The mental wellbeing of engineering students: a scoping review protocol. [Protocol]

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The Mental Wellbeing of Engineering Students: A Scoping Review Protocol

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Introduction

The mental wellbeing (MW) of higher education students is a subject that has increased in visibility in recent years. In 2010, a systematic review looking at mental health in students worldwide highlighted that student mental health is poorer than the general population.[1] In a UK survey, 20% of students considered themselves to have poor MW with 13% reporting suicidal thoughts, and 92% identifying as having had feelings of mental distress.[2] The survey also highlighted that students generally do not disclose mental health issues with their institutions with 80% reporting stigma as a barrier[2]. In a report for the Royal College of Psychiatrists in 2011 it was noted that the time when the risk of development or onset of schizophrenia or bipolar disorder is highest is also the time when it is likely young adults are entering higher education[3]. The report discussed the high risk that young adults face in potentially developing a serious mental illness. Incidence of schizophrenia in males is significantly higher than in females.[3,4] In a recent publication by the Scottish Public Health Observatory in 2015,[5] the suicide rate for males in Scotland was more than two and a half times than that for females. In the UK in 2018 the male suicide rate was more than three times higher than for females, with 17.2 male deaths per 100,000 compared with 5.4 female deaths per 100,000[6]. Results from studies in 2007,[7] and 2016,[8] demonstrated only 36% of students screening positive for major depression had received treatment. Both studies highlighted that the perception that student stress is "normal" is a barrier to help-seeking.

Engineering degree programmes are challenging and competitive in nature with a male-skewed gender balance. The majority of engineering students are young adult males with nearly 85% of engineering undergraduates identified as men in the UK. In Australia, it is 84.4% , Canada 86.3%, USA 81.3% and EU 72.6%.[9], [10] In addition to the published research related to the mental health and wellbeing of young adult men, it has also been reported that female engineering students report poorer mental wellbeing than their male counterparts.[13] There is a global shortage of engineers,[11,12] and while the reasons for this are as yet not clear, mental wellbeing can impact on student attainment and so calls for education reform are beginning to grow.[12]

Before carrying out a systematic review to identify the effectiveness of interventions for mental wellbeing in engineering students, it is important to identify existing research in this area. A scoping review to map the available evidence of mental wellbeing in engineering students should therefore be carried out. An initial search of the JBI Database of Systematic Reviews and Implementation Reports, Prospero and Cochrane Library have not identified any systematic reviews or protocols on this topic area. Considering the lack of mapping of existing research, it is appropriate that a systematic scoping review is conducted on this topic. A systematic scoping review would potentially highlight key themes relating to the mental wellbeing of engineering students.[13]

Considering the evidence available for students as a population indicates higher risk of mental ill health, the challenging nature of engineering courses and the majority of the engineering student population being a higher risk group (male, aged 18-25) and the minority population reporting poorer mental health it is appropriate that a scoping review is conducted to map the evidence to support mental wellbeing in engineering students.

Review Question

What research has been conducted to support mental wellbeing in engineering student populations?

- What types of research studies have been conducted to support wellbeing in engineering populations?
- What mental wellbeing interventions have been carried out with engineering students?
- What outcomes have been reported for mental wellbeing interventions in engineering student populations?

Keywords

Engineering Students; Mental Wellbeing; Scoping Review

Inclusion Criteria

Participants

The scoping review will consider studies that include participants over the age of 17 who are engineering students of any gender. The types of engineering student where possible will be categorised using the principal subject codes outlined by HESA[14] (Higher Education Statistics Agency):

(H0) Broadly-based programmes within engineering & technology
(H1) General engineering
(H2) Civil engineering
(H3) Mechanical engineering
(H4) Aerospace engineering
(H5) Naval architecture
(H6) Electronic & electrical engineering
(H7) Production & manufacturing engineering
(H8) Chemical, process & energy engineering
(H9) Others in engineering

The search strategy includes the term engineer in addition to "engineering student" to ensure all available literature is identified. The focus of the review however is engineering students or student engineers and therefore papers only looking at professional engineers will be excluded.

Concept

To identify studies with a focus on mental wellbeing in the engineering student population. The focus of the protocol is on mental wellbeing rather than diagnosed mental illness therefore studies that focus on mental health illness will be excluded.

Context

The context of the review is within the engineering population in an academic setting i.e. university or college in any country.

Types of Sources

This scoping review will consider both experimental and quasi-experimental study designs including randomized controlled trials, non-randomized controlled trials, before and after studies and interrupted time-series studies. In addition, analytical observational studies including prospective and retrospective cohort studies, case-control studies and analytical cross-sectional studies will be considered for inclusion. This review will also consider descriptive observational study designs including case series, individual case reports and descriptive cross-sectional studies for inclusion.

Qualitative studies will also be considered that focus on qualitative data including, but not limited to, designs such as phenomenology, grounded theory, ethnography, qualitative description, action research and feminist research. In addition systematic reviews that meet the inclusion criteria will also be considered. Text and opinion papers will also be considered for inclusion in this scoping review in order to be fully inclusive.

Methods

Search Strategy

The proposed scoping review will be conducted in accordance with the Joanna Briggs Institute Reviewer's Manual methodology for scoping reviews utilizing a three-step search strategy.[13] An initial limited search of MEDLINE, CINAHL, JBI Evidence Synthesis and Cochrane Library was undertaken followed by analysis of the text words contained in the title and abstract and of the index terms used to describe the article. The following initial keywords were used: engineers or engineering students, and mental health.

The second step, using all identified keywords and index terms, was developed and will be undertaken across all included databases: Business Source Complete, CINAHL, Cochrane Library, Compendex, Emerald, Epistemonikos, EPPI Centre, ERIC, JBI Evidence Synthesis, MEDLINE, PsycARTICLES, Scopus, SocINDEX, and Web of Science. The final step will be screening of the reference lists of all included studies for additional studies. A full search strategy example for CINAHL is detailed in Appendix I.

A search of grey literature will be carried out on Google and Google Scholar, the British Library Thesis Index (EThOS), World Health Organization's library database (WHOLIS), ProQuest Digital Dissertations, OpenGrey, Royal Academy of Engineers, IEAust, NSPE and The Conference Papers Index. A modified search using the terms "engineers AND mental health" and "engineering students AND mental health" will be applied to grey literature sources.

Studies published in English will be included. A lack of funding to support translation prevents the inclusion of studies in other languages. Studies published since inception will be included as this search has not been carried out before and earlier publications may still hold relevance.

Study Selection

Following the search, all identified citations will be collated and uploaded into REFWORKS (ProQuest) and duplicates removed. All sources of evidence retrieved will then be uploaded to COvidence to facilitate screening. Titles and abstracts will be screened by two independent reviewers for assessment against the review inclusion criteria. Sources of evidence that meeting this criteria will then be retrieved in full and assessed in detail against the inclusion criteria independently by two reviewers. Full text studies that do not meet the inclusion criteria will be excluded and reasons for exclusion will be provided in an appendix in the final scoping review report. The results of the search will be reported in full in the final report and presented in a PRISMA flow diagram.[15] Any disagreements that arise between the reviewers will be resolved through discussion, or with a third reviewer.

Data Extraction

Data relevant to this review will be extracted from included sources of evidence by two independent reviewers using the standardized Joanna Briggs Institute data extraction tool.[14] The data extracted will include specific details about the population, concept, context, study methods and key findings relevant to the review objectives such as interventions (including delivery method, content, frequency, length, who delivers) and outcomes. A draft charting table is provided (see Appendix 2).

The draft data extraction tool will be modified and revised as necessary during the process of extracting data from each included study. Any modifications will be detailed in the full scoping review report. Any disagreements that arise between the reviewers will be resolved through discussion, or with a third reviewer. Authors of papers will be contacted to request missing or additional data, where required.

As per Scoping review methods, no critical appraisal of included sources of evidence will be conducted in this review. [13]

Data Presentation

The extracted data will be presented visually in diagrammatic or tabular form in a manner aligning with the objective of this scoping review. A narrative summary will accompany the tabulated and/or charted results and will describe how the results relate to the review's objective and questions.

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Conflicts of Interest

The authors declare no conflict of interest.

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Appendices

Appendix 1: Search Strategy

CINAHL

Search Mode Boolean/Phrase

Special limiters

- Language: English
- Age groups: Adolescence (13-17 years – to capture any data on young students at university)
  : Young Adulthood (18-29)
  : Thirties (30-39)
  : Forties (40-49)
  : Adulthood (18 years and older)

	Limiter/Filter	**Search Term**	**Operator**	**Limiter/Filter**	**Search Term**
1	TX	"Engineers"	AND	TX	"Mental Health"
2	TX	"Engineers"	AND	TX	"Anxiety"
3	TX	"Engineers"	AND	TX	"depression or depressive disorder or depressive symptoms or major depressive disorder"
4	TX	"Engineers"	AND	TX	self-esteem or self-concept or self-worth or self-evaluation or self-perception
5	TX	"Engineers"	AND	TX	"Stress"
6	TX	"Engineering Students"	AND	TX	"Mental Health"
7	TX	"Engineering Students"	AND	TX	"Anxiety"

8	TX	"Engineering Students"	AND	TX	"depression or depressive disorder or depressive symptoms or major depressive disorder"
9	TX	"Engineering Students"	AND	TX	"self-esteem or self-concept or self-worth or self-evaluation or self-perception"
10	TX	"Engineering Students"	AND	TX	"Stress"
11	#1 OR #2 OR' #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10				

Appendix 2: Data Extraction Instrument

Study	Author	Year of Publication	Country of Origin	Aims	Study Population	Methodology	Context	Intervention	Outcomes	Conclusions