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Running title:

Transdisiplinary Generalism: a Methodology

Transdisciplinary Generalism: naming the epistemology and philosophy of the generalist.

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Abstract

Transdisciplinary research and generalist practice both face the task of integrating and discerning the value of knowledge across disciplinary and sectoral knowledge cultures. Transdisciplinarity and generalism also both offer philosophical and practical insights into the epistemology, ontology, axiology, and logic of seeing the 'whole'. Although generalism is a skill that can be used in many settings from industry to education, the focus of this paper is the literature of the primary care setting (i.e., general practice or family medicine). Generalist philosophy and practice in the family medicine setting highly values whole person care that uses integrative and interpretive wisdom to include both biomedical and biographical forms of knowledge. Generalist researchers are often caught between reductionist (positivist) biomedical measures and social science (post-positivist) constructivist theories of knowing. Neither of these approaches, even when juxtaposed in mixed-methods research, approximate the complexity of the generalist clinical encounter. A theoretically robust research methodology is needed that acknowledges the complexity of interpreting these ways of knowing in research and clinical practice. We undertook a conceptual review of literature that outlines (a) the philosophy and practice of generalism in primary care and (b) both the practical (Zurich) and philosophical/methodological

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/jep.13446

(Nicolescuian) schools of transdisciplinarity. The alignment between generalism and transdisciplinarity is discussed in detail – outlining their broad scope, relational process, complex knowledge management, humble attitude to knowing, and real-world outcome focus. The concurrence between these approaches to knowing is offered here as Transdisciplinary Generalism – a coherent epistemology for both primary care researchers and generalist clinicians to understand, enact, and research their own sophisticated craft of managing diverse forms of knowledge.

Keywords

Transdisciplinary research; General Practitioner, Physician, family; Epistemology; Philosophy; Methods

Introduction

A Call from generalism to acknowledge the whole: the generalist gaze

Although generalist primary care clinicians (often called a general practitioner [GP] or family physician) offer a wide scope of care, their approach to knowledge is often constrained by reductionist (or positivist) biomedical approaches. These limitations of the biomedical gaze directly contradict generalist philosophy that values whole person care [1]. Primary care clinicians negotiate the boundaries between medical and social conceptualisations of distress in their everyday practice. They routinely assess broad undifferentiated presentations (including a large case load of mental distress) while seeking to integrate biomedical and biographical understanding of the person [2-4]. Generalists see the dominance of biomedicine in the face of complexity as epistemological and ontological incongruence or dichotomy [5,6], ignoring the particular complexities of the person [7].

Experienced generalists consider current positivistic approaches incomplete and have argued for coherent integrative approaches that acknowledge the "lived body" [6] and consider the "neglected concepts of social medicine" [8, p. 255]. They also call for transdisciplinary participatory approaches [9] and approaches that acknowledge the discernment, scholarly wisdom, or tacit forms of knowledge involved in clinical decision making [9,10]. Simple awareness of different forms of knowledge is not enough. As generalists warn, "gathering more information is not enough unless we also have a framework by which to use it" [1, p. 8]. Disciplinary approaches are necessarily reductionist with inherent hierarchies of knowledge value – perhaps made more overt through the evidence-based movement [11]. Biomedical and sociological disciplines have offered insights into health care; yet both can constrain knowledge of the whole person by "technical or social reductionism" [12, p.452]. Without

awareness of their limited scope, reliance on either predominantly a biomedical positivist or a psychosocial post-positivist approach constrains assessment and treatment of the whole person.

Primary health care needs scientifically and philosophically robust ways of integrating knowledge from different research traditions to care for the whole person. Facilitating discourse among siloed disciplines is ethically important and pragmatically urgent [6,13]. Any process of care where the hearer or knower does not attend to the whole person risks being epistemically and hermeneutically unjust [14]. Generalist primary care *requires* an integrative approach as Kirkengen et al. (2016) challenged: "medical thinking needs to be changed, not by bridging the gap between human subjectivity and materiality, but by realising that these two were never separate" [15, p.500]. This generalist gaze needs to be enshrined in research and practice designed for the complexity of contexts such as primary care.

Dominance of positivist biomedical approaches to knowledge

The current dominance of biomedical forms of evidence in the discourse and practice of healthcare can lead to mechanistic assumptions that the body is an object that is "completely explorable" [16, p.2] using linear scientific method. Transdisciplinary thinkers warn that "the death of the subject is the price we pay for objective knowledge" [17, p.186], and generalists express concern that the biomedical approach means that "biology is granted primacy, human subjectivity is regarded as an additional and secondary issue and the body remains a silent depersonalized object" [6, p. 1096]. Biomedicine can leave clinicians without a theoretical framework to see the "self-aware, meaning-making, purposeful and relational nature of humans" [18, p. 1] including their own humanity. In his writings on reflective practice, Schön [19] adds that the dominance of biomedical epistemology leaves the clinician unable to explain to peers and patients their own inherently integrative clinical skills and competence. This is especially noticeable in the care of complex chronic conditions at the interface of biology and lived experience - an everyday part of primary care.

Biomedical ways of valuing knowledge (epistemology) necessarily preference objective, reductionist, decontextualized, and deterministic (or predictive) forms of knowledge amenable to linear and exclusive logic. These positivist values are important and have contributed to good quality biomedical evidence, diagnosis, prognosis, and therapeutic outcomes. They do, however, draw attention away from what positivist scientists call 'confounding variables' that are aspects of the whole person. As outlined in Table 1, each aspect of positivist biomedical approaches to knowledge necessarily excludes key aspects of the person and their world. These include subjective inner experience, perception, meaning

and spirituality; complex interconnected regulatory processes; relationships, social context, community, culture, environment; and agency, growth, meaning making and story.

?Table 1 here?

Dominance of biomedicine has several other implications. It can invalidate some forms of disease and unease [20], offer others "disease prestige" [21, p.60] that influences clinical practice and research funding, or misattribute disorder to the individual that rightly belongs in chronic sociological problems and other forms of suffering [22,23]. On the other hand, sociological reductionism that does not ascribe value to positivist facts leaves generalist clinicians without a coherent approach to the physicality of their biomedical decision-making processes. The artificial disciplinary separation of the whole person into positivist material body and post-positivist interpretive mind causes barriers to the metacognition, clinical care and research of the whole person.

Transdisciplinarity as both philosophy and practice of managing diverse forms of knowledge

Any discussion of diverse knowledge management and creation needs to address the inherent differences in how reality is perceived (ontology), knowledge is understood and valued (epistemology), rigor is defined (logic), and values play a role in knowledge discovery, creation, or generation (axiology). The intersection of these four axioms influences understanding of what forms of knowledge are considered valid for both clinicians and researchers. Table 2, adapted from McGregor [24,25], outlines these four philosophical axioms in relation to positivism, interpretivism, critical post-positivism, and transdisciplinarity. These axioms confirm the paradigmatic shifts of worldview outlined in the nursing literature that include a shift from a focus on parts to patterns, reductionism to holism, outcomes to emergence, and even Newtonian physics to quantum physics in order to see the dynamic interconnected whole [26]. These axioms clearly outline the limitations of seeing health only through either a linear positivist or post-positivist lens, and build on other's suggestions to take up the challenge of transdisciplinarity and complexity in medicine [27].

Table 1: Comparison of Methodological Axioms ***Insert Table 2 here?***

Positivism holds that it is possible to be positive (or sure) about knowledge (or evidence) if it was discovered using the scientific method. Post-positivism holds certainty about knowledge differently and is open to other ways of knowing (such as complex interpretation, meaning making, intuition and construction of knowledge among people). Nicolescuian theoretical transdisciplinarity values post-Aristotelian logic that includes not only either/or, but also both/and approaches to knowledge [28]. Significantly, transdisciplinarity does not exclude

positivist paradigms that offer either/or classifications and ways of seeing; it does, however, overtly limit their influence [28].

Nicolescuian transdisciplinarity encompasses (a) the ontological axiom that sees reality as multifaceted and in flux (*Multiple Levels of Reality* whose interaction is mediated by the unifying *Hidden Third*), (b) an epistemological axiom of seeing knowledge as *emergent, complex*, *cross-fertilized and embodied* and (c) a logical axiom of inclusive logic allowing for integration of contradictions in the *Included Middle* [17,25,29]. As a unique contribution to this transdisciplinary conversation, the authors suggest that a way of describing each of these axioms could be summarised as *seeing* (positivism), *listening* (interpretive post-positivism), *questioning* (critical post-positivism), and *discerning* (transdisciplinarity). When caring for the whole person, these skills to manage diverse forms of knowledge are needed in both everyday clinical practice and the underlying development of knowledge through research.

Transdisciplinarity is not the dismissal of disciplinary knowledge; rather, it is a process of reconciliation and dialogue, inviting solutions to complex problems beyond disciplinary boundaries [30]. Transdisciplinarity seeks integrative understanding and consilience, discerning what is integral or essential among, across, and beyond disciplines. It also values participatory approaches to knowledge formation and sees knowledge as living and emergent, open to new information and perspectives [24,25]. Transdisciplinary knowledge does not exist ahead of time, waiting to be discovered. It includes more than just factual information and emerges from dialogue and interaction among participants while tolerating and accommodating uncertainty, paradox and conflicting values.

The understanding of transdisciplinarity considered here draws on both predominant forms of transdisciplinarity: (a) the theoretical or philosophical (methodological) approach to the creation of diverse forms of knowledge [31] as outlined above (i.e., the Nicolescuian approach that builds on quantum physics (that like complexity theory can attend to both the particle and the wave) [32] and the work of Jean Piaget, who coined the term in 1972 [17,24,31,33]) and (b) the practical and phenomenological (Zurich) approach to transdisciplinary participation in addressing complex real world problems [34]. Both forms of transdisciplinarity have relevance for the generalist.

The Nicolescuian approach has already been addressed. It is a new methodology for creating knowledge. The Zurich approach, called pragmatic or phenomenological transdisciplinarity, describes the practical process of integrating the voices of many disciplines into real world solutions. This form of transdisciplinarity offers socially responsive Mode-2 research that enshrines participatory innovation, active cross-disciplinary dialogue,

inclusion of sectors beyond academic discourse, and a focus on complex problems [34-36]. Insights from this form of transdisciplinarity, which explores and produces knowledge in communication with society, are relevant to both the practical task of generalist clinical care and research into the whole person.

Because transdisciplinarity privileges the whole person and whole knowing, it is suggested here as a valuable and legitimate approach to whole person generalist primary care research and clinical practice. In fact, the way that transdisciplinary methodology conceptualizes knowledge may be very close to what an experienced generalist does in the face of a person in distress – seeing, listening, questioning, *and* discerning. The clinician (holding the perspectives of many different disciplines) interacts with the patient (holding many perspectives on their life, health, and health care) and actively includes and discerns what thoughts and perspectives are integral through a process of "collaborative deliberation" [37, p.158]. This is very similar to the consultative forms of theoretical transdisciplinarity [17]. Transdisciplinarity also gives voice and legitimacy to a clinician's own experiential wisdom and skills. Transdisciplinary philosophy may offer a response to calls from primary care clinicians to integrate generalist philosophy into practice and articulate their own complex whole-person approach [3,38-40].

Method

We undertook a conceptual literature review to address the question of whether established literature on transdisciplinarity (from both schools) was aligned with literature defining the philosophy and practice of generalism. Literature was purposively selected – focused on sentinel papers that expressed a consensus of opinions on theoretical (methodological) transdisciplinarity, phenomenological (pragmatic) transdisciplinarity, and generalism as discussed in the primary care literature. Contributions from key thinkers in each area as they developed over time were comprehensively examined to gain an understanding of the historical development of each construct as well as the current iteration in use.

As per other transdisciplinary approaches to the literature [41], identifying and selecting pertinent papers included systematic, heuristic, iterative, and pragmatic considerations. Analysis of papers included a process of transdisciplinary learning – an iterative process of transformation of initial understanding into merged knowledge [42]. This included broad synthesis of each school of thought prior to comparison and consideration of any areas of alignment. After the analysis and the preliminary development of the results, an expert in theoretical transdisciplinary methodology and an expert in generalism were invited to critique the results. Their input was integrated into this final report.

Results:

Alignment between Transdisciplinary and Generalist Philosophy and Practice

Although the context of general practice is far removed from most places where transdisciplinary methodology is currently being used, areas of alignment between generalism and transdisciplinarity were clearly identified in the literature (see Table 3) and subsequently named *Transdisciplinary Generalism* (a neologism developed for this inquiry).

Table 3 here?

The new construct of Transdisciplinary Generalism includes the (a) **Broad Scope** (*integrative purpose* of consultation and *inclusive scope* –breadth, depth, and length of reality considered); (b) **Relational Process** (*collaborative understanding* and shared language, and *participatory co-creation with* stakeholders who own the problem); (c) **Complex Knowledge Management** (*complex problems addressed* and *coherent integration* of information, perspectives and consciousness from many disparate sources); (d) **Humble Attitude to Knowing** (*emergent attitude* to co-created knowledge, and *reflexive position* of the embedded transdisciplinary researcher, generalist clinician or patient); and (e) **Real World Outcome Focus** (*translating* outcomes into real world solutions). Each of these alignment themes can be considered relevant to generalist practice and research and is now discussed.

Broad Scope

Integrative Purpose of Consultation

Transdisciplinarity "transcend[s] and transgress[es]" [43, p.868] being "at the same time, between, among and beyond disciplines" [44, p.12] in the search for unified practical solutions to complex problems. Theoretical transdisciplinarity uses *inclusive logic* allowing topics, ideas and people that should logically be excluded (barred from involvement), or would be antagonistic, to be connected [17]. Generalism also values this integrative purpose, focusing on integrating biography and biology in order to facilitate the whole person's creative capacity to live in the world [45].

Inclusive Scope (breadth, depth, length of reality considered)

Just as generalists seek biological, psychological and social, cultural and existential understanding of each patient [38], transdisciplinary researchers seek relevancy [17] (not just validity) by including many ways of knowing and becoming [24]. These multiple levels of Reality (capitalised as per Nicolescu) include what is internal to humans (TD-Subject – perspectives and consciousness), what is external to humans (TD-Object – facts, statistics, information, evidence), and the invisible unifier of subject and object (Hidden Third in the Included Middle – spirituality, culture, the sacred, and aesthetics) [46].

Polk [47], from the pragmatic Zurich school of thought, although addressing production, which theoretical transdisciplinarity would differentiate from co-creation, also highly valued broad inclusion as knowledge is formed:

> *"Within the transdisciplinary discourse, scientific reliability is not seen as threatened by inclusive forms of knowledge production. On the contrary, types of extended peer communities in the knowledge production process is seen to increase the validity and quality of science for societal problem solving"* [47].

The breadth (extensiveness, comprehensiveness), depth (profundity, insightfulness), and length (awareness of knowledge over time) of multiple Realities are important to both generalist clinicians and transdisciplinary thinkers [48]. Both value movement among the many aspects of Reality leading to a new trans-Reality (unique take on the situation) created each time a complex problem is addressed.

Relational Process

Collaborative understanding and shared language

Both generalism in primary care [49,50] and transdisciplinarity [51] highly depend upon and value a shared language among participants. Practical transdisciplinarity calls for joint generation of a "common language that is meaningful for … each contributor" [52, p.S127]. Generalists note that "practitioners commonly fashion explanations which integrate patient and practitioner conceptual accounts of presented health problems" [3, p.2]. Transdisciplinarity sees a shared language (which can take months and years to generate) as a way to support the creation of viable solutions to wicked, complex problems [51,53].

Participatory co-creation with stakeholders

The transdisciplinary relational process of integrating knowledge - "working in an alliance" [52, p.S126] or "mutual learning" [54, p.1148] - could also describe the primary care generalist clinical encounter. Generalists describe this as creating a "joint account of illness that meets the needs of both" [3, p.7], including the patient's perspective [55], and building trust between physician and patient to facilitate accurate understanding [56]. Interestingly, the term 'collaborative deliberation' was used in both the generalist and transdisciplinary literature to describe the participatory process of decision making [37,57].

In more detail, generalists see this as looking beyond the presenting complaint to taking a good history [48], or "inductive foraging" [58, p.69]. Nicolescuian transdisciplinary researchers describe this inclusive, participatory process as "dig[ging] deeper through dialogue and perspective sharing rather than stop[ping] at the first satisfactory explanation of the

problem" [51, p.7]. Pragmatic transdisciplinarity (the Zurich school) and complexity science would call this *sense making* between disparate minds [32,59]. Key critique of evidence-based medicine points to inadequacy of integrating the patient voice, agenda, experience, and agency into medical decision-making [60]. Participatory co-creation clearly names what is missing from any 'positivist only' framework.

Complex knowledge management

Complex problems addressed

Both transdisciplinarity and clinical primary care deal with complex problems. For clarification, complexity differs from complicated. Complexity involves not just intricate and detailed (complicated) content but the emergence of new structures, patterns and relationships during the process of appraisal and management [51]. Transdisciplinary work deals with complex, wicked macro community issues [61]. Generalist clinicians, at the micro level, deal with complex undifferentiated, indistinct problems with unclear causality [3] and perhaps unclear next steps. The task of managing complexity [62] is central to primary care clinical consultation [19].

Coherent integration and interpretation of diverse forms of knowledge

According to theoretical transdisciplinarity, the intellectual task of seeing the whole is achieved through allowing emergence of new "integral knowledge" [24, p.19]. Integral means that if something in particular is not there, 'the whole' would be different. This knowledge creation is more than the synthesis of ideas and influences – it is alive, resonant [63], "dynamic, non-linear and iterative" [54, p.1149]. Nicolescuian transdisciplinarity uses the "intuitive zone of non-resistance" [24, p.173] and values subjective, embodied intuitive sensations and emotions in the creation of knowledge [51,64]. This axiom (taken as a given) aligns with generalists' calls to both notice the "lived body" [6, p.1095] and use practical wisdom (phronesis [56]) and tacit intuitive knowledge in the clinical setting - living knowledge[65].

Furthermore, both transdisciplinarity and generalism seek to notice patterns. Pragmatic transdisciplinarity uses phronetic abductive reasoning as a form of logic that ebbs and flows between inductive and deductive reasoning *of* the disciplines in order to seek unity and insight that lies *beyond* the disciplines [66]. It describes "looking for coherence, correspondences and 'ridges' across the differences, generating knowledge by finding, identifying and communicating patterns across diverse disciplines and discourses" [63, p.1053]. Nicolescuian transdisciplinary hermeneutics - "the art of interpretation to create meaning" [25, p.191] - aligns with generalist interpretive medicine [3] and requires movement between the parts and the whole in cycles of illumination and integration [67]. It acknowledges the tension of "avoid[ing] thinking both we have the whole truth and that there is no truth" [68, p.151].

Zurich transdisciplinarity highly values intelligibility, plausibility[69], meaning-making, interpretation, and understanding [25].

Transdisciplinary approaches to seeing the whole have the potential to coherently describe what generalists actually *do* in practice – pattern recognition and pattern failure as part of the approach to the complex embodied lives of their patients [6,58].

Humble Attitude to Knowing

Emergent attitude to provisional knowledge

Both transdisciplinarity and generalism share a provisional attitude to knowledge, remaining open to the emergence of new insights and information. Transdisciplinary knowledge is considered to be alive, in flux and always in-formation [17,25]. It is thus understood as imperfect [70] and incomplete [24]. Theoretical transdisciplinarity sees "…merit in vagueness, uncertainty and unpredictability because these states serve as prompts for potentialities" [64, p.173] . It also values being open and accepting – tolerating the unknown [30]. Primary care generalism also values "tolerating uncertainty" [71, p.1713] and learning "from below…inquisitive humility" [56, p.280]. This emergent principle also aligns with the generalist skill of not foreclosing too early on diagnosis or coming to premature categorisations [72], and of understanding complexity science approaches to 'knowing' in medicine – in the face of chaos, the known, the unknown and the complex.

Reflexive position of embedded researcher or practitioner

In generalist care, the clinician is part of "social embeddedness of care" [56, p.284]. Engel's description of clinical observation, as outlined by Epstein, aligns with this priority:

> "communing (sharing experiences) as well as communicating (exchanging information). Hence, observation (outerviewing), introspection (innerviewing), and dialogue (interviewing) are the basic methodologic triad for clinical study and for rendering patient data scientific" [56, p.277].

This generalist role of "participant observer" [56, p.277] aligns with the embedded transdisciplinary researcher attitudes of 'transleadership' [24,64]. Transdisciplinary attitudes include creativity, openness and humility toward other disciplines and participants, reflective and reflexive practice, and curiosity or "permanent inquisitiveness" [70, p.236]. They also include a capacity to resist being the "alpha expert" [70, p.241]. These same attitudes and levels of maturity are also highly valued in generalist clinicians [73,74] and those who resist 'expertosis' [75] in order to offer collaborative care. Although positivism excludes the perspectives of the observer (unless that is the focus on the research), transdisciplinary

insights validate the reflective generalist clinician as reflexive clinical observer and collaborative innovator in medical knowledge formation [52].

Translative Real World Impact: focus on pragmatic outcomes

Transdisciplinarity and generalism align in their goals to improve the "common good" [43] and, as explained by the Zurich school, produce "socially robust solutions" [47, p.443] to the macro and micro wicked problems they encounter:

> *"practical, manifest contributions to the resolution of pressing messy problems…[to develop] useable knowledge… that has some prospect of producing desired change"* [54, p.1147].

Their descriptions could just as easily describe the goals of nearly every generalist clinical encounter – the goal of "supporting patients in living their lives" [3, p.8], the whole person goals of facilitating "relief, repair, and meaning" [9, p.286], enabling [76], and rehabilitating the self [77]. The practical real-world focus of both transdisciplinarity and generalism is a key alignment of these philosophical approaches to complexity: translation into practice.

In summary, the areas of alignment between transdisciplinary and generalist philosophy and practice support the naming of a new ontologically and epistemologically coherent approach to the whole person: *Transdisciplinary Generalism*. This alignment (see Table 3) includes an approach to the whole that sees, listens, questions, and discerns knowledge as integrative and inclusive (broad scope), collaborative and participatory (relational process), complex and coherent (complex knowledge management), emergent and reflexive (humble attitude to knowing), and translative (real world impact).

Discussion: Transdisciplinary Generalism and Whole person care

Other methodologies and clinical practices have been proposed to address the whole. These include philosophical approaches such as clinical pragmatism, critical realism and subtle realism, the biopsychosocial model, indigenous approaches to knowing, complexity systems theory, narrative medicine, and pragmatic approaches from within the disciplines. Each of these has some benefits and limitations that we propose are answered in the Transdisciplinary Generalism construct.

Although Clinical Pragmatism does not address the process of integration, it links positivist and post-positivist knowledge through (a) a focus on *pragmatic* outcomes (i.e., focus on results rather than commitment to any particular theory); (b) *plural* sources of information (i.e., incorporate explanatory concepts that span the biopsychosocial spectrum); (c) *participatory* process (i.e., collaborative, not imposed by the clinician); and (d) *provisional*

conclusions (i.e., open ended and malleable to newly acquired information and evolution of the patient's condition) [78-80].

Critical realism [81], although a positivist approach, does critique both positivist and post-positivist knowledge paradigms for either ignoring or over acknowledging social influences. It maintains a provisional attitude to knowledge – acknowledging the limitations and bias of the observer. The closely aligned philosophy of subtle realism [82] has been used to determine the value of knowledge when considering diverse sources of knowledge in the general practice setting [3].

Engel's biopsychosocial framework [83], sought to prevent the removal of what some have called "'psychosociological underbrush' from medicine's quest to deal with 'real' diseases'" [83,p. 129].It has however been critiqued both for its positivist foundations that do not attend to the differing theories underpinning each form of knowledge [84] and reification of bio, psycho, and social categories that implies they are comprehensive and unitary [85]. The biopsychosocial framework does not integrate subjective experience, story, or the "suffering human subject" [78,p.312]. Although it is acknowledged that the biopsychosocial framework has "broaden[ed] the scope of the physician's gaze" [1, p. 8], there is still an awareness that the generalist needs more than a description of reified categories of specialised knowledge [86] to address the whole person.

Indigenous approaches to wellbeing, including the Social Emotional Wellbeing (SEWB) framework, offer cultural, relational, political and historical frameworks to understand health and see the whole [87]. Complexity theory and narrative medicine also offer ways of seeing the interconnected whole [88,89]. Discipline-bound practical (pragmatic) frameworks such as those grounded in occupational therapy [90], palliative care [91], nursing [92] or social work [93] offer pragmatic approaches but do not address the inherent epistemic, ontological, and axiological barriers to seeing the whole. Transdisciplinary philosophy and practice could offer a coherent response to these barriers.[94]

Transdisciplinary Generalism as a research methodology offers a robust philosophical and practical underpinning to the sophisticated task of integrating diverse forms of knowledge in the primary care clinical encounter. The challenge of integrating positivist and post-positivist approaches to knowledge is familiar to the generalist clinician. The integrative task of including a broad scope of information, with both clinician and patient collaborating in forming a coherent real world understanding of complex problems over time, is a sophisticated clinical skill. Research that translates diverse forms of knowledge into the

clinical setting needs to address and respect this clinical reality of how knowledge is formed and valued. Generalist clinicians call for integrative approaches to knowledge that actively resist positivist forms of 'evidence' as incomplete [10,94]. They also resist disempowering medicalized diagnoses in favour of "functional diagnoses" [95] and have developed idiosyncratic approaches to complexity that acknowledge adverse life events [96] . Those who critique the biopsychosocial framework remind us that

> *"unless there is an integrating theory already in place, gathering biological, psychological and sociological data about people will only yield scattered lumps of information that do not relate to each other in any coherent sense."* [97, p.91]

Transdisciplinary inquiry has had increasing influence in addressing complex communal problems [61]. There is also a growing application to healthcare [66,98]. Some name transdisciplinarity as an "intellectual foundation" for generalist research [99, p.905] and a "scientific essential" to counter specialised knowledge fragmentation [100, p.487]. Some have already described links between transdisciplinarity and primary care as they are both "open, participatory, respectful and focussed on the real world" [99,p.905].

The neologism and construct of *Transdisciplinary Generalism* therefore addresses current philosophical, ontological, epistemological, logical, and axiological barriers to whole person care. It describes and defines the sophisticated clinical (and research) skills required for robust understanding of the whole person. It is proposed as a research methodology and a form of clinical expertise – an approach to knowledge within the clinical encounter.

Although the *Transdisciplinary Generalism* construct requires further practical and theoretical critique from both the generalist and transdisciplinary communities, the potential for transdisciplinarity to offer new ways of seeing the whole person in primary care is worthy of further exploration. Both clinical and research communities can use the *Transdisciplinary Generalism* (TG) construct developed herein as a tool for discourse, research and potential practice-wide transformation. It is seen as a metacognition that will enfranchise the lived experience of both clinician and patient, normalise uncertainty and the emergent reflexive approach to knowledge, and legitimise breadth of awareness of the whole person in primary care.

Transdisciplinary Generalism is also a way to define a participatory, reflexive inclusive approach to knowledge as a research methodology. This would facilitate translation of the complexity of generalist ways of knowing into academic forms of knowledge, and vice versa. Transdisciplinary Generalism is offered as a coherent epistemology and philosophy to define

the goals, process and content of integrative research as well as the clinical practice of whole person care.

Acknowledgments

This research was undertaken as part of a PhD through The University of Queensland and funded by the Australian Government Research Training Program Scholarship and the Advance Queensland Scholar program.

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Tables

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Deterministic	Growth and change	Loss of humility, agency, meaning-making, spirituality and sense of story over time
Dualist	Integration of mind and body	Loss of whole person approach and meaningful connection to the body

Table 2 is submitted as a separate document

Table 3: Principles of Transdisciplinary Generalism's Approach to Knowledge

TRANDISCIPLINARY GENERALISM PRINCIPLES			
INTEGRATIVE Purpose	INCLUSIVE Scope	COLLABORATIVE Understanding	PARTICIPATORY Co-creation
BROAD SCOPE		**RELATIONAL PROCESS**	
COMPLEX Problems	COHERENT Integration	EMERGENT Attitude	REