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(Article)

How Different Understandings of the Nature of Medical Practice Can Limit Future Development as a Medical Practitioner

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Abstract: Previous research has shown that medical practitioners' conceptions of their profession play a significant role in their practice. This study extends that research by investigating ways in which different conceptions of 'being a doctor' may act to expand or limit the potential for future development as a doctor. Based on previous research that identified different conceptions of 'being a doctor' and 'developing as a doctor', a chi-square test of association between the two sets of conceptions was undertaken and a statistically significant association found. More and less complex conceptions of being a doctor were associated with more and less complex conceptions of developing as a doctor, respectively. This raises the likelihood that conceptions of being a doctor that develop early in one's career may act to limit the potential for future development. Consequently, the paper recommends that different conceptions of medical practice be addressed as part of medical education. To help with this, the paper describes an innovative educational design based on the 'variation theory of learning' proposed within a phenomenographic epistemology. The educational design is specifically intended to help trainees become aware of elements of practice and development that they have not previously discerned.

Keywords: medical practice; medical education; professional development; conceptions; phenomenography; variation theory

1. Introduction

Ongoing professional development is a requirement for medical practitioners throughout their careers. This is typically justified in terms of the need to stay up-to-date with rapidly changing knowledge and techniques in the field. But professional development consists of more than developing knowledge and skills, just as being a medical practitioner consists of more than practicing knowledge and skills, including for example, clinical wisdom, values, ethics and beliefs [1-3].

In line with this, research in the field of professional work pedagogy has moved beyond the notion of professional excellence as being primarily defined by knowledge, skills and attitudes, to include the importance of professionals' own understandings of their practice. It is argued that professionals are 'embodied' practitioners [4] who evidence a professional 'way-of-being' [5-7]. In addition, professionals' ways of understanding their work has been found to have an impact on their performance at work, with those with a more complex view of their work showing better performance [8-10].

In line with this, since the 2000s many researchers have emphasised the educational value of exploring medical professionals' own understandings or conceptions of their work, and how this is developed during medical training [9, 11-16]. However, the role played in medical practitioners' ongoing development by different understandings of the nature of professional development itself is

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a neglected area of research. A search of the databases of PubMed, PsycINFO, Scopus and Web of Science found only two studies that investigated different understandings of development as a medical practitioner, one with newly qualified practitioners [17] and one with experienced practitioners [16] (undertaken by the paper's authors).

Cuyvers et al. [17] interviewed 11 newly qualified doctors from different specialty backgrounds, asking them to describe their experiences of development arising from learning in daily practice. They grouped these descriptions of doctors' professional learning into four categories:

1. *Learning related to diagnosis and treatment* – experience of medical problems that the newly qualified doctors had not previously had to deal with;
2. *Learning related to policy and organisation* – experience of problems such as sudden changes made by the government that impacted upon operations within the department;
3. *Learning related to changing professional roles* – experience of problems related to the shift from being a resident-trainee to being a supervisor;
4. *Learning related to communication with patients* – experience of problems that concern communicating uncertainty to patients.

Yu and Åkerlind [16] interviewed 30 experienced doctors from different specialty backgrounds, asking them to describe their experiences of development as a doctor over their careers. They grouped these descriptions of development into the following four categories:

1. *Development as becoming more clinically competent and confident* – by acquiring knowledge and skills;
2. *Development as becoming more productive and efficient at work* – by accumulating experience as a doctor;
3. *Development as becoming a more effective and more patient-oriented practitioner* – by actively reflecting on one's practice and experiences;
4. *Development as broadening one's roles and horizons* – by exposing oneself to different ideas and opportunities.

Whilst the language used in the two studies is somewhat different, there is a clear overlap in findings. For instance, the Cuyvers et al. developmental category of 'learning related to diagnosis and treatment' contains elements of the Yu and Åkerlind category of 'becoming more clinically competent and confident'. Similarly, the Cuyvers et al. category of 'learning related to changing professional roles' contains elements of the Yu and Åkerlind category of 'broadening one's roles and horizons'. Lastly, the Cuyvers et al. category of learning 'related to communication with patients' contains elements of the Yu and Åkerlind category of 'becoming a more effective and more patient-oriented practitioner'.

