



Ethics Education in Allied Health: A Systematic Review of Learning Outcomes for Entry-Level Students

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To cite this article:

Louise K. Wiles, Carolyn M. Murray, Amy Baker, Angela Berndt, Kobie Boshoff. Ethics Education in Allied Health: A Systematic Review of Learning Outcomes for Entry-Level Students. *Humanities and Social Sciences*. Special Issue: Ethical Sensitivity: A Multidisciplinary Approach. Vol. 4, No. 2-1, 2016, pp. 13-24. doi: 10.11648/j.hss.s.2016040201.13

Received: December 21, 2015; **Accepted:** December 23, 2015; **Published:** May 13, 2016

Abstract: The complexities of modern healthcare pose a range of ethical issues for health professionals. In preparing student health professionals for these complexities, entry-level education must go beyond exposure to ethical theory, codes and standards. The aim of this systematic review was to determine the student learning outcomes reported in peer-reviewed allied health literature following ethics training. The review method included an *a priori* protocol, adherence to PRISMA statement, with critical appraisal via the Critical Appraisal Checklist for an Article on an Educational Intervention and The Critical Appraisal Skills Program (CASP) Qualitative Checklist. From a total of 1237 possible records published between 1991 and 2015, 11 studies of variable methodological quality met the inclusion criteria for final synthesis. Studies focused on teaching to occupational therapy, physiotherapy, pharmacy and dietetics students (n=588). Heterogeneity among studies precluded meta-analysis and data were synthesised qualitatively in a narrative format. A range of outcomes measures were used in the reviewed publications including the Structure of the Observed Learning Outcomes (SOLO), Defining Issues Test (DIT), Readiness for Interprofessional Learning Scale (RIPLS), Attitudes to Health Professionals Questionnaire (AHPQ), Student Development Task Lifestyle Inventory (SDTLI) and the Socio-moral Reflection Measure-short form (SRM-SF). Other studies surveyed students at the completion of the educational intervention using free text questions or Likert scales. The pedagogical approach used was varied, including transformative, constructivist, arts-based, inter-professional, problem-based or experiential learning approaches. The findings of this review suggest that given the current body of evidence, the teaching of ethics to and for allied health students should include the delivery of ethics focused content, be intensive in nature, link theory with real-life situations and practice, and expose students to multiple views using a variety of methods such as reflection and discussion of ambiguous, controversial topics. While the exact prescription of ethics training to maximise efficacy and uptake is unknown, there is some suggestion that immediate learning outcomes may follow a dose-response pattern, providing potential for future teaching models to incorporate repeated ethics exposure support for cumulative and sustained learning.

Keywords: Entry-Level, Students, Education, Ethics, Moral, Systematic Review

1. Introduction

The complexities of modern healthcare pose a range of ethical issues for health professionals. While codes of ethics and professional standards provide important and necessary frameworks for practice [1], health professionals face other ethical considerations that may, at times, be beyond the governance and scope of such codes and standards. Tensions

around advocacy, rationalisation of health resources, and prioritisation of competing priorities and interests have been reported across and within various health professions [2-7].

In practice, ethical decision making must be tailored to clinical situations, which requires addressing each unique, independent and individual characteristic variable. Therefore, education of student health professionals must go beyond exposure to ethical theory, codes and standards [8] to include preparation for ethical tensions that are 'everyday' and which

reflect the individual complexities of practice [7]. This preparation includes personal engagement with applying theory in practice [9] opportunities for critical thinking, moral appraisal and prioritisation of different options during decision making [10, 11].

Methods for teaching and learning ethics reported in the literature include modules that focus on deontology and consequentialism in nursing [12], using artistic expression to promote awareness of personal values and beliefs in occupational therapy [13], embedding ethics into inter-professional education [14, 15], using vignettes [16] and scenarios with nursing students in online and face-to-face environments [17], as well as using ambiguous cases with ethical dilemmas in physiotherapy [8]. A textual evaluation of course descriptions in occupational therapy and physiotherapy programs in Canada found that programs met the professional standards for expectations of ethics curriculum but did not address the actual learning outcomes for students [18].

Opportunities for practising ethical decision making often constitute part of the ‘hidden curriculum’ [11] and are rarely given enough attention [12]. In addition, outcomes of curricula which focus on the teaching of ethics are difficult to extract as they may relate to personal and professional craft knowledge, rather than clearly identifiable and measurable propositional knowledge [19]. To learn more about teaching methods and learning outcomes for health professional ethics education, there is a need to systematically appraise, analyse and synthesise existing research.

Whilst traditionally used to inform health professional practice, systematic reviews are starting to grow traction in health professional education. For example, a systematic review was conducted on the use of reflection for health professional education [20] and about shared, core competencies across medicine, nursing, occupational therapy and physiotherapy [21]. Although a review has been conducted about ethical tensions in occupational therapy practice [22] and for teaching ethics in medicine [23], there have been no systematic reviews exploring the teaching and learning of ethics for students enrolled in allied health professional programs. Therefore, the aim of this systematic review was to explore the student learning outcomes reported in allied health literature following ethics training.

2. Methods

2.1. Participants

The participants of interest were entry-level allied health professional students. ‘Entry-level’ was defined as undergraduate and graduate entry programs that prepare students to enter their professions as beginning practitioners [24, 25]. For the purposes of this review, the term ‘allied health’ incorporated the health disciplines proposed by Turnbull *et al* [26] with a therapy focus (i.e. nutrition and dietetics, occupational therapy, physiotherapy, podiatry, speech pathology). Excluded were those professions that

were paramedical (i.e. ambulance, intensive care), may be considered alternative or complementary therapies (i.e. art and music therapy) [27, 28], or where ethical considerations may not be directly relevant to or transferrable across other allied health disciplines. These include the specific ethical practices required in exercise physiology for athlete development [29], the delivery of psychotherapy in psychology [30], and a range of unique complexities which characterise social work [31]. Studies which sampled more than one health discipline (but included participants from the therapy-focused disciplines of nutrition and dietetics, occupational therapy, physiotherapy, podiatry, speech pathology) were eligible for inclusion.

2.2. Interventions

In this review, due to the absence of a universally-agreed definition or framework for what constitutes the teaching of ethics, studies simply needed to report the inclusion of at least one ‘ethical’ type component as the primary focus of an educational intervention (involving entry-level allied health professional students).

2.3. Comparison

All studies were included irrespective of the presence or absence of control or comparator groups.

2.4. Outcomes

For inclusion, studies had to evaluate learning outcomes following (post- and possibly pre-) the educational intervention. The outcomes of interest could include, but were not limited to, actual (i. e. measured objectively) or self-reported measures, or participants’ perceptions of knowledge, values, attitudes, morals, self-awareness, behaviours, skills, and confidence [25].

2.5. Study Design

Only primary studies reporting original data on learning outcomes following evaluation of an ethics focused educational intervention were included. Study designs could include randomised controlled trials, controlled trials or cohort studies (pre-post and longitudinal studies) and qualitative studies. Editorials and narrative reviews were excluded. Secondary research, such as systematic reviews of primary studies (with original data on learning outcomes evaluating ethics focused educational interventions), was not included; however, reference lists of such reviews were screened to identify potentially relevant studies.

2.6. Search Strategy

Nine electronic databases were searched in October 2015: A+ Education (Informit), Academic Search Premier (EbscoHost), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Excerpta Medica Database (EMBASE), Education Resources Information Center (ERIC), Health Source: Nursing/academic edition

(EbscoHost), Medical Literature Analysis and Retrieval System Online (MEDLINE), Psychology and Behavioural Sciences Collection (EbscoHost), and Scopus. The Medical Subject Headings (MeSH) database was used to formulate relevant search terms. The search strategy for one database (Medline) is presented in Appendix 1. There were no restrictions placed on publication year and where possible, all searches were limited to English and studies involving humans. The reference lists of all included studies meeting the inclusion criteria were screened (pearled) to identify additional relevant studies. An expert in the field of entry-level education and ethical decision-making was contacted and invited to provide details of additional relevant studies (Dr Gisela Van Kessel).

2.7. Study Selection

Two rounds of eligibility screening were completed. Firstly, the titles and abstracts were screened for inclusion of an ethical focused educational intervention (LKW). The full text of studies were retrieved when: (a) studies were identified as potentially relevant from the title and abstract, (b) the relevance of studies was uncertain from the title and abstract, or (c) the abstract was unavailable. In the second round of screening, all full text studies were reviewed against the eligibility criteria and their reference lists screened by two sets of paired reviewers (KB, AB, CM, AB). Where there was uncertainty, discussion was held with the research team to reach consensus. Full agreement was reached on all included studies.

2.8. Data Collection Process

Data from all included studies were independently extracted by two sets of paired reviewers using a purpose-designed data extraction sheet and instructions. Results were compared and discussed with any discrepancies between reviewers' data resolved by discussion and consensus.

2.9. Data Items

The following information was extracted verbatim from each included study: (1) research design; (2) health professional discipline; (3) sample size; (4) ethics focused intervention (type, content, duration and mode of delivery or format); (5) outcomes measured; and, where relevant, (6) pre- and post- intervention data for the identified outcomes (mean, standard deviation, standard error, number of students before and after intervention, effect size, p-value, t-value).

2.10. Critical Appraisal

All included studies were evaluated for risk of methodological bias using 'The Critical Appraisal Checklist for an Article on an Educational Intervention Tool' [32]. This tool contains 13 items evaluating the research question, study presentation and design, outcome measures and results of each study. Eleven items (items 1-9, 12 and 13) have three possible gradings: 'Yes', 'Can't Tell', and 'No'. The remaining two items (items 10 and 11) require a narrative

response. For the purpose of this study, a score of one point was allocated for items that were graded 'Yes'; and zero points for 'Can't Tell', 'No' or 'Non-applicable'. This applied to all of the 11 graded items, except item 13 where 'No' indicates a positive response and was therefore allocated one point. To capture an additional aspect of methodological rigor (i.e. *Has the relationship between researcher and participants been adequately considered?*), one item (question 6) from 'The Critical Appraisal Skills Program (CASP) Qualitative Checklist' [33] was added to the critical appraisal process (Table 1). The authors identified this as an important factor to consider in educational intervention studies where the power differential between course administrators (i.e. lecturers and tutors) and students may influence learning outcomes, especially those of a self-reported nature. The highest possible critical appraisal score was 14.

Table 1. Critical appraisal questions.

Critical appraisal questions	
Critical Appraisal Skills Program (CASP)	
Q6.	Has the relationship between researcher and participants been adequately considered?
<i>Critical appraisal checklist for an article on an educational intervention</i>	
Q1.	Is there a clearly focussed question?
Q2.	Was there a clear learning need that the intervention addressed?
Q3.	Was there a clear description of the educational context for the intervention?
Q4.	Was the precise nature of the intervention clear?
Q5.	Was the study design chosen able to address the aims of the study?
Q6.	Were the outcomes chosen to evaluate the intervention appropriate?
Q7.	Were any other explanations of the results explored by the authors?
Q8.	Were any unanticipated outcomes explained?
Q9.	Were any reported behavioural changes after the intervention linked to measurement of other, more objective measures e.g. changes in referral rates?
Q10.	What were the results of the intervention?
Q11.	How precise were the results?
Q12.	Was the setting sufficiently similar to your own and/or representative of real life?
Q13.	Does it require additional resources to adopt the intervention?

3. Results

3.1. Study Selection

Our searches identified a total of 1237 records; after duplicates were removed, we screened the title and abstract of 1218 records against the inclusion criteria, of which 1184 were excluded. Thirty-four full-text articles were assessed for eligibility and their reference lists pearled. The main reasons for exclusion of 26 of these articles were the relevance of the: research design (not primary research, narrative review) and, primary focus of the intervention (i. e. not specific or relating to ethics). Additional studies were identified through pearling (n=2) and expert review (n=1), resulting in eleven studies for inclusion in the final synthesis. The flow of studies through the selection process is presented by way of a modified PRISMA flowchart in Figure 1 [34].

3.2. Critical Appraisal

There was good agreement among reviewers' critical appraisal scores ($n=99/120$ items, 80.6%), with discrepancies resolved by way of discussion and consensus by all authors. Critical appraisal scores varied among the included studies (mean 8.2, median 8, range 4 – 11), however these did not appear to follow a systematic pattern according to publication year (Table 2). The majority of studies scored a 'Yes' for most items of 'The Critical Appraisal Checklist for an Article on an Educational Intervention Tool' (items 1-7, 12); as well

as a 'Yes' for item 13 (i. e. $n=6/11$ included studies, 54.5% of items) where the intervention required additional resources for adoption. However few studies ($n=4/11$, 40%) offered an explanation of unanticipated outcomes (item 8), and only one ($n=1/11$, 9%) reported behavioural changes after the intervention that were linked to measurement of other, more objective measures (item 9). In terms of adequately considering the relationship between researchers and participants (question 6 CASP tool), only three studies (30% of those included) scored a 'Yes'.

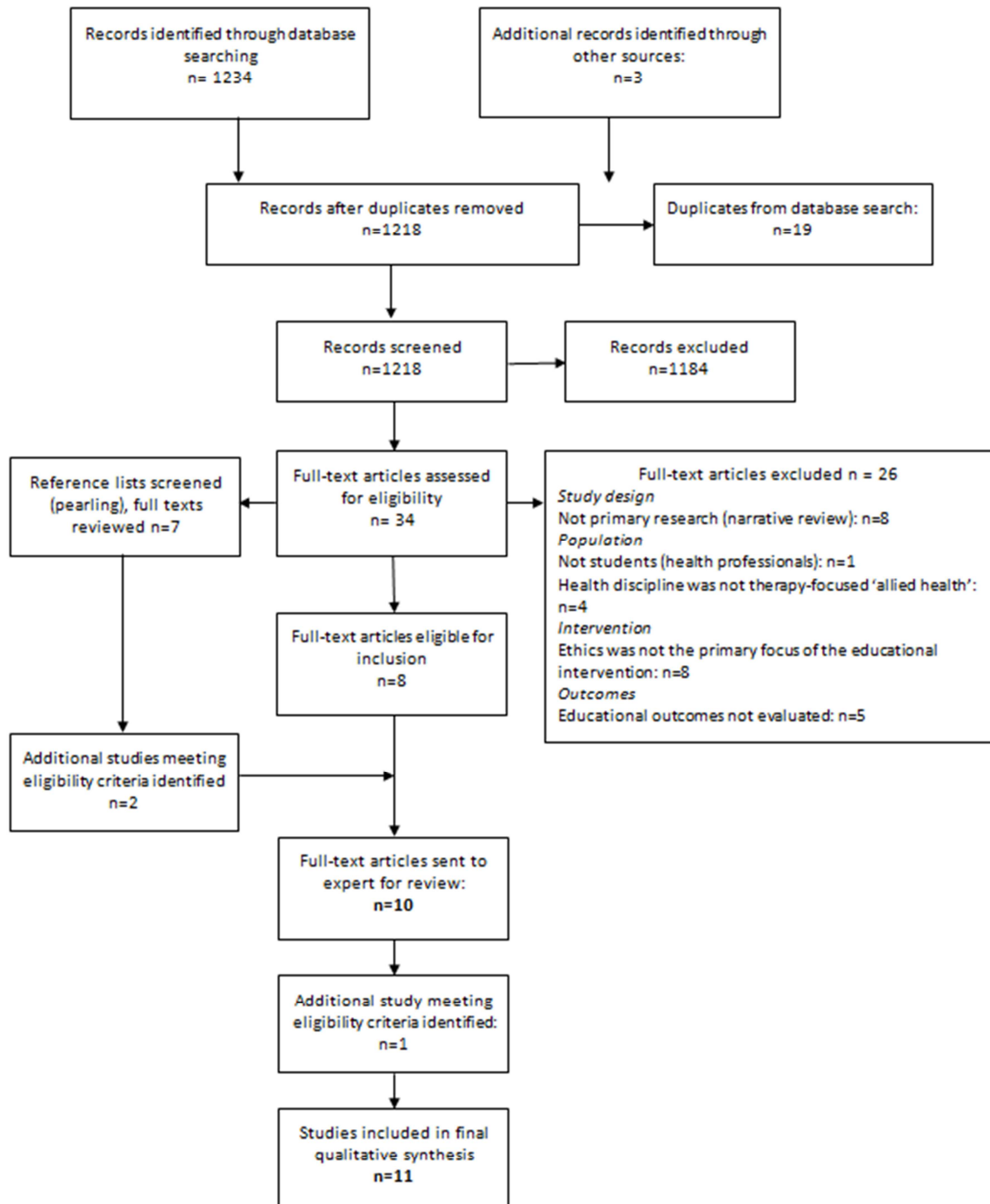


Figure 1. Modified PRISMA flowchart depicting flow of studies through the selection process [34].

Table 2. Summary of critical appraisal of articles on educational interventions.

Study	Question number on the critical appraisal checklist													
	CASP		Critical appraisal checklist for an article on an educational intervention											
	6	Score	1	2	3	4	5	6	7	8	9	12	13	Score
DeMars et al 1991	CT	0	Y	Y	Y	Y	CT	CT	N	N	N	CT	N	5
Greene 1997	CT	0	Y	Y	N	N	Y	Y	Y	Y	N	Y	N	8
Solomon & Geddes 2000	CT	0	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	10
Dieruf 2004	CT	0	Y	Y	N	N	Y	Y	Y	Y	N	CT	N	7
Whelan et al 2005	N	0	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y	8
Geddes et al 2009	CT	0	Y	Y	Y	N	Y	Y	Y	Y	N	Y	Y	10
Edwards et al 2012	Y	1	Y	Y	Y	Y	Y	Y	Y	CT	N	Y	Y	10
Swisher et al 2012	Y	1	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	9
Jones et al 2014	N	0	Y	Y	N	N	Y	Y	Y	N	Y	Y	Y	8
Strawbridge et al 2014	N	0	Y	CT	Y	CT	CT	CT	N	N	N	Y	Y	4
Kinsella & Bidinosti 2015	Y	1	Y	Y	Y	Y	Y	Y	N	N	N	Y	N	8

3.3. Study Characteristics

The eleven included studies were published over a twenty-four year period between 1991 [35] and 2015 [13] (Table 3). There were multiple studies conducted in Australia [8, 36, 37], Canada [13, 38, 39], and the United States of America (USA) [10, 35, 40]. Most included studies (n=8/11, 72.7%) evaluated intradisciplinary learning outcomes for students enrolled in physiotherapy [8, 36-38], occupational therapy

[13, 35, 40] and dietetics [41] programs. However, it is important to note that three Australian studies sampled the same group of physiotherapy students [8, 36, 37] and the publications are based on the same educational program. There were three studies which recruited participants from more than one allied health discipline; combining students from physiotherapy with those from occupational therapy [10, 39], and pharmacy [42] programs. The characteristics of included studies are summarised in Table 3.

Table 3. Characteristics of the included studies.

Study and country	Participants	Study Design	Ethics teaching intervention	Outcome measure	Learning outcomes
DeMars et al. 1991	Sample size not reported	Not reported	Ethics content integrated throughout curriculum. History and present status of ethics in occupational therapy, informed consent, freedom or risk, brain death and quality of life, ethical use of outcome measures, continuity of treatment, scope of practice, relationships with clients, making judgements. Lectures, case studies, group discussions, role play	Student evaluation of teaching modules and faculty feedback	Working knowledge of the ethical principles combined with the critical thinking abilities needed to apply these principles to dilemmas in clinical practice. Increased awareness and sensitivity to ethical concerns and complexities
United States	Occupational therapy students				
Greene 1997	N=52 total	Quasi-experimental – between group and pre-test/ post-test Cohort study	Unstructured service learning, applying ethics in practice. Six one-hour visits to older people in nursing homes (n=19) or people with disabilities in the community (n = 33). Reflective journaling	Student Development Task. Lifestyle Inventory (SDTLI). Socio-moral Reflection Measure-Short Form (SRM-SF)	The only significant change was found for both groups in greater self-awareness. Changes were noted in values of empathy, equality and justice. No changes in moral reasoning
United States	Occupational Therapy students enrolled across two programs (n=33, n=19)				
Solomon & Geddes 2000	N=17 total				
Canada	Physiotherapy students in third semester of a two-year program	Qualitative case study	Learning objectives related to access and consent to treatment, and respect for individual differences (assessment and treatment of rheumatoid arthritis). 28 tutorials of ethics education focusing on different problems in health care (in third semester of a two-year program)	Recording of two half-hour tutorials; preceded by students ranking the importance of specific learning issues (questionnaire), and followed by participation in focus groups two weeks later (to discuss learning issues). Two tutors participated in semi-structured interviews	The majority of students seemed to recall discussion of cultural issues but did not describe this using ethical terminology. Students and tutors reported that they preferred to focus on rheumatoid arthritis because students found ethics content difficult to research for learning issues and tutors weren't confident to facilitate discussions about ethics.
Dieruf 2004	N=94 total	Longitudinal Pre-test/ post-test	Section on ethics during first semester and then units throughout curriculum. Ethics in relation to practice scenarios, decision making and	Defining Issues Test (DIT) on the first day of class and again during students' final semester.	Analysis of covariance, Age p=0.003; profession p=0.07, time by profession p=0.499. No significant differences
United States	Physiotherapy (n=58) and Occupational				

Study and country	Participants	Study Design	Ethics teaching intervention	Outcome measure	Learning outcomes
Whelan et al 2005	Therapy (n=36) students N= 26 total	Student evaluation survey	personal biases	Students completed a questionnaire after every class about (1) interest value; (2) the learning experience and (3) value for clinical practice	between moral reasoning at the start and end of the program
United Kingdom	Dietetics students		Inter-professional education (medicine, nursing and dietetics) classes involving four hours of lecturers and interactive workshops. Topics included communication skills, empathy, questioning and interview styles, confidentiality, consent, competency and capacity, critique of written health information, autonomy, paternalism and truth-telling		More students rated the sessions positively than negatively (statistically significant) except for the session on autonomy
Geddes et al. 2009	N = 548 total				Analysis of covariance (ANCOVA); N2 scores of OT and PT students entry and exit of each program $P < 0.001$; interaction with time of program $P < 0.05$. The moral judgement of students significantly improved over time. Authors were unsure what aspect of the program contributed to the change.
Canada	Physiotherapy (n=282) and Occupational Therapy (n=266) students	Pre-test/ post-test design – longitudinal	Problem-based learning material set in the context of clinical practice. Formal ethics education using a problem-based learning approach	Used DIT (pre-post educational program with each cohort over 6 years (5 cohorts)	Paired t-tests; N2 scores $P = 0.006$; P scores $P = 0.175$; concept map scores $P = 0.001$; SOLO score $P = 0.003$
Edwards et al 2012	N=37 total	Pre-test/ post-test design – mixed methods	Intensive delivery of ethics content over six weeks. Case studies involving ambiguous dilemmas and guided reflection	Students constructed a concept map and completed DIT measure pre-post intensive education	Significant change in moral reasoning of students towards more integrated and socially oriented post-conventional organisation of knowledge with greater appreciation of ambiguity and recognition of multiple perspectives
Australia	Final year physiotherapy students				Paired t-tests; N2 scores $P = 0.006$; P scores $P = 0.175$. Increase in post-conventional thinking and decrease in thinking from the personal interest and maintaining norms schema.
Swisher et al. 2012	N=37 total		Intensive delivery of ethics content over six weeks. Transformative learning, self-knowledge/reflection, relationships between ethical and clinical knowledge, and responding to ethical disequilibrium	Students completed DIT measure pre-post intensive education	Concept map scores $P = 0.001$; SOLO score $P = 0.003$. Second concept maps showed greater understanding of relationships between concepts. The mean SOLO scores improved significantly from first to second map
Australia	Final year physiotherapy students	Pre-test/post-test design			
Jones et al. 2014	N=37 total	Pre-test / post-test design – cohort study	Intensive delivery of ethics content over six weeks. Formal exposure to ethics theory, the focus was on developing students' knowledge structures on ethics constructs which recognises multiple realities due to different contexts and experiences. Students link knowledge to application in practice	Students constructed concept maps before and after intensive education – change in knowledge organisation was measured using Structure of the Observed Learning Outcomes (SOLO) taxonomy	Unspecified test; $P = 0.012$. Attitudes shifted significantly. 87% (n=54/62) of the class agreed that they developed critical thinking skills. They liked debating. No change in control group
Australia	Final year physiotherapy students				
Strawbridge et al. 2014	N=76 total		Contemporary and controversial debate topics. Students who did not participate in debate were control group (n=55). Raise awareness of controversial topics. Consider alternative points of view and construct learning in groups	Readiness for interprofessional learning scale (RIPLS). Attitudes to health professionals questionnaire (AHPQ)	
Ireland	Pharmacy (n=50) and Physiotherapy (n=26) undergraduate students	Controlled before and after cohort study			
Kinsella & Bidinosti 2015	N=234 total	Hermeneutic phenomenology.	Students had to represent their ethical stance to the question - What does	Students wrote a half page reflective piece at	Five themes - becoming aware of values, (re)

Study and country	Participants	Study Design	Ethics teaching intervention	Outcome measure	Learning outcomes
Canada	Occupational Therapy students	Longitudinal with data collected over 5 years	ethical practice mean to me? using a range of artistic means; a 3-D model, a piece of visual art such as a painting, collage, pen and ink drawing; literary works of art (poetry), a dramatic performance or script, a short story. Topics included ethical theories, ethical principles, ethical tensions, narrative ethics, ethics of care, moral agency, and obstacles to moral reasoning, reflective deliberation, and ethically-based decision making.	completion of the course which were thematically analysed	discovering creativity, coming to value reflection in professional life, deepening self-awareness and developing capacities to imagine future practices

3.4. Synthesis of Results

Heterogeneity among included studies precluded meta-analysis. Therefore, data were synthesised qualitatively in a narrative format, with descriptive statistics (mean, standard deviation, standard error, number of students before and after intervention, effect size, p-value, t-value) reported where available.

3.4.1. Pedagogy and Content of Interventions

The pedagogical approach used by educators was varied, comprising learning approaches across transformative learning [8, 13, 36, 37], constructivist [37, 42], arts-based [13], inter-professional learning [41, 42], problem-based learning [38, 39] and experiential learning [40] approaches. The remaining studies in this review did not specify a particular approach [10, 35]. Some pedagogical approaches led to innovative methods of course content delivery, such as students constructing concept maps [8, 37], participating in debates on controversial topics [42], and creatively expressing what ethical practice means to them [13].

With the exception of Greene [40], all other studies reported specific content devoted to ethics education which was variable in its timing, intensity and mode of delivery. An ethics course for final year physiotherapy students was delivered intensively for three hours per week over six weeks, in conjunction with online activities and discussion [8, 36, 37]. Similarly, the ethics courses described by Solomon and Geddes [38] and Kinsella and Bidinosti [13] were delivered towards the end of the educational program. In contrast, two studies [10, 35] timed the majority of their ethics education within the first year, and further content was delivered throughout the curriculum. Two other studies also provided ethics education in the early stages of the educational program (i.e. to first year students) [41, 42] with the remaining study including ethics training throughout the overall curriculum [39]. Across studies, there was considerable variation in the content of ethics education, with most focusing on development of moral reasoning and thinking [8, 10, 36, 37, 39], or ethical theory and principles [13, 38, 42]. Relatively few studies focused on professional behaviours such as communication and empathy [40, 41], or

used a combined approach [35].

3.4.2. Study Design and Data Collection

There were two qualitative studies; Solomon and Geddes [38] triangulated data collection methods through recording and analysing two tutorial sessions, asking students to rank learning issues and then discussing these in a focus group, and also conducting semi-structured interviews with two tutors. Kinsella and Bidinosti [13] used a hermeneutic phenomenological approach to gather data using textual analysis of a half page reflection written by students at the completion of their course. Seven studies reported a pre-post test design, with a variety of outcome measures used amongst these studies [8, 10, 36, 37, 39, 40, 42]. One study used a student questionnaire [41] and one did not stipulate the design used [35]; however, reported student and faculty feedback.

3.4.3. Outcome Measures

The Structure of the Observed Learning Outcomes (SOLO) tool was used to show change [8, 37] in students' knowledge organisation in their concept maps. The SOLO is a taxonomy illustrating increasing levels of structural complexity in student learning. One study also reported findings from measures on the Defining Issues Test (DIT), particularly the N2 and P scores [8]. The P score is an indicator of principled or post-conventional moral reasoning developed by analysis of ranked responses to six scenarios by participants in two studies [36, 39]. The N2, also a measure of post-conventional moral reasoning and considered the gold standard DIT index [36], was developed after the P score as a more reliable measure, as it both ranks and rates the data as seen in Swisher et al. [36] and in Rest et al. cited by Geddes et al. [39]. Post-conventional reasoning relies on ethical ideals, societal cooperation and principles of fairness, compared to personal interest that relies on one's self-interest and well-being, or maintaining norms where laws, rules, conventions and traditional sources of authority inform reasoning, pp.169 in the Swisher et al. [36].

The DIT was used in a pre-test and post-test design in three other studies [10, 36, 39]. Two studies conducted their research as controlled, cohort studies with the Strawbridge et

al. [42] study collecting and comparing outcomes from students who participated in debates with data from students who did not participate and the Greene [40] study comparing outcomes for students involved in service learning with two different client groups (older people in nursing homes and adults with disabilities in the community).

Aside from the DIT, other outcome measures included the readiness for interprofessional learning scale (RIPLS) [42], the attitudes to health professionals questionnaire (AHPQ) [42], the lifestyle inventory (SDTLI) and the socio-moral reflection measure-short form (SRM-SF) [40]. Other studies surveyed students at the completion of the educational intervention [38] or after each class using free text questions and evaluation questions with Likert scales [41]. Similarly, the DeMars *et al.* [35] study evaluated learning outcomes by seeking feedback from student and faculty but this was in relation to ethics content in their whole curriculum rather than a specific course.

3.4.4. Learning Outcomes

Significant changes in moral judgement scores on the DIT N2 scores were noted for both groups of occupational therapy and physiotherapy students undertaking problem-based learning for the whole two year curricula [39]. When the interaction of time with program was measured, there was more movement from baseline to time two for the occupational therapy students than the physiotherapy students, with occupational therapy students starting with slightly lower moral judgement scores and ending with slightly higher scores (pp. 98 in Geddes *et al.*) [39]. However, the results showed no differences at exit based on gender, as results were affected by low numbers of males in the occupational therapy cohort, or by previous education.

Changes in moral reasoning following a six week, final year ethics education module were reported in two articles using data from the same study which reported both N2 and P scores [8, 36]. Whilst mean changes in N2 scores for moral reasoning for physiotherapy students at time two were significant, when analysed in groups the significant change only occurred for female physiotherapy students ($n=22$; 59.5%). There were no significant findings for the P score for the entire physiotherapy student group or for the males [36]. No significant differences were found on the DIT P scores in the study by Dieruf [10] when comparing occupational therapy and physiotherapy students and the two years spent studying (time), which may be attributable to the non-specific nature of the intervention (i. e. their whole curriculum). However, Dieruf [10] did find a significant relationship between P scores and age of students.

Evaluation of the concept maps [8] found that students had learned constructively from the process of having to work through unsettling and ambiguous cases in groups, both in class and online. Analysis of the concept maps found a shift from uni-structural learning at time 1 (SOLO level 2) to relational learning at time 2 (SOLO level 4) ($P=0.003$), suggesting students had integrated and organised their learning and thus see how topics related to each other,

holding greater meaning and relevance than prior to the educational intervention. Comparison of the SOLO level outcomes and the DIT N2 scores showed no significant correlations.

Through a descriptive evaluation of their course, Strawbridge *et al.* [42] reported percentages of agreement and pre- and post- p values, finding the debates encouraged active learning through challenging topics (95% agreement) and were an appropriate way to learn ethics (87% agreement), with students also becoming more cognizant of conflicting views about topics. Through their analysis of student reflective writing, Kinsella and Bidinosti [13] found students were seeing the connections between ethical and reflective practice and had become more self-aware of their own assumptions, beliefs and values through using arts as a learning medium. In particular, changes in moral judgement can be seen in the following quote extracted from their research.

'Reflecting on this experience encouraged me to think deeply about how I felt... and how I can incorporate this [reflection] into my practice. I learned that while ethical practice is twisty and complicated I should not be intimidated because I have started to develop skills that will aid me in the future.' (Catlin), pp. 10-11 in Kinsella and Bidinosti [13].

Faculty who participated in the evaluation by DeMars *et al.* [35] reported that they believed students were able to consider situations from different perspectives after completing the curriculum. However, the tutors interviewed in Solomon and Geddes [38] reported facilitation of discussions about ethics to be difficult, as they had not learned much about ethics themselves and were unfamiliar with the ethical language. Students in the same study stated they preferred to focus on the condition knowledge rather than prioritise learning about ethical issues related to the condition.

"Sometimes, especially at the beginning of a problem, there are so many learning issues that we have generated. For an ethical issue, we're like, okay let's put that on the back-burner because there's so much to learn before that" (student), pp. 282 in Solomon and Geddes [38]

4. Discussion

Ethics training for entry-level students is important to equip them with the necessary foundation knowledge and skills for clinical practice. This systematic review is the first to explore learning outcomes for entry-level allied health students following ethics training. The eleven included studies were conducted across five westernised countries, used varied methodological approaches and reported results for a total of 1057 entry-level students enrolled in one of four allied health disciplines ($n=588$ occupational therapy, $n=393$ physiotherapy, $n=50$ pharmacy, $n=26$ dietetics). While the findings are limited to the scope of the review question, and the methodological parameters and reporting standards of included studies, our approach was strengthened by the development of an *a priori* protocol and adherence to the

PRISMA statement [34].

In keeping with existing literature, there was a predominance of single group pre- and post-test designs [43]. No studies reported outcome data in sufficient detail (e. g. mean, SD, sample size, t-value, p-value) to enable calculation of effect size [25]. In addition, only three studies [8, 13, 36] adequately reported consideration of the relationship between researchers and participants. We consider this to be a sizeable omission within the context of educational research, due to the power and status differentials that exist between academic staff and their students, and the potential effects these could exert on learning participation, engagement and outcomes [44, 45].

Due to the heterogeneity among studies within this review, it is difficult to conclusively determine the effects of ethics education, and to tease out which characteristics are most effective [46]. However, within this sample, it appears that the teaching of ethics to allied health students is associated with improvements in a range of learning outcomes, comprising greater self-awareness [13], greater understanding of relationships between concepts [37], higher levels of sophisticated thought with respect to moral judgement [39], reasoning and post-conventional thinking [8, 36].

Studies reporting positive student outcomes described a specific focus on the teaching of ethics content. The deliberate delivery of ethics content within programs was specified in some studies [13, 38, 39, 41, 42], as well as in the description of the ethics program in three related studies within our sample [8, 36, 37]. The educational program delivered by three studies [8, 36, 37], stipulated that it was delivered across six weeks, with weekly three-hour face-to-face sessions and online modules. In contrast, the study by Dieruf [10] – which also had a specific focus on the teaching of ethics content – found no significant differences in moral reasoning between the start and end of the program. While the exact details of program delivery were not provided, the author questioned whether the intensity of the focus on ethics content was sufficient, given that the content was delivered in one session on ethics in the first semester, followed by small units in the curriculum.

Programs with positive learning outcomes were characterised by the linking of ethics theory to real-life situations and practice, with a range of teaching methods being employed [8, 36, 37, 39]. Examples of this approach included the use of problem-based learning scenarios and case studies. The teaching and assessment methods within these programs exposed students to multiple points of view, with a variety of interactive forums including debates, discussions and presentations [13, 37, 39, 41, 42]. Reflection was also used in some programs [8, 13, 36, 37]. In addition, ambiguous, controversial topics were used [8, 42].

While it is beyond the scope of this review to comment on the mechanisms by which students' ethical learning outcomes improved, this was discussed within some of the included studies and appeared to differ between whole of curriculum approaches and intensive or targeted courses. The learning and teaching interventions in each of the studies

varied in time and intensity, as well as explicit focus on ethics and exposure. A number of studies reported on integrated curriculum or problem-based learning, whereby the entire curriculum formed the intervention e. g. in DeMars et al. and Greene [35, 40]. The relationship of time spent at university, as described in Geddes et al. [39], versus students' age – found as a factor in the study by Dieruf [10] – conflated results of studies. In these instances, authors argued the curriculum did have an effect but speculated on the evidence that general exposure to tertiary education influences the moral development of students [47] and acknowledged that age or maturity may have a possible effect on capacity for moral development.

A review of the effect of evidence-based training for health professional students (pp. 111 in Wong et al.) [25] also found that previous educational experiences and time could have carried over to postgraduate education, resulting in higher baseline measures, leaving less scope for improvement. However, a US study of the moral reasoning development of 165 medical students, when comparing exposure to the general curriculum to experience of a course focused on ethics and professionalism, found no differences in DIT P scores ($P=0.312$) [47]. In Murrell [47], similar to many in this review, age was not a factor. However, in contrast to other evidence, time spent at university was also not a factor with no significant progress in moral reasoning taking place in the four years of medical education, (pp. 222 in Murrell) [47]. Murrell [47] highlighted the medical students operated in the conventional level of moral processing, thinking within rules-based constructs; which in the medical professions would be reflected in professional and evidence based standards and cost limits established by hospitals. Rules-based reasoning can be described as a Maintaining Norms Schema (pp.168 in Swisher et al.) [36], where the person relies on laws, societal norms, traditions, conventions and sources of authority rather than ethical ideals or principles of fairness. It is interesting to reflect on the relationship, and possible tensions between education that assist students to reach a post-conventional level of moral reasoning, and the future contexts in which they will work. Of which, the latter may potentially favour a rules-based approach to decision making.

No study was able to specifically state what intensity or combination of core learning activities were most effective, with the range including a six-week delivery, a debate program and lecture / workshop formats. Yet the notion of the learning being constructed in a manner that fostered transformational outcomes was recommended. Studies which used focused, intensive and interactive education interventions, such as Swisher et al., Whelan et al. and Greene [36, 41, 42] presented the strongest measurable changes in outcomes, and as a result argued that intensity and targeted curriculum is a key factor to consider. A number of mechanisms were used to promote reflection and deeper understanding, including debates, concept maps or reflective journaling. Kinsella and Bidinosti [13] used an arts based intervention and measured students' learning via their reflective writing to show that students considered their

values and reflection in professional life. In agreement with several of the methods used in studies in this review, Brody and Doukas [48], in a philosophical ethical analysis of the precepts of professionalism in medical education (as a subset of health care ethics), concluded that topics that fail to use reflection and fail to convey deep ethical and humanistic aspirations, also fail to support students to understand a robust presentation of professionalism that involves trust, commitment to patient interests and application of virtue ethics in practice.

Most studies delivered ethics training to students who were enrolled within the one allied health discipline. In clinical practice, healthcare has moved to a multidisciplinary model, therefore it is somewhat surprising that few studies in this review chose to employ interprofessional teaching approaches. Whether this was a function of opportunistic research design and sampling for convenience, resourcing constraints, or pre-determined prioritisation of intraprofessional ethics training is beyond the commentary capacity of this review. In a literature review [15] regarding the teaching of health care ethics for nursing and medical students, the author notes that an ethics curriculum should be purposefully designed to be taught as an interdisciplinary subject. Conceptualising health care ethics separately for individual professions implies that there are specific moral problems to be solved by different groups or that different professions seek different moral goods rather than all being concerned with autonomy, beneficence, or justice [15]. Interestingly, our review found studies that compared student learning between professions, for example, Geddes *et al.* and Strawbridge *et al.* [39, 42] reported little difference in outcomes between groups. Within this body of literature, it seemed that teaching strategies encouraging exposure to multiple points of view (such as debating, discussions and interprofessional learning) produced positive student learning outcomes and favourable student experience ratings.

The findings of this review suggest that given the current body of evidence, the teaching of ethics to and for allied health students should include the delivery of ethics focused content, be intensive in nature, link theory with real-life situations and practice, and expose students to multiple views using a variety of methods such as guided reflection and discussion of ambiguous, controversial topics. While the exact prescription of ethics training to maximise efficacy and uptake is unknown, there is some suggestion that immediate learning outcomes may follow a dose-response pattern, providing potential for future teaching models to incorporate repeated ethics exposure and support for cumulative and sustained learning.

The inconsistency around the teaching of ethics observed in this review highlights the need for at least national-level consensus and standardised frameworks for entry-level ethics education in allied health. We believe a lack of agreed definitions around what constitutes the teaching of ethics, its concepts and constructs may have masked the identification of ethics interventions focused around decision making. It is possible that related work in allied health could be housed

within studies investigating other reasoning-type (e. g. clinical reasoning) teaching models.

As a first step towards achieving allied health agreement in ethics education, future research must adhere to carefully designed study protocols to minimise methodological bias, and include the use of control groups (which, due to ethical considerations, may need to be in the form of historical data) and multiple intervention arms to test different models, modes and intensities of ethics teaching. Longer follow-up periods are also advocated, to track how ethical performance and maturity change over time for allied health cohorts, and particularly in response to different learning and practical environments.

5. Conclusion

This systematic review of literature published over a 24 year period, with a focus on the learning outcomes of allied health students, following an ethics based curriculum found that to date, evidence is limited. The review revealed that ethics education is delivered using diverse content, formats and intensities, leading to difficulty determining which teaching tools, techniques or pedagogical approach is of the highest educational value. Despite the variability in research quality and varied outcomes amongst the studies, the teaching of ethics in a focused, reflective and transformational manner is advised. Issues such as age of students, previous educational exposure and suggestions that exposure to tertiary education alone may influence moral development, complicate the research topic. Further research to test a variety of learning methodologies, intensities and measures is required to evaluate learning outcomes over time. In addition, opportunities exist to explore mechanisms for the active engagement of students in ethics-based learning, application to their daily lives and to practice in clinical placements. Finally, future research opportunities should include longitudinal and follow-up study designs that explore factors which hinder or help students to maintain their ethical ideals in practice after graduation. Then, and only then, can we know that we are doing our best to equip allied health students and professionals with the tools they need to navigate the complex clinical landscape and ethical terrain that characterises a career in modern healthcare.

Appendix 1. OVID Medline Search Strategy

1. learn*
2. teach*
3. 1 or 2
4. student*
5. learner*
6. 4 or 5
7. ethic*
8. moral*
9. 7 or 8
10. decision-making

11. care
12. duty
13. responsibility
14. accountability
15. experience
16. or/10-15
17. occupational therap*
18. physiotherap*
19. physical therap*
20. speech therap*
21. speech patholog*
22. podiatr*
23. diet*
24. nutrition*
25. allied health
26. or/17-25
27. 3 and 6 and 9 and 16 and 26

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