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## Transformative learning as pedagogy for the health professions: a scoping review

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**CONTEXT** Transformative learning (TL) has been described as learning that challenges established perspectives, leading to new ways of being in the world. As a learning theory it has resonated with educators globally, including those in the health professions. Described as a complex metatheory, TL has evolved over time, eliciting divergent interpretations of the construct. This scoping review provides a comprehensive synthesis of how TL is currently represented in the health professions education literature, including how it influences curricular activities, to inform its future application in the field.

**METHODS** Arksey and O'Malley's six-step framework was adopted to review the period from 2006 to May 2018. A total of 10 bibliographic databases were searched, generating 1532 potential studies. After several rounds of review, first of abstracts and then of full texts, 99 studies were mapped by two independent reviewers onto the internally developed data extraction sheet. Descriptive information about included studies was aggregated. Discursive data were subjected to content analysis.

**RESULTS** A mix of conceptual and empirical research papers, which used a range of qualitative methodologies, were included. Studies from the USA, the UK and Australia were most prevalent. Insights relating to how opportunities for TL were created, how it manifests and influences behaviour, as well as how it is experienced, demonstrated much congruency. Conceptions of TL were seen to be clustered around the work of key theorists.

**CONCLUSIONS** The training of health professionals often takes place in unfamiliar settings where students are encouraged to be active participants in providing care. This increases the opportunity for exposure to learning experiences that are potentially transformative, allowing for a pedagogy of uncertainty that acknowledges the complexity of the world we live in and questions what we believe we know about it. TL provides educators in the health professions with a theoretical lens through which they can view such student learning.

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 INTRODUCTION

Transformative learning (TL) has become an established theory across numerous disciplines in higher education, including the medical and health professions.<sup>1</sup> In his critical review, Taylor<sup>1</sup> highlighted the role of reflection in TL and described ways in which it might be fostered in health professions education (HPE). The publication of the seminal Lancet Commission article on HPE for the 21st century<sup>2</sup> further entrenched TL as an important pedagogical construct for HPE. Frenk *et al.*<sup>2</sup> described TL as focusing on the development of leadership attributes that ‘produce enlightened change agents’. They further qualified their definition, highlighting ‘three fundamental shifts: from fact memorisation to searching, analysis, and synthesis of information for decision making; from seeking professional credentials to achieving core competencies for effective teamwork in health systems; and from non-critical adoption of educational models to creative adaptation of global resources to address local priorities’. This understanding clearly positions TL as a desirable outcome for HPE.

Transformative learning as a theoretical construct was introduced through the formative work of Mezirow in 1991.<sup>3</sup> Influenced by established educational theorists (Kuhn’s conception of paradigms, Freire’s work around conscientisation, and Habermas’s domains of learning)<sup>4</sup> Mezirow’s early position on TL was ‘learning [that] is understood as the process of using a prior interpretation to construe a new or revised interpretation of the meaning of one’s experience in order to guide future action’.<sup>5</sup> This understanding evolved to describing TL as ‘learning that transforms problematic frames of reference—sets of fixed assumptions and expectations (habits of mind, meaning, perspectives, mindsets)—to make them more inclusive, discriminating, open, reflective, and emotionally able to change’.<sup>6</sup> Others have described TL as involving a ‘deep structural shift ... that dramatically and permanently alters our ways of being in the world’.<sup>7</sup>

Creating opportunities that might enable TL requires intentional curriculum change. As part of our curriculum development work within the Bellagio Global Health Education Initiative (BGHEI), we aimed to create such opportunities. Immediately evident from our deliberations, however, was the extent to which our understanding

of the construct differed amongst us and lacked a clear theoretically grounded comprehension. We therefore embarked on a scoping review of the following research questions: How is TL understood in the HPE literature? How does current empirical work describe TL? Apart from the BGHEI members, our review team was augmented by the inclusion of three researchers with an HPE background and a librarian. Our intention was to provide the HPE community with a comprehensive synthesis of TL, including how it is taken up in curricular activities, with a view to informing its future application in the field.

