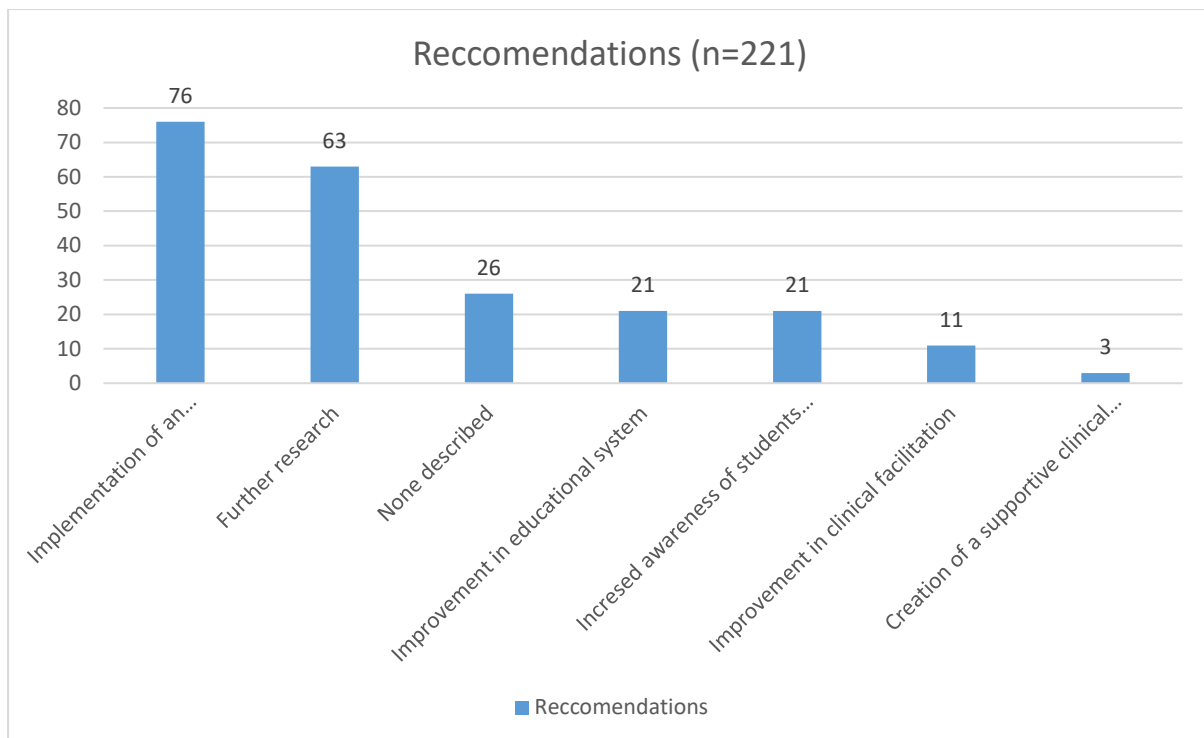


Figure 3.10: Recommendations reported in included articles

The recommendations displayed in Figure 3.10 are arranged from the most common recommendations to the least common. A recommendation in research is applying a study to theory, practice and further research (Lobiondo-Wood & Haber, 2018:515). The most common recommendation was the implementation of an intervention/support programme (n=76), whereas the least recommendation given was the creation of a supportive clinical environment (n=3). The implementation of an intervention or support programme being the most common recommendation could be due to the health sciences students not being able to cope with the stressors they face, or that they are using negative coping mechanisms (Neufeld & Malin, 2021:2). Implementing an intervention or support programme could assist in the academic performance and improvement in students' mental health, as they will be equipped with the necessary coping strategies, allowing them to complete their studies successfully (Klein, 2012:online; Roos *et al.*, 2016:6). The researcher also investigated interventions used studies.

3.4.9. Interventions reported in included articles

Interventions are any treatment, therapies or procedures implemented by a researcher to determine their effectiveness (Grove *et al.*, 2013:698). It was noted that nine of the articles included classified the study design for their interventions as either quasi-experimental, longitudinal, a randomised controlled trial, or a qualitative and exploratory study design. One study did not describe the type of study design used but implemented an intervention. However, based on the review of the full text articles, the following interventions were found, as depicted in Figure 3.11. A description of Figure 3.11 follows, showing which interventions were most frequently used.