Another commonality between the two studies is the distinction they draw between the *outcomes* or intended outcomes of development and the *approaches* or strategies taken to development. Cuyvers et al. summarised the developmental activities described by their participants as:

- *Interacting with others* – learning by consulting, seeking help and feedback, discussing and/or reflecting together;
- *Doing something* – learning by trialling and testing, doing extra research, and/or clinical or technical investigations beyond the standard procedures;
- *Consulting written sources* – reading handbooks, guidelines, review articles, the internet, the patient file, setting up journal alerts;
- *Communicating uncertainties* – learning from recognising uncertainty and communicating this honestly to patients;
- *Observing others* – when faced with a problem situation, observing experts and other doctors with more experience in those situations.

Yu and Åkerlind summarised the developmental activities described by their participants as:

- *Acquiring clinical knowledge and skills* – accessing information from websites, asking somebody, life-long learning;
- *Accumulating experience over time as a doctor* – relating knowledge to experience, working out techniques, practising;

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- *Actively reflecting on one's practice and experiences* – examining your actions, stopping to reflect, learning from your mistakes;
- *Exposing oneself to different ideas and opportunities* – exposing yourself to challenges, exposing yourself to different ways of thinking, interacting with people outside your normal range.

It is interesting to note the focus on informal and self-initiated developmental activities amongst medical practitioners in both studies. However, Cuyvers et al. did not link the developmental activities they identified with different developmental outcomes, whilst the analysis by Yu and Åkerlind found a conceptual link between the developmental outcomes described by doctors and the approaches doctors took to their development (see Table 1).

Table 1. Different outcomes of development associated with different approaches to development.

	Outcomes of development			
Approaches to development	**Becoming more competent & confident**	**Becoming more productive & efficient**	**Becoming more effective & patient-oriented**	**Broadening one's roles & horizons**
Acquiring knowledge & skills	X			
Accumulating experience as a doctor		X		
Active reflection one's practice & experiences			X	
Exposing oneself to different ideas & opportunities				X

This paper builds on the existing body of research into medical practitioners' understandings or conceptions of their work and profession (i.e., what it means to *be* a doctor) and research into medical practitioners' understandings or conceptions of professional learning and development over their career (i.e., what it means to *develop* as a doctor) by looking at the relationship between the two sets of understandings. Building on previous research by the authors, this study asks:

- Is there a relationship between medical practitioners' conceptions of their profession and practice (being a doctor) and conceptions of the possibilities for development over their career (developing as a doctor)?
- And if so, what are the implications of this for medical education and training?

As shown in the findings below, more and less complex conceptions of being a doctor were significantly associated with more and less complex conceptions of developing as a doctor, respectively. The findings indicate that conceptions of being a doctor that develop early in practitioners' careers may act to limit their potential for future development, which raises the importance of explicitly addressing different conceptions of medical practice as part of medical education and training.

1.1. Different conceptions of being a doctor

In order to understand this study, we first need to summarise the findings of our previous research. The findings of our study of different conceptions of *developing* as a doctor have already been summarised above, and the findings of our study of different conceptions of *being* a doctor are summarised below.

Based on semi-structured interviews with a sample of experienced medical practitioners asked to describe what they do as a doctor, three qualitatively different conceptions of 'being a doctor' were found [15]:

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1. *Being a doctor as treating patients' medical problems* – with a focus on treating the disease, problem or illness itself, and the doctor's role in doing that;
2. *Being a doctor as maximising patients' well-being* – with a focus on considering the patient's role in treatment and the range of psychosocial issues that might be affecting their response to treatment and overall well-being;
3. *Being a doctor as maximising community health* – with a focus on social responsibility and balancing individual patient needs with community needs.

It is important to note, however, that the three conceptions found were not constituted in an exclusive way. That is, medical practitioners were able to experience multiple goals and perspectives in their work. However, the multiplicity of perspectives developed in a hierarchically-inclusive way, with Conception 3 including awareness of the perspectives described in Conceptions 1 and 2, and Conception 2 including awareness of the perspectives described in Conception 1, but not vice versa. So, the order of conceptions from 1-3 represents not just different ways of understanding being a doctor, but also more and less *complex* (or sophisticated) ways of understanding it.

This was also the case with the four conceptions of developing as a doctor described earlier, with Conception 4 the most complex in that it incorporated all previous perspectives, and Conception 1 the least complex in that it was the only perspective described.

The rest of the paper describes our analysis of the relationship between the two sets of findings, and the implications for medical education and training.

2. Materials and Methods

2.1. Sample characteristics

The original interviews on which this study is based were undertaken with 30 medical practitioners, recruited from the staff list of a prestigious medical school located in Australia. Sample characteristics included:

- Gender –16 male; 14 female;
- Medical discipline – 13 general practitioners, 12 specialist physicians; 5 surgeons;
- Location of medical training – 25 Australian medical school graduates; 5 international medical school graduates;
- Years of clinical/work experience – 2 with <10 years; 6 with 10-20 years; 11 with 21-30 years; 9 with 31-40 years; nil with 41-50 years; 2 with >50 years;
- Location of clinical/work experience – 25 with international work experience; 5 with work experience only in Australia.

Although recruited within Australia, participants had a high degree of international work experience, including in the United States of America, India, Germany, New Zealand, the Netherlands, the United Kingdom, Bangladesh, Afghanistan, Tanzania, Europe, Iran, the United Arab Emirates, Qatar, Papua New Guinea, Mexico, Nepal, Canada, South Africa and China.

The range of specialties amongst physicians and surgeons included radiology, pathology, immunology, cardiology, gastroenterology, infectious disease and sexual health, anatomical pathology, neonatal, sports, oncology, geriatrics and paediatrics for the physicians, and general surgery, vascular, breast, ophthalmology and paediatric surgery for the surgeons.

2.2. Data analysis

For this study, the original interview transcripts were revisited and each transcript coded according to which of the previously described conceptions of (a) being a doctor and (b) developing as a doctor (described above) it was seen to best represent. The codings for being and developing as a doctor were then cross-tabulated and a Pearson's chi-square test of association between the two sets of conceptions undertaken.

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Given the relatively small sample size, Conceptions 1 and 2 for developing as a doctor were combined into one category for the purpose of the chi-square test, that is, the developmental outcome of becoming more 'competent and confident' was combined with the developmental outcome of becoming more 'productive and efficient'. This was justified on the basis that they represented the two least complex conceptions of developing as a doctor, as well as being more qualitatively similar than the other conceptions.

3. Results

The chi-square test showed a statistically significant association between the two sets of conceptions (χ^2 =60.08, df=4, p<.01), with more complex conceptions of 'being a doctor' associated with more complex conceptions of 'developing as a doctor'. Conversely, less complex conceptions of 'being a doctor' were associated with less complex conceptions of 'developing as a doctor' (see Table 2).

Table 2. Crosstabulation of conceptions of being a doctor with conceptions of developing as a doctor.

	Being a doctor		
Developing as a doctor	**1: Treating patients' medical problems**	**2: Maximising patients' well-being**	**3: Maximising community health**
1 & 2: Becoming more competent and productive	7		
3: Becoming more effective and patient-oriented		11	
3: Broadening one's roles and horizons			12

(χ^2=60.08, df=4, p<.01)

Participants whose focus in being a doctor was solely on treating patients' medical problems described their past development and potential future development solely in terms of becoming more competent and productive at work. This incorporated only two of the four possible ways of developing as a doctor that were previously identified [16].

Participants whose focus in being a doctor was on maximising patient well-being (in addition to treating patients' medical problems) described their past and potential future development in terms of becoming more patient-oriented. As described earlier, this conception included awareness of the perspectives on development described in Conceptions 1 and 2, so included a focus on becoming more competent and productive as well as more patient-oriented. In this way, this conception demonstrated awareness of three out of the four possible ways of developing as a doctor previously identified.

Lastly, participants whose focus in being a doctor was on maximising community health (in addition to maximising patient well-being and treating patients' medical problems) described their past and potential future development in terms of broadening their roles in unpredictable directions (as well as becoming more patient-oriented and more competent and productive). This shows awareness of all four possible ways of developing as a doctor previously identified.

4. Discussion

4.1. Relationship between conceptions

This study investigated the relationship between medical practitioners' conceptions of being a doctor and developing as a doctor, based on a sample of 30 experienced practitioners. A statistically

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significant association was found, with more and less complex (or sophisticated) conceptions of what it means to be a doctor associated with more and less complex (or sophisticated) conceptions of what it means to develop as a doctor, respectively.

This finding implies a self-reinforcing relationship between doctors' conceptions of their practice and their engagement in professional development. This indicates that a less complex conception of being a doctor can act to limit, not just doctors' current medical practice, but their potential for future development of that practice. For example, doctors who described their practice as focused solely on 'treating patients medical problems' also described their past and potential future development solely in terms of 'becoming more confident and efficient at work'. In contrast, doctors who described their practice as focused on 'maximising patient well-being' (in addition to treating patients' medical problems) described their past and potential future development in terms of 'becoming more patient-oriented' (in addition to becoming more confident and efficient).

This is not to deny that doctors' practice will inevitably become more sophisticated *in some ways* over time, but that unless their conception of their practice also becomes more sophisticated, any development in their practice will be limited only to what is possible *within* that conception of their work. For example, doctors who see their practice solely in terms of treating patients' medical problems are then limited in their development to only maintaining and developing biomedical knowledge and skills. This is because, unless their conception of being a doctor changes, it would not make sense to them to engage in any other forms of development.

It is also important to emphasise that we are talking about variation in awareness here, not simply variation in beliefs or values. Variation in values would be indicated where, for example, a doctor shows awareness of the *possibility* of catering for patient psychosocial context and taking community health needs into account in treatment of individual patients, but feels that it is inappropriate to do so for some reason. In contrast, variation in awareness is indicated when some doctors do not express awareness of even the possibility of catering for psychosocial context and community needs in patient treatment, indicating that it is not even recognised as an option [15]. As elaborated below, this focus on awareness, rather than beliefs and values, is in line with the phenomenographic epistemological perspective adopted in this research.

4.2. Implications for medical education and training

Going back to the original research on which the current study is founded [15,16], it was shown that participants who expressed the least complex conceptions of being and developing as a doctor included those with extensive work experience. This implies that their conceptions had not substantially changed, or become more sophisticated, since first completing medical school. This reinforces the implications of this study, which are that limited conceptions of practice lead to limiting approaches to development, which then reduces the chances of developing more complex conceptions of practice over time.

In this way, the study challenges a common assumption in the profession, that medical students and junior doctors will automatically develop more sophisticated views of medical practice as they become more experienced. And given that more sophisticated conceptions of medical practice do *not* necessarily develop spontaneously over time, it then becomes important to address such conceptions as part of medical education and training. To help with this, we would like to introduce an innovative approach to learning more complex conceptions of medical practice, grounded in the same epistemological assumptions as the original studies, that is a phenomenographic view of learning. To do this, we first need to explain the epistemology and associated theory of learning underlying the phenomenographic perspective that inspired this body of research.

Phenomenographic epistemology posits that humans experience phenomena (such as being a doctor or developing as a doctor) in an inherently multidimensional way, with different conceptions of a phenomenon arising from awareness of different dimensions or characteristics of the phenomenon. In line with this, some conceptions will inevitably be more complex than others, through awareness of a greater number of dimensions of the phenomenon. More complex

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conceptions inherently enable more powerful ways of operating with respect to the phenomenon, because one can only act within the limits of one's understanding. Consequently, a key claim underlying phenomenography is that "powerful ways of acting originate from powerful ways of seeing [understanding]" [18] (p.7).

Thus, associated with every dimension of a phenomenon that is discerned by individuals is a capability for acting. Whilst this does not ensure that people will employ that capability in every situation, it gives them the flexibility of doing so. "The research outcomes thus have implications, not so much for what people will actually [definitely] do in any one situation, but for what it is possible for them to do. This is often referred to in phenomenography as a 'capability' for acting" [19] (p. 179).

The phenomenographic search for key dimensions in people's awareness of phenomena has strong educational implications because it highlights specific dimensions that learners need to become aware of in order to develop a more complex conception (or understanding) of a phenomenon. This provides an empirical basis for paying particular educational attention to certain dimensions.

The variation theory of learning associated with phenomenography has proposed and tested a pedagogical design that maximises learners' opportunities to become aware of different dimensions of a phenomenon, such as a disciplinary concept or professional skill [20-23, 24-26]. Variation theory claims that we become aware of a dimension when we notice that variation in that dimension impacts the phenomenon as a whole – i.e., it is at this point that we notice that the dimension forms part of the phenomenon, rather than being separate to the phenomenon. For example, in order to see the dimension of catering for patient psychosocial context as part of being a doctor, one needs to notice, not only that patient context can impact the success of treatment, but that variation in *how doctors cater for* patient context can impact the success of treatment. Otherwise, patient context will be seen as something that may impact the success of treatment, but is not relevant to what doctors themselves do.

According to Variation Theory, the most pedagogically effective way to maximise the chances of learners becoming aware of any dimension of a phenomenon is not just to vary that dimension, but to do so *whilst holding all other dimensions of the phenomenon constant*. Continuing with the example of the dimension of catering for patient context during medical treatment, this means that trainee doctors need to be exposed to clinical scenarios where doctors' responses to patient context vary (with an associated impact on the success of treatment) *whilst biomedical treatment factors are held constant,* including doctors' clinical knowledge and skills.

While it is likely that medical educators already vary the dimension of catering for patient context at various points in their teaching, doing it in this controlled way is usually counterintuitive. For instance, it would probably be more common for educators to create scenarios where considering patient context is *added to* considering biomedical issues, with both dimensions varying simultaneously, rather than one dimension being held constant while the other varies.

Whilst it is important to expose learners to complex clinical scenarios, where multiple dimensions of being a doctor vary simultaneously, variation theory argues that this should not be done until *after* all relevant dimensions have first been varied one at a time (called 'separation' of dimensions). This is to reduce the potential for distraction of learners' attention away from the dimension being highlighted. Complex multi-dimensional scenarios, where learners can observe how dimensions interact (called 'fusion' of dimensions), become appropriate only after dimensions have first been discerned separately [21-23, 26]. Variation theory also emphasises the importance of subsequent 'generalisation', where pedagogical design should repeat the recommended pattern of separation and fusion of dimensions *using different examples and settings*. This encourages learners to generalise their new conception of the phenomenon across contexts.

The following case study scenario illustrates the process of separation and fusion, with the intention of helping students to become aware of the dimension of catering for patient psychosocial context as part of being a doctor, in particular. In Parts 1 and 2, the dimensions of 'biomedical treatment' and 'patient psychosocial context' are *separated*. First, by having biomedical treatment

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options vary whilst patient context is kept invariant in Part 1, then by keeping biomedical treatment invariant whilst patient context varies in Part 2. In this way, Part 1 acts to draw students' awareness to the role of patient biomedical treatment in patient outcomes, whilst Part 2 acts to draw students' awareness to the role of patient context in patient outcomes. Part 3 then *fuses* the two dimensions by having both vary simultaneously. This draws student awareness to the potential interaction of biomedical treatment and patient context in patient outcomes.

4.2.1. Illustrative case study

1. *Part 1* – A 75 year old caucasion male presents to his GP complaining of tiredness and increasing back pain over the last few weeks. Vital signs are normal. He has type 2 diabetes, which is controlled through diet, and GORD which is treated with rabeprazole. Blood tests show anaemia and high levels of M-protein. The GP suspects myeloma and refers for consultation and treatment.
   Questions:

- What further investigations would you undertake to confirm the diagnosis?
- What are the possible treatment options for myeloma?
- What are the indications and contraindications of different options?
- Which treatment would you recommend and what further information would you need to make a decision?

2. *Part 2* – Further discussion with the patient reveals that, although he was initially described as living with his son, he lives alone in a granny flat in the backyard and rarely sees his son. He shows signs of deteriorating memory and depression.
   Questions:

- What patient support options would you suggest and why?

3. *Part 3* – The patient was prescribed *Lenalidomide*, 25 mg orally once a day on Days 1 to 21 of repeated 28-day cycles, and *dexamethasone*, 40 mg dose once weekly. Blood tests at 3 weeks showed a positive response in the form of a decrease in M-protein levels, and the patient reported a reduction in pain and fatigue, confirming that the patient is in partial remission (>50% reduction in M-protein). However, in week 5, the patient presented to his GP reporting fever, shortness of breath, and nose bleeding. Blood tests showed neutropenia and thrombocytopenia. Discussion with the patient revealed he was confused about his medication dosages and had continued taking *Lenalidomide* throughout the 28-day cycle *:* (possible treatment invariant; patient context varies). This scenario acts to highlight the role of patient psychosocial context in patient outcomes.
   Questions:

- What further investigations, treatment and patient support plans would you consider?
- What are the indications and contraindications of different options?

This three-part pattern of variance and invariance of different dimensions of being a doctor then needs to be repeated across multiple medical and patient scenarios to encourage *generalization* of learning (by using different biomedical issues and different types of variation in patient context, for example). Meanwhile, given the strong relationship between conceptions of being and developing as a doctor shown in this study, as medical trainees' conceptions of medical practice become more complex, their conceptions of developmental possibilities and activities can be expected to simultaneously grow in complexity.

Obviously, however, this educational design represents a resource-intensive approach that can only realistically be undertaken for a limited number of key concepts – concepts that are particularly important in medical practice, but have also proven to be particularly difficult to understand in a sophisticated way [24]. Identification of such concepts might initially be undertaken by regulatory bodies, but should be accompanied by empirical research to establish more and less complex ways in which such concepts are being understood and applied in practice. Phenomenographic research would be a particularly useful approach to take here, as illustrated in this paper. Originating in the field of educational research, phenomenography is not yet well known in medical research, but has

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been increasingly recommended over time as a useful research method for medical education and health research [27-34].

4.3. Limitations of the study

The study has some limitations that may effect generalization of the findings. One is the selection of the sample from a single country. However, this limitation was mitigated by the international experience of the sample, in terms of participants' country of origin, medical training and previous work experience, representing 20 different countries in total.

The selection of participants from a medical school means that all participants were simultaneously engaged in clinical practice and medical education. This may mean that the views of doctors who are not attached to a medical school may not be represented. Nevertheless, all participants were practicing doctors, and their role in educating future practitioners may well have increased the thoughtfulness of their interview responses.

Lastly, with only 30 participants, the sample size for this study was relatively small. Nevertheless, the size was adequate to conduct a test that showed the statistical significance of the relationship between conceptions of being a doctor and developing as a doctor .

5. Conclusions

This study shows a strong relationship between the sophistication of medical practitioners' conceptions of being a doctor and their conceptions of developing as a doctor, indicating a self-reinforcing relationship between the two. This means that limited conceptions of being a doctor are likely to lead to limited approaches to development as a doctor, which will then present few opportunities to expand limiting conceptions of being a doctor over time.

The educational significance of the study findings is that they indicate a need for medical education and training programs to explicitly address different conceptions of being a doctor and associated dimensions of practice. This is to enable more sophisticated ways of practicing to develop over the course of their careers, which might otherwise be constrained by early and less sophisticated conceptions of practice.

From a phenomenographic perspective, the most effective way of doing this is to identify the dimensions of being a doctor that are recognised within more sophisticated conceptions, but not within less sophisticated conceptions, as shown for example in the Yu and Åkerlind (2024a) study [15]. The dimensions associated with the more sophisticated conceptions then need to be brought to trainees' attention. But for dimensions that have proven difficult to discern, this is not a simple process. According to phenomenography's variation theory of learning, simply informing trainees of the importance of a dimension is not the most effective approach, nor is introducing the dimension into multi-dimensional examples of practice. Instead, the dimensions of practice that educators wish to emphasise are best introduced in a structured way. First, each dimension should be highlighted individually (separation), then in a multi-dimensional way (fusion), then this pattern repeated across varied contexts and examples (generalisation). However, this is a resource-intensive approach that can only realistically be done for a limited number of dimensions of practice – hence the value of undertaking empirical research into the importance of discerning different dimensions.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Human Ethics Committee of the Australian National University (Protocol Number 2010/246).

Informed Consent Statement: Informed consent was obtained from all participants involved in the study.

Data Availability Statement: The data used for this study may not be made available due to confidentiality requirements.

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