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 METHODS

This scoping review aims ‘to map the key concepts contained in a research domain ... to produce a quick, narrative, descriptive account of the scope of current literature’.<sup>8</sup> We used Arksey and O’Malley’s<sup>9</sup> six-step framework. The research question was developed through a consultative process including all group members (Step 1), after which potentially relevant studies were identified by conducting an extensive search of the literature based on a set of inclusion and exclusion criteria (Step 2). We began with the Yale MeSH Analyzer<sup>10</sup> using key known articles to identify relevant controlled vocabulary (MeSH [Medical Subject Headings] terms, Emtree and others) and keyword terms to be used. Each concept was then translated for use in databases. Major concepts searched included a combination of controlled vocabulary and keywords with variations such as undergraduate medical education, nursing education, health profession education, learning and transformative (including transforming, transform, etc.; Appendix 1). Undergraduate medical education was defined as programmes at the pre-licencing level, whereas postgraduate referred to post-licencing programmes, including graduate medical education.

On 27 February 2017 and 31 May 2018, an experienced medical librarian searched 10 bibliographic databases, including: Ovid MEDLINE, Ovid Embase, Ovid PsycINFO, Scopus and Education Resources Information Center (ERIC) (Appendix 2). Search results were downloaded to EndNote X7 (Clarivate Analytics, Philadelphia, PA, USA) and duplicates removed. The 1080 retrieved abstracts were independently reviewed by two team members (CM, LM, TB, MP, MM, SvS, DD, JH) using Covidence (a Cochrane technology platform); conflicts were resolved by a third team member

(DD, JH, SvS). Abstracts were excluded if they were not within the scope, specifically if they were not about TL and undergraduate HPE, or if they were conference abstracts, letters to the editor or abstracts from dissertations. At this point, the period under review was limited to January 2006 to May 2018, resulting in 266 full texts being considered (Step 3; Fig. 1).

A data extraction sheet was developed consultatively, guided by the research question (Step 4). Each study was again reviewed independently by two reviewers and conflicts resolved by a third (SvS). Apart from descriptive data about the articles, data relating to how TL was defined, which theorists were featured, how TL was applied in the study, whether a learning intervention was described, and whether and how TL was assessed, were also captured. These data were subjected to content analysis<sup>11</sup> using a 'structuration' approach as an analytical frame, as we searched for patterns, similarities and contradictions across the data.<sup>12</sup> Structuration theory acknowledges the structural and agentic dimensions present in all contexts. These dimensions informed the categorisation of our data as we sought to understand the way in which TL is structured as well as how it is experienced. The results of this analysis are presented in the section below (Step 5).

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## RESULTS

### Description of the included studies

A total of 42 (42%) of the 99 studies were conceptual in nature, whereas 57 (58%) papers referred to empirical work. A total of 50 studies used qualitative methodologies with the balance using a mixed methods approach. Only one study used a purely quantitative approach.

The data collection methods varied between in-depth, semi-structured focus groups and individual interviews (18%), written reflection essays (9%), journals and narratives (6%), and surveys and questionnaires (5%). Other approaches to generate data included audio-diaries, participant observations, critical incidence reports and debrief sessions. A modified version of the Reflection Questionnaire was used in the quantitative study.<sup>13</sup>

Nursing was the health profession that featured most in the included studies (52%), whereas programmes in medical education were described in 24 (24%) articles. In four articles, multiple

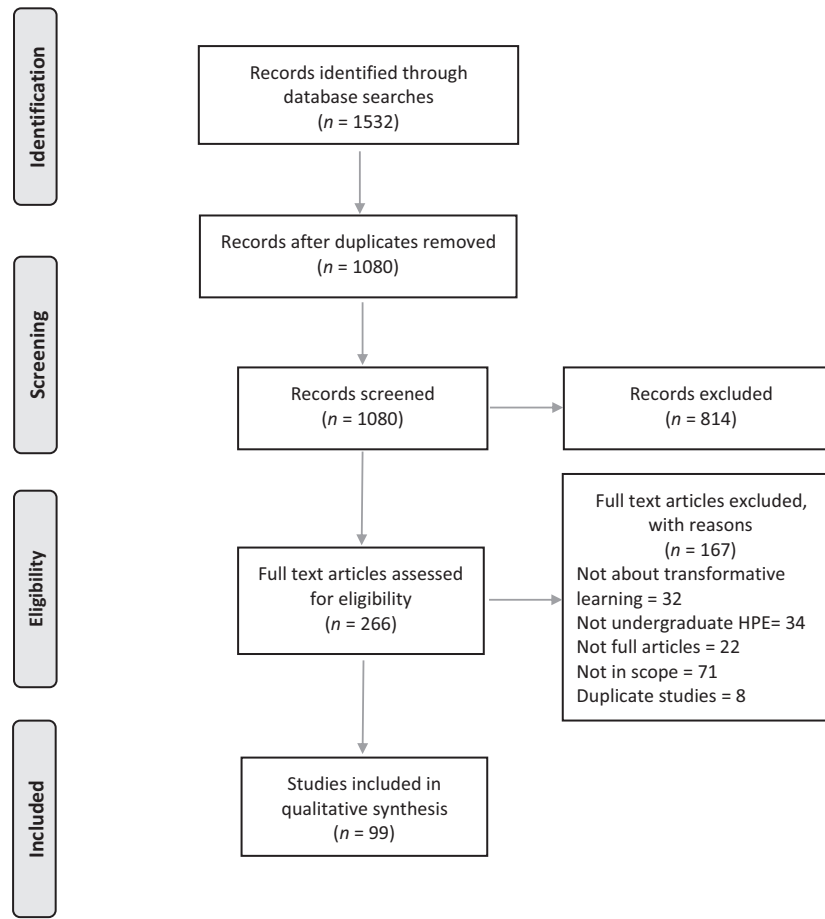
health professions were included in a single study. Other health professions included dentistry, pharmacy, sociology, occupational therapy and physical therapy. In the case of one article, the profession was not identified. A total of 68 (67%) articles referenced undergraduate programmes; 31 (31%) articles included both undergraduate and postgraduate trainees. Amongst the empirical studies (37%) participants ranged from first-year to final-year undergraduate students. One article also included postgraduate students. In 17 (17%) of the articles, the study year of participants was not identified. The interventions took place in various countries, including Australia ( $n = 19$ ), Canada ( $n = 8$ ), Ecuador ( $n = 2$ ), Ghana ( $n = 1$ ), Japan ( $n = 1$ ), Mexico ( $n = 2$ ), South Africa ( $n = 6$ ), Sweden ( $n = 4$ ), Taiwan ( $n = 1$ ), UK ( $n = 12$ ), USA ( $n = 31$ ) and Zambia ( $n = 1$ ), and in both rural and urban settings. Around 44% of articles were identified as having been applied in a global health context.

### Transformative learning in review

In this section, we offer a synthesis of how the tenets of TL theory manifest in the included studies, both conceptually and practically. A total of 69 studies (70%) referenced the work of Mezirow, in many instances in tandem with other theorists such as Brookfield, Boyd, Cranton, Meyer and Land, and Freire. Based upon our analysis of the various ways in which TL is defined in the HPE literature reviewed, constituent elements were organised around 'input' spaces (or the conditions that foster TL), descriptions of the learning process itself, and 'output' spaces, or the desired, observed or theorised outcomes of TL.

#### *How transformative learning occurs*

As a theory of learning, TL is characterised by change: change in one's beliefs about oneself,<sup>14</sup> about others, about practices, etc. Conceptualisations draw on constructivist principles in that learning occurs through critically engaging with what one believes and knows in light of what one experiences,<sup>15,16</sup> going beyond and building on prior learning.<sup>17-19</sup> It may also mean learning from one's mistakes.<sup>20</sup> A dominant theme across a large number of the included studies emphasised that for TL to occur there has to be an opportunity for questioning existing frames of reference, and for reassessing one's beliefs, habits of mind and prejudices before entering a less-known environment where the knowledge and values upon



**Figure 1** PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram. HPE = health professions education

which these beliefs and prejudices are founded might be questioned.<sup>16,18,21–37</sup> Enablers for TL are therefore becoming aware of one's prior assumptions and having one's world view challenged.<sup>38–53</sup> In addition, 'liberating learning environments' or 'those conducive to developing autonomous thinking and self-empowerment'<sup>54,55</sup> were described as necessary for reinterpreting experiences. TL requires an intentional, conscious act that occurs within both the cognitive<sup>17,27,40,56</sup> and affective domains,<sup>23,27,54,57</sup> and involves critical thinking.<sup>17,31,58</sup>

Many of the studies suggested that TL is often best facilitated through immersion in a different context, specifically outside of the classroom.<sup>59</sup> It speaks to a 'pedagogy of place' that acknowledges the role of locale and context in learning.<sup>29,60</sup> Common pedagogies and approaches to teaching and learning were those that required active engagement with communities that appeared to be different to what the students knew.<sup>61,62</sup> These engagements in less familiar communities included working in rural or

underserved communities,<sup>53,59–61,63–68</sup> travelling abroad,<sup>36,69</sup> service learning at mental health institutions,<sup>45,70</sup> visiting homes for marginalised and otherwise disadvantaged persons,<sup>52,71,72</sup> or caring for patients at the end of their lives.<sup>73</sup>

There was a clear focus on clinical activities (29%) and interactive teaching through workshops (13%). Online courses,<sup>30,74–76</sup> digital storytelling<sup>21,77</sup> and film,<sup>78</sup> as well as simulation,<sup>20,25,32,48,50,51</sup> were used. Interventions included collaborative or peer-led learning, group or teamwork<sup>37,57,79–81</sup> and mentorship,<sup>82</sup> with opportunities for dialogue and the use of narrative.<sup>17,39,62</sup> Similarly, what was described as 'experiential' learning<sup>25,57,68</sup> and learning that provided for authentic experiences<sup>19,33,41,59,83</sup> in natural settings were seen to be challenging often from a resource or socio-economic perspective.<sup>35,52</sup>

A total of 64 of the 99 articles made reference to reflection as a process to both facilitate and assess TL, with one article offering a 'Model of Holistic

Reflection'.<sup>84</sup> Specific ways in which reflection was encouraged included interviewing<sup>69,83</sup> and debriefing,<sup>32,85</sup> discussions,<sup>41,86</sup> focusing on core values,<sup>29</sup> and reflective writing, including using journals.<sup>13,27,30,45,52,87</sup> Reflection was described as 'open-ended',<sup>40</sup> 'self-reflection',<sup>28</sup> and 'critical',<sup>38,55,63,88–90</sup> with one study suggesting that such 'critical reflection' could minimise the gap between theory and practice.<sup>90</sup>

There is also a strong social imperative for TL. It presupposes engagement with others, including communities, who may well have different ways of thinking and doing to those of the student.<sup>23,36,42,88,91</sup> Several authors refer to the social dimensions of TL. Transformative learning is not just the process of introspection through critical reflection that leads to new ways of thinking, or illumination,<sup>86</sup> but it also emphasises high-level communication skills, including 'empathic listening',<sup>37</sup> rational discourse,<sup>30</sup> reflective discourse<sup>26</sup> and an awareness of the assumptions of others.<sup>92</sup>

Several studies<sup>41</sup> described specific events or conditions that acted as 'triggers' for TL. Mezirow's notion of a 'disorienting dilemma', the first of his 10 phases of transformative learning, featured strongly.<sup>23,36,40,51,93</sup> Often this was linked to a particular event or experience, typically the 'authentic' experiences mentioned above, and could be associated with feelings of guilt and fear.<sup>40,59</sup> In some instances, TL was directly linked to Meyer and Land's idea of 'threshold concepts':<sup>41,43,47,77,94</sup> 'a transformed way of understanding, or interpreting, or viewing something'.<sup>95</sup>

#### *Outcomes of transformative learning*

Transformative learning, as described in the studies, was seen to influence the formation of students' professional identity.<sup>45,47,62</sup> As they developed more discriminating perspectives, their worldviews shifted.<sup>47,53,58,66,96–98</sup> Accordingly, TL influenced their values, attitudes and behaviours,<sup>30,37,57,61,72,99</sup> and how they saw and understood themselves.<sup>14,33,69,80</sup> Students developed new interpretations of how things were, including conditions within the realm of health care.<sup>22,93</sup> There was a heightened awareness of others,<sup>17,28,64</sup> regardless of culture and socio-economic standing,<sup>69</sup> and of differing opinions and perspectives<sup>23</sup> as they progressed towards 'multiplicity' considering multiple viewpoints.<sup>17</sup> Studies spoke of how this awareness enhanced humanistic values, such as humility and integrity,<sup>24,55,57</sup> and patient-

centredness, characterised by empathy and caring.<sup>17,22,45</sup> Students were also described as having authentic opportunities to build and negotiate social, professional, therapeutic and reciprocal relationships.<sup>24,33,64,78,93,100,101</sup>

Although TL is characterised as having a strong cognitive dimension, its impact should manifest in behavioural change. Students were described as becoming agents for change,<sup>44,64,67</sup> an important feature of Mezirow's theory, which argued for change that spoke to issues of both social accountability and social justice. The transformed view of the world allows individuals to examine social injustice,<sup>58,74,102</sup> which in a health context leads to health inequalities.<sup>31</sup>

Students' increased reflectiveness encourages a process of self-actualisation, which is seen to build self-confidence and the resulting competence<sup>70</sup> and empowerment.<sup>54,85</sup> Students claimed to be more confident in caring for patients from different cultures<sup>66,85,93</sup> as a result of a sense of cultural competency.<sup>87</sup> Some studies suggested that as a result of the immersion that was mentioned above, students developed a sense of belonging or connectedness with patients, other health care professionals and members of the community.<sup>19,83</sup>

Although there was much coherence across the included studies as to the value of TL for students, and indeed ultimately for patient care, health care delivery and even society, there were also some less-common indicators that warrant discussion. For example, although personal and social dimensions featured strongly in the described outcomes, one study suggested that students still acquired 'academic knowledge' but did so 'in a different way' from what they felt they had experienced previously.<sup>68</sup>

#### *Experience of transformative learning*

Although most studies framed TL as potentially having a significant positive effect on an individual's career, it was evident that students could also have some unsettling experiences. Apart from the guilt and fear mentioned above, studies also described how students experienced learning events as being 'transformative', 'intense',<sup>72</sup> 'uncomfortable',<sup>93</sup> and characterised by 'uncertainty'.<sup>47</sup> Experiences also were described as 'intellectual',<sup>71</sup> and 'emotional',<sup>63,71,101</sup> but also 'different',<sup>34,60</sup> or as a 'journey'.<sup>63</sup>

Students need to be receptive and have the capacity<sup>49</sup> to consider multiple viewpoints when their own

positions and frames of reference are being challenged. They need to be open to experiencing a level of vulnerability and take the 'disorienting dilemmas' on board rather than opting to distance themselves from either the patients or the context.<sup>94</sup> There needs to be an intent to seek common ground for understanding<sup>37</sup> that will lead to the social good that is implicit in TL theory. Inevitably, there are students who may be too egocentric and/or emotionally disconnected to benefit.<sup>63</sup> A vacation mindset was an acknowledged danger in 'study abroad' studies.<sup>63</sup> Finally, it should be noted that only one included study indicated that the work conducted had provided no evidence of TL and described the experience of students struggling with the uncertainty and challenges that they are presented with, specifically with regards to ethical issues.<sup>103</sup> These authors and others<sup>104</sup> call for curriculum renewal to prepare students in advance for such learning initiatives.

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## DISCUSSION

To the best of our knowledge, this review represents the first of its kind in HPE literature. The review showed that there is broad consensus as to what TL in HPE is perceived to be, how TL is fostered, and how students experience it. Transformative learning is described as learning that changes the way we see the world through an experience or event that encourages reflection, typically challenging preconceived understandings, which enables positive future action and meaningful relationships.<sup>1</sup> It appears to be more common when learning takes place outside of the conventional classroom, when students are exposed to less familiar contexts, and when modes of delivery and engagement other than formal lectures are adopted. For TL to occur, students must have the capacity to respond to and engage in these unfamiliar contexts. A lack of such capacity can preclude TL.

Criticism has been lodged against the way in which TL theory has been assimilated into learning theory discourse.<sup>105,106</sup> For example, Newman argues that change appears to be key to TL and questions whether all learning is not about change in some way and whether it is even possible to identify TL as a distinct phenomenon.<sup>106</sup> Perhaps it is that TL theory essentially provides a frame within which we are better able to understand learning, although in this instance it is learning to a particular end. We would therefore argue that TL is indeed identifiable and distinct. A recent review emphasises these distinct

features, describing a typology of TL outcomes comprising 'worldview', the assumptions, beliefs, attitudes that influence how we make sense of an experience and the development of a more complex perspective, consisting of five aspects: (i) 'self', taking responsibility, knowing oneself, also in relation to others, and one's identity; (ii) 'epistemology', becoming more discriminating about what knowledge is and acknowledging multiple ways of knowing; (iii) 'ontology', ways of being in the world; (iv) 'behaviour', action influenced by changed perspectives and even new skills; skills, and (v) 'capacity', cognitive and affective ability.<sup>107</sup> Each of these domains is present in our review to a greater or lesser extent, although they are not all present in each of the studies. This prompts the question: when does a learning experience qualify as transformative? Although in general the included studies that describe an intervention all speak to a type of learning that goes beyond informative and formative approaches, the application of such a typology as inclusion criteria would have resulted in excluding many of these publications. Their standing in terms of facilitating TL could therefore be critiqued.

Hoggan argues that depth and breadth of experience and evidence that change is not temporary are important criteria for TL.<sup>107</sup> These criteria also resonate with Mezirow's 10 phases of TL, which move from being confronted with a disorienting dilemma, to critical reflection of self and of one's assumptions, to consideration of new roles and a different course of action, to the adoption of these new roles, and finally, reintegration into one's life based on one's new way of being. Mezirow's work was dominant in the included studies, and many of these phases are featured, particularly in those studies that describe empirical work.

Generally, however, the frequency of representation diminishes the further one moves through the phases, with most studies acknowledging students being challenged to reflect on their assumptions, and suggesting that this leads to new perspectives, but with fewer emphasising changed action. This again raises the question about when a claim for TL can be made, and whether movement through all phases is required. Although TL theory claims that the new ways of being are both integrated and irreversible, there is a dearth of longitudinal studies, one exception being a study by Greenhill *et al.*,<sup>108</sup> that could offer perspectives on the extent to which change is sustained. In addition, one might argue that it is not possible to attribute sustained change to a particular event.

What are the implications of this study for HPE? First, context is critical. As the training of health professionals continues to move towards settings where they are active participants in care,<sup>109</sup> often in unfamiliar surroundings (whether learning for the first time in a hospital or on an elective in a foreign country), increased opportunities for exposure to learning experiences that are potentially transformative will become available. Moving outside of the conventional classroom offers both students and educators the freedom to explore issues beyond the formal curriculum, such as social justice, that are implicit in the work of the original theorists in the field. Second, despite the influence of context, TL is about the individual – his or her journey. This journey is characterised by both a cognitive and an affective dimension, an epistemological and ontological position, and these are intertwined, potentially providing for the depth and breadth of learning alluded to above. Third, in the context of HPE, the social, relational and emotional components have specific relevance to becoming a professional in any of the caring professions. As mentioned earlier, Mezirow's sense was that TL would ultimately lead to social change and promote social justice. In the context of current global health inequity this imperative strikes a chord more strongly than any other when considering the learning that we would wish future health professionals to be exposed to.

Finally, the findings of this study also carry implications for teachers, including clinical educators, for curriculum developers and for programme administrators responsible for creating learning opportunities and establishing enabling learning environments, such as those described above. To fulfil these tasks would require a preparedness on the part of these educators to themselves critically engage with what they believe and what this might mean for their own practice. Curriculum renewal activities can be designed to include teaching strategies that engage students in critical self-reflection. Equally important, however, is for educators in the health professions to be sensitive to students' potential responses, whether positive or negative, both cognitively and emotionally. Providing detailed and practical guidelines for educators in the health professions about facilitating TL would be an important next step to emerge from this review.

Although this review has sought to address a gap in our current understanding of TL and how it is represented in the existing HPE literature, there are limitations to this work. In seeking to scope the

literature we adopted an approach that pushed for breadth rather than depth. In the process of synthesis, unique details may have been lost. Following the conventions of scoping reviews, we did not formally review the quality of the evidence in the included studies.<sup>9</sup> A systematic review might address this gap. Furthermore, because the nursing profession was the most represented programme in the included studies, the relevance of this review for all health professions' undergraduate programmes may be questioned. Nevertheless, we believe that the work provides insights that can inform future studies that seek to foster and assess TL. Another aspect that warrants further attention is the role of self-reflection in facilitating and assessing TL. Finally, the review team comprised a diverse group of professionals that includes clinicians, administrators and educationalists, who approached the process of review and analysis from quite different perspectives. Reaching consensus required vigorous debate, but we believe this enhanced the final product.

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## CONCLUSIONS

Transformative learning theory has become 'an internationally well known and recognised contribution to the understanding of what may be perceived as the most advanced kind of human learning'.<sup>110</sup> It has been described as 'complex and multifaceted',<sup>4</sup> 'the iconic education philosophy'<sup>1</sup> in higher education, and an 'analytic metatheory'<sup>107</sup> providing educators with a theoretical lens through which to view students' learning. Notwithstanding critiques levelled at TL, there can be no doubt that it warrants our attention and further work that will explore the issues raised in this review is required.

One of the main goals of the BGHEI relates to offering curriculum recommendations for global health education.<sup>111</sup> Much can be learned from this review by those who are involved in, or intend to embark on, a global health educational intervention, particularly in terms of preparing students, ensuring time and space for critical reflection and discourse, structuring learning events or experiences to allow for discomfort and a move away from 'safe' spaces. However, we would argue that the review offers a broader perspective and that addressing the challenges facing health professions education in the 21st century requires a pedagogy of uncertainty that allows for 'human flourishing', acknowledging the complexity of the world we live in and questioning what we believe we know about it.<sup>112</sup> Transformative learning theory offers such a pedagogy.



**Contributors:** SCVS: made substantial contributions to the conceptualisation and design of the study, was directly involved in the review at all levels and the analysis and interpretation of the data, and prepared the first draft of the manuscript and managed subsequent revisions and finalisation thereof. JH participated in the conceptualisation of the study, in data abstraction, analysis and interpretation and was involved in critically revising the manuscript for important intellectual content. TFB participated in the conceptualisation of the study, in data abstraction, analysis and interpretation and was involved in critically revising the manuscript for important intellectual content. MAM: participated in multiple levels of abstract review, and contributed to some segments of analysis and interpretation, as well as final review. LMcN: participated in all levels of review, data extraction and analysis, and contributed to writing and review of segments of the manuscript. IM participated in the review process at abstract and full text level, and contributed to data analysis and final review of the manuscript. MJP participated in the review at all levels, the abstraction and analysis of data, and was involved in critically revising the manuscript. SS participated in the review process at abstract and full text level, and contributed to data analysis and final review of the manuscript. JMS participated in the refinement of the research question, conceptualised and conducted the literature searches, and the acquisition of the literature as data for analysis, and was involved in critically revising the manuscript for important intellectual content. DD made substantial contributions to the conceptualisation and design of the study, was directly involved in the review at all levels, including the analysis and interpretation of the data, and was involved in critically revising the manuscript for important intellectual content.

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**Ethical approval:** as this was a scoping review of literature that is already in the public domain, no ethical approval was required.

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**Appendix 1: Concept table of terms for searching in Ovid MEDLINE**

	<b>Concept A</b>	<b>Concept B</b>	<b>Concept C</b>
Medical Subject Headings (MeSH)	exp Education, Medical, Undergraduate/ exp Education, Nursing/ exp Education, Dental/ exp Education, Pharmacy/ exp Education, Veterinary/ exp Education, Professional/	Students, health occupations/ Students, dental/ Students, medical/ Students, nursing/ Students, pharmacy/ Students, premedical/ Students, public health/	exp Learning/
Textwords	health* profession* educat*.mp.	((medica* or nurs* or physician assistant* or allied health or dent* or pharmac* or veterinary*) adj2 (student* or trainee*)).mp.	(transform* adj2 learn*).mp. (transformative or transform or transforms or transforming).tw.

**Appendix 2: List of databases and resources searched**

Ovid MEDLINE (Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE<sup>®</sup> Daily and Ovid MEDLINE<sup>®</sup> 1946 to Present)

Ovid Embase (1974 to May 2018)

Ovid PsycINFO (1967 to May 2018)

ERIC (Education Resources Information Center via ProQuest)

Sociological Abstracts (via ProQuest)

Scopus

CINAHL with Full Text (EbscoHost)

Academic Search Premier (EbscoHost)

Education Research Complete (EbscoHost)

The Cochrane Library ([www.cochranelibrary.com](http://www.cochranelibrary.com))

Best Evidence Medical Education (BEME) Collaboration website ([www.bemecollaboration.org](http://www.bemecollaboration.org))

The Campbell Collaboration website ([www.campbellcollaboration.org](http://www.campbellcollaboration.org))