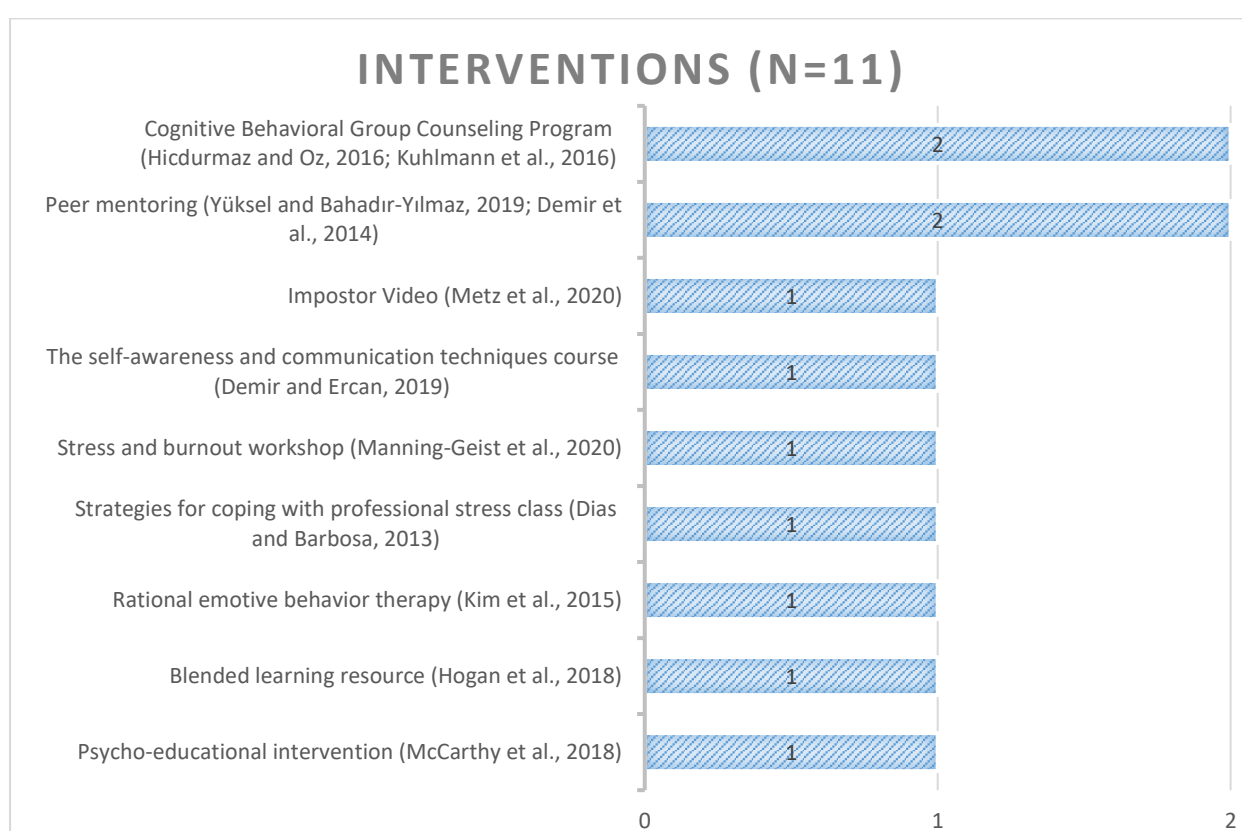


Figure 3.11: Study interventions reported in the included articles

The interventions in Figure 3.11 have been arranged from the most common interventions noted to the least common. Figure 3.11 highlights that only 11 out of 156 were intervention studies. The Cognitive Behavioral Group Counselling Program (n=2) and Peer mentoring (n=2) are the most common interventions. Cognitive Behavioral Counselling is a common method of therapy and focuses on teaching an individual how to overcome despondency caused by stress. It further encourages an individual

to learn positive strategies to cope with stress (In Balance Counseling, 2022:online). This is particularly effective in assisting health sciences students to cope with stressful situations and how to employ positive coping strategies (Hicdurmaz & Oz, 2016:156-157). Peer mentoring is also a common intervention in health sciences. It assists students with learning adequate career development skills, such as coping skills, and mentees learn from mentors with more experience (Robson-Kelly, 2022:online; Cree-Green *et al.*, 2020:1129-1130). In health sciences, junior students learn from senior students, which could be the reason why peer mentoring was one of the common interventions identified. The next section describes the outcome of the interventions applied in the studies.

3.4.10. Outcome of the interventions noted in the included articles

Figure 3.12 contains the outcome of the interventions noted in the studies. A description of the table follows below, showing which interventions were most frequently used.

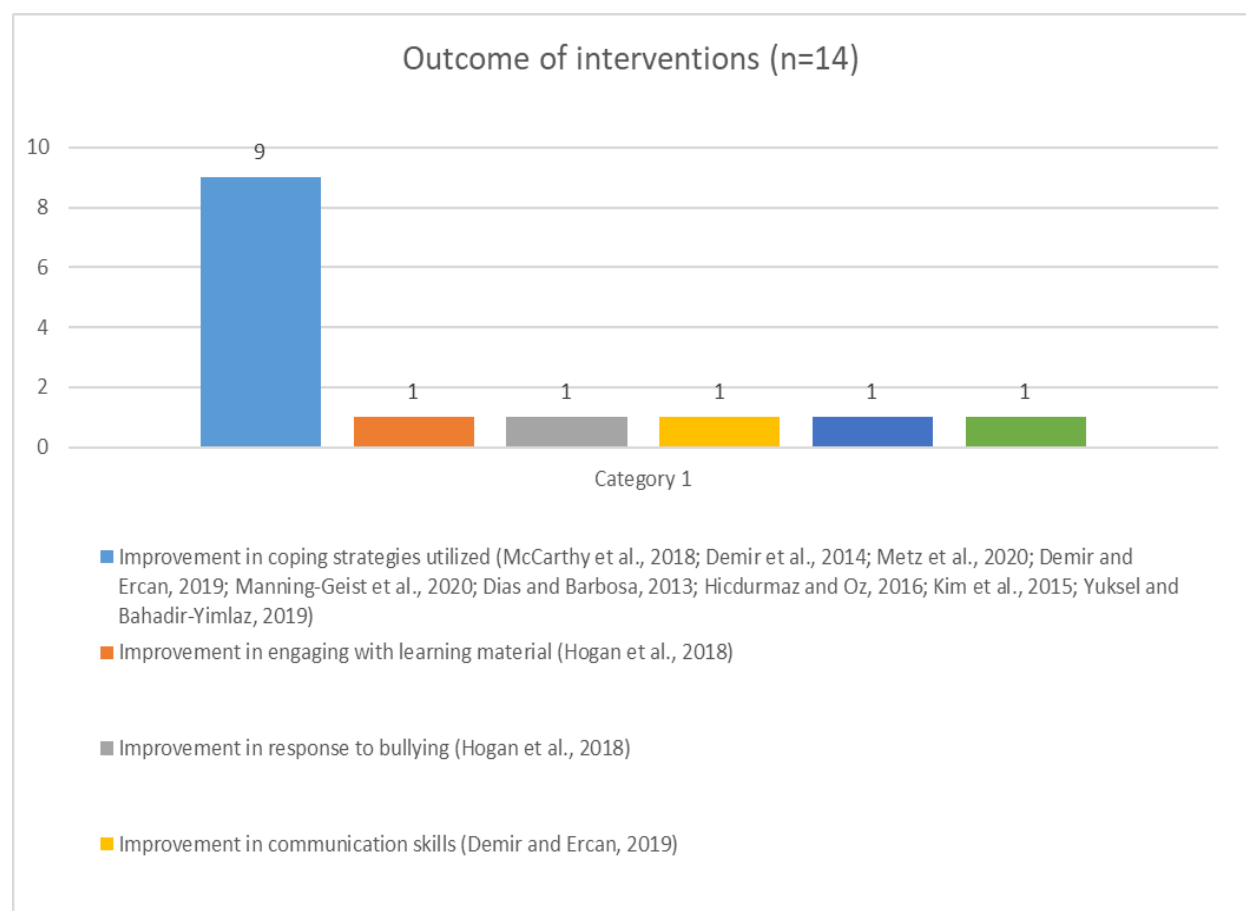


Figure 3.12: Outcomes of the interventions noted in the included articles

Outcome of interventions refers to the success of any intervention rendered during a study. The outcomes of the interventions in Figure 3.12 have been arranged from the most to the least reported outcome of the applied interventions. Only 11 of the 156 included articles were intervention studies, and all of these articles reported the outcome of the intervention. However, one of the studies was a follow-up study and did not report on the initial intervention, and two of the studies reported more than one outcome of the intervention, hence (n=14). Of the studies, the largest outcome was an improvement in coping strategies (n=9), as depicted in Figure 3.12. It was reported in the studies (see the attached Microsoft Excel spreadsheet) that students now made use of problem-focused coping strategies and positive coping strategies instead of negative coping or avoidance coping strategies. The conclusion of this chapter follows below.

3.5. Summary of this chapter

This chapter provided an elaboration of the data analysis and interpretation, which are steps 6 to 8 of the scoping review framework. The next chapter provides a detailed description of the last step of a scoping review, which is to provide a summary of the evidence, make conclusions, and note limitations and recommendations.

Chapter 4 Conclusions, limitations and recommendations

4.1. Introduction

This chapter concludes this study and summarise the research findings, as well as recommendations for Health Sciences Education Institutions (HSEIs) and future research and limitations. The value of the study and the researcher's self-reflection on the research journey are also elaborated on. The research approach is summarised in the next section.

4.2. Outline of the study

Students in health sciences need support to cope with their academic workload (Hwang & Kim, 2022:1-2) and reduce potential drop-out (Roos *et al.*, 2016:6). There is a vast range of literature already available on the coping of undergraduate health sciences students. However, the researcher could not find any scoping study to investigate the available evidence on coping strategies of undergraduate students in health science programmes. Therefore, a scoping review methodology was utilised to systematically guide this study. The researcher used the PCC (Participants, Concept and Context) format to compile the following review question:

- What is known from the literature regarding the coping strategies of undergraduate students in health sciences programmes?

The researcher made use of the nine steps of a scoping review (Peters *et al.*, 2020b: 2220). The first step was the formulation of the research question based on the PCC mnemonic. The next step was to develop the inclusion and exclusion criteria. Once these had been finalised, a search string was formulated based on the PCC mnemonic, assisted by the same information specialist that was present during the evaluation committee. The search string was utilised on fifteen EBSCOHost databases. A total of 1432 records were generated. From those records, 319 full text articles were then screened, and 163 articles were excluded as they did not meet the inclusion criteria, bringing the total number of articles to 156 to be included in this study. The summary of the findings of this scoping review, as well as the gaps, are discussed next.

4.3. Summary of the findings and gaps

The aim of this scoping review was to determine what is known from the literature regarding the coping strategies of undergraduate students in health sciences programmes. The researcher answered the review question by representing the findings in Chapter 3 and by summarising the findings of the study, which also forms part of step nine of the scoping review framework, as highlighted in Figure 4.1.

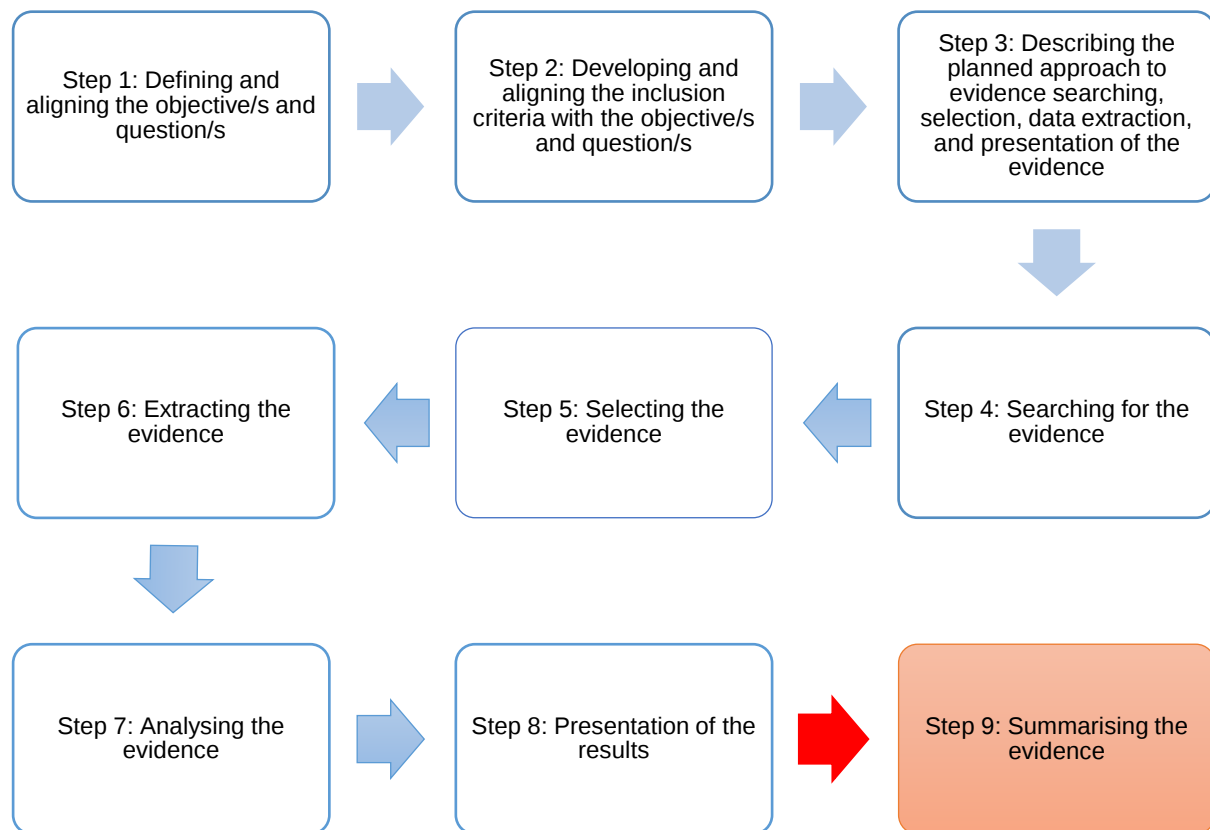


Figure 4.1: Scoping review framework. (Peters et al., 2020a:412)

The main findings and identified gaps of this study are presented in Table 4.1 below. A discussion of the table follows. The researcher will present the main findings by highlighting categories and their respective findings and gaps.

Table 4.1: Main findings and identified gaps

Categories	Main findings	Gaps
Countries where studies were conducted	Most of the studies were conducted in the United States of America.	Seven of the 156 studies were conducted in Africa.
Health sciences profession	Nursing and medicine were the most reported health sciences profession (90%).	Coping strategies in other healthcare professions need to be investigated.
Underpinning theories, frameworks and models	Only nine articles reported on the underpinning theories, frameworks and models used.	The majority of the studies did not describe any theoretical underpinnings, frameworks or models used.
Method and design	Predominantly quantitative and descriptive research with diverse aims. The majority of the studies used questionnaires as a data collection method, and also collected data at a single-site.	A limited number of multi-site studies were done, and more intervention studies are needed.
Sampling	The majority of the studies did not indicate information on how sampling was done.	A lack of information on sampling methods of studies.
Study intervention	Only nine of the studies reported on the improvement in coping strategies post-intervention.	A lack of information on the effectivity of interventions rendered.
Coping strategies identified	Emotion-focused coping is the most frequently used strategy.	Support services offered to students to assist in coping effectively.

Health sciences undergraduate training is deemed stressful, thus making it important for students to have functional coping strategies for dealing with stressors (Naidoo *et al.*, 2014:258-259; Neufeld & Malin, 2021:1-2). The researcher identified several gaps in Chapter 3, which resulted in the categories presented. The main findings of this scoping review and the gaps identified were presented in Table 4.1, which contribute to the answering of the review question.

From Table 4.1, it can be noted that the majority of the studies were conducted in the USA, which is a country with a developed economy, according to the United Nations (2020:165). Only seven studies were conducted in Africa, which is a continent with an economy still under development (United Nations, 2020:166). There is a gap in literature pertaining to the coping of undergraduate health sciences students in the African context. The next category to be discussed is the health sciences profession.

The majority (90%) of the participants in the included studies were nursing and medical students. A reason the increase in research on medical and nursing students could be the great shortage of nurses and doctors (Dzakula *et al.*, 2022:107; Gaines, 2022:online; Hansen, 2020:online). There is a lack of literature on the coping strategies used by other health sciences professions such as physiotherapy, occupational therapy, dentistry and paramedics. The researcher further identified a gap in the underpinning theories, frameworks and models.

Lobiondo-Wood and Haber (2018:76) report that when a study is placed within a theoretical context, the theory guides the researcher on how to conduct the study, which makes it important for a study to work from a theoretical framework or underpinning. Of the 156 included articles, only nine articles reported on the theoretical underpinnings, models or frameworks used, whereas 147 did not report, which is an identifiable gap. The gap identified with regard to the methodology and study design is discussed next.

The majority of the articles included in this study made use of quantitative methodologies and designs. It was also noted that most of the studies made use of a single site to collect data. There is a lack of multi-site studies on the coping of undergraduate health sciences students. Collecting data at a single site serves as a limitation in research, as multi-site studies assist in the generalisability of a study to

the larger population (Grove *et al.*, 2013: 699; Lobiondo-Wood & Haber, 2018:213). Sampling plays an important role in research.

From the results of this study, it is evident that most of the studies did not report on the sampling technique used to select participants. Lobiondo-Wood and Haber (2018:213) highlight that several problems in research cannot be resolved unless the researcher makes use of rigorous sampling procedures. Intervention studies are particularly important for research pertaining to the coping of health sciences students.

Only 11 of the 156 studies were intervention studies, and of those 11, only nine studies reported an improvement in the coping strategies applied by students post-intervention. Literature on this aspect is lacking. The most used coping strategy by health sciences students were also identified in this study.

The studies revealed that students make use of emotion-focused coping strategies to cope with stress such as, acceptance, seeking emotional support, positive reframing, humour and religion. Problem-focused strategies were found to be the second most utilised coping strategies. The systemic model of transfer of learning as adopted from Botma *et al.* (2013:39) and Donovan and Darcy (2011:online) highlights that student's characteristics have an influence on the student's motivation to transfer. If a student is not equipped with the necessary skills to handle the stressors they come across while enrolled at an HEI, then the transfer of learning will not take place. An effective support system in Higher Education Institutions (HEIs) is particularly important to assist students in coping with the stressors they encounter by making use of problem-focused coping strategies instead of emotion-focused strategies (Vimal *et al.*, 2021:2). Data on support services offered to students to assist them with coping is identified as a gap.

In conclusion, undergraduate health sciences students encounter a vast range of stressors throughout the course of their training. The systemic model of transfer of learning as adopted from Botma *et al.* (2013:39) and Donovan and Darcy (2011:online) as explained in the conceptual framework in chapter 1, reports that there is a relationship between student characteristics which are inadequate coping strategies and the transfer of learning, making it essential for HEI's to be equip students with problem-focused coping strategies so that the transfer of learning may take place. This

scoping review was conducted to determine what is known from literature regarding the coping strategies of undergraduate students in health sciences programmes. The results of this scoping review highlight that there is still a great need for further research on the coping of undergraduate health sciences students. HEI's would benefit from developing and reporting on functional support programmes to assist students in coping with the stressors they encounter throughout their studies, so that the transfer of learning may take place, in turn producing competent health care professionals needed to address the ongoing worldwide shortage of health care professionals. In the next section, the researcher highlights the limitations of this scoping review.

4.5. Recommendations of this study

Based on the finding and gaps identified in this scoping review, the researcher was able to generate recommendations for future research on the coping strategies of undergraduate health sciences students, and also recommendations to educators at nursing education institutions. The researcher will first commence this section with recommendations of future research.

4.5.1. Future research

The researcher proposes the following recommendations for future research:

- Conduct more research on the coping strategies of health sciences students in low- to middle-income countries such as within the African context.
- Coping strategies in other health sciences students such as dentistry, dietetics, sport and exercise science, occupational therapy, optometry, paramedicine, pharmacy, physiotherapy and radiography need to be explored.
- Conduct more intervention studies and note the effectiveness and outcomes of the interventions on coping strategies used post-intervention.
- Research on the theoretical underpinnings, frameworks and models guiding research on the coping strategies of undergraduate students in health sciences can strengthen the quality of studies.
- Further research on the type of support services offered to students by HEIs should be investigated.
- Multi-site research should be done as it can provide a larger and more diverse sample that can detect significant associations.

- Future research on coping strategies amidst the COVID-19 pandemic and post-pandemic.

4.5.2. Health Sciences Education Institutions

The researcher suggests the following recommendations to HSEI's:

- The training of educators and clinical facilitators on identifying the stressors of students and how to assist students in coping effectively with stressors or refer them to the appropriate unit or person.
- The development of functional support programmes to assist nursing students in coping with stressors.
- Raise awareness of such support programmes under students and staff.
- Monitor existing support programmes timeously in HEI's for effectiveness.

4.6. Limitations of this study

All studies have certain limitations. The researcher acknowledges the following limitations identified in this study:

- Four articles in any language other than English were excluded, after the researcher was unable to obtain the English versions of the articles. Articles in other languages could have provided significant data regarding the coping strategies that undergraduate health sciences students use.
- Theoretical articles, theses and dissertations were excluded from the study as the researcher was only interested in peer-reviewed studies generated through the search. Including such literature could have contributed to this study by giving a greater insight into the coping strategies used by undergraduate health sciences students.
- Articles on the coping of undergraduate health sciences students related to the COVID-19 pandemic were also excluded. Data collected regarding the coping of health sciences students during the COVID-19 pandemic, might have given a false representation of the coping strategies used by students.
- Nursing and medicine constitute 90% of the health sciences professions from the articles included in this study, making it difficult to generalise the results of this scoping review to all health sciences students.

- The available support services were included as a category in the preliminary data extraction table, however during the piloting of the extraction table support services available to students were removed as the review question focused on coping strategies and not support services. Adding support services in the data extraction table could have provided more insight into the coping strategies of students.

4.6. Value of the study

This study aimed to identify the published evidence available on the coping strategies of undergraduate health sciences students. This scoping review enabled the researcher to identify which methods are used when researching the coping strategies of undergraduate health sciences students. The study enabled the researcher to identify which coping strategies health sciences students use to cope with stressors, and from the findings, the researcher was able to generate recommendations on how to improve the available support structures at HSEI's.

This scoping review also aimed to identify the underpinning theories supporting research on the coping strategies of undergraduate health sciences students. From the findings, the researcher was able to make recommendations to health sciences programmes in health sciences education institutions, which could guide policy change and assist students in identifying appropriate coping strategies.

The value of this study also addressed a call in the profession that more reviews should be done and published (Sigma and editor of Nursing Scholarship in 2022) to identify the value of research as well as gaps in literature. The researcher's self-reflection follows below.

4.7. Self-reflection

As I take a look back to 2019, when I had just enrolled for Research Methodology (NVRT 7905), to where I am now in 2022, at the end of my Master's in Nursing journey, I realise how much I have grown, not only as a researcher over the years but also as an individual.

I registered for the NVRT 7905 methodology course with limited knowledge, and only a glimpse of research based on the module I did as part of my undergraduate training. I am now confident to say that I now have sufficient knowledge to conduct research independently. Research has instilled a certain level of maturity in me, and I no longer perceive research as tedious.

I have always been a meticulous student, however, conducting a scoping review has helped me to focus even more on the finer details of the information that one could easily miss. My academic writing skills have definitely improved, based on the constructive feedback I received from my supervisors.

From a professional stance, I work as a clinical facilitator for undergraduate Nursing students at a School of Nursing. Conducting this scoping review on the coping of undergraduate health sciences students has assisted me in my work as a clinical facilitator. I have become more mindful as a nurse educator of the stressors that students encounter as part of their nursing training. This scoping review has assisted me in becoming more aware of the coping strategies students use to deal with stressors, enabling me to identify students who are not coping, and assisting them with the necessary support.

My supervisors have planted seeds of being a researcher in me, and I cannot wait to see these seeds bloom. I now realise my potential and the ability to achieve anything I set my mind on.

This journey was not an easy one. It entailed a lot of reading, a lot of writing, sometimes missing out on all the fun stuff happening around me, and lots of “I don’t think I can do this” days, but in the end, it was all worth it, as I am able to provide NEIs with recommendations on how we can support students better, which is quite fulfilling.

4.8. Summary

This chapter includes a summary of the study. This scoping review was conducted to determine what is known from literature regarding the coping strategies used by undergraduate students in health sciences programmes. By following the nine steps of the scoping review framework (Peters *et al.*, 2020a:412), answers could be found to the review question. The main findings of this scoping review highlighted certain

gaps as mentioned in Table 4.1. The researcher then made recommendations for future research to HSEI's on the implementation of effective support programmes and the training of nurse educators. Despite certain limitations, this review provides valuable information to HSEI's. The study was concluded with a description of the value of the study and self-reflection by the researcher.

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Addendum A: Ethics Clearance

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Health Sciences Research Ethics

06-May-2021

Dear Miss Tlholohelo Kataza

Ethics Clearance: **Coping strategies of undergraduate students in health sciences: a scoping review** Principal Investigator: **Miss Tlholohelo Kataza**

Department: **School of Nursing Department**
(Bloemfontein Campus) [Submission Page](#)

APPLICATION APPROVED

Please ensure that you read the whole document

With reference to your application for ethical clearance with the Faculty of Health Sciences, I am pleased to inform you on behalf of the Health Sciences Research Ethics Committee that you have been granted ethical clearance for your project.

Your ethical clearance number, to be used in all correspondence is: **UFS-HSD2021/0084/2505**

The ethical clearance number is valid for research conducted for one year from issuance. Should you require more time to complete this research, please apply for an extension.

We request that any changes that may take place during the course of your research project be submitted to the HSREC for approval to ensure we are kept up to date with your progress and any ethical implications that may arise. This includes any serious adverse events and/or termination of the study.

A progress report should be submitted within one year of approval, and annually for long term studies. A final report should be submitted at the completion of the study.

The HSREC functions in compliance with, but not limited to, the following documents and guidelines: The SA National

Health Act. No. 61 of 2003; Ethics in Health Research: Principles, Structures and Processes (2015); SA GCP(2006); Declaration of Helsinki; The Belmont Report; The US Office of Human Research Protections 45 CFR 461 (for non-exempt research with human participants conducted or supported by the US Department of Health and Human Services- (HHS), 21 CFR 50, 21 CFR 56; CIOMS; ICH-GCP-E6 Sections 1-4; International Council for Harmonisation (ICH) Harmonised

Guideline, Integrated Addendum to ICH E6(R1), Guideline for Good Clinical Practice (GCP) E6(R2), 2016, SAHPRA Guidelines as well as Laws and Regulations with regard to the Control of Medicines, Constitution of the HSREC of the Faculty of Health Sciences.

For any questions or concerns, please feel free to contact HSREC Administration: 051-4017794/5 or email EthicsFHS@ufs.ac.za.

Thank you for submitting this proposal for ethical clearance and we wish you every success with your research.

Yours Sincerely



Prof. A. Sherriff
Chairperson: Health Sciences Research Ethics Committee

Health Sciences Research Ethics Committee

Office of the Dean: Health Sciences

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Addendum B: Microsoft Excel Data Extraction Sheet

See Microsoft Excel accompanying this dissertation.

Addendum C: Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (Prisma-Scr) Checklist

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	Cover page
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	Page iv-v
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	Page 6-7
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	Page 7
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	Page 12 and 25
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	Page 11-12
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	Page 26
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Page 26
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	Page 27-28

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	Page 30-32
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Page 30-32
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	N/A
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	Page 33
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Page 26-28
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Page 30-64
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	N/A
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Page 30-64
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Page 66 - 69
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	Page 66-69
Limitations	20	Discuss the limitations of the scoping review process.	Page 70-71
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Page 73
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	N/A

JBİ = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBİ guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.* 2018;169:467–473. doi: [10.7326/M18-0850](https://doi.org/10.7326/M18-0850).

Addendum D: TURN-IT-IN Plagiarism Report

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Addendum E: Declaration of Language Editor

To whom it may concern

This is to state that the Master's study titled *Coping strategies of undergraduate students in health sciences: a scoping review* by Tlholohelo Kataza has been language edited by me, according to the tenets of academic discourse. The final responsibility for applying any proposed corrections lies with the author.

A handwritten signature in black ink, appearing to read 'Adam Preez', with a stylized flourish at the end.

B.Bibl.; B.A. Hons. (English)

22-11-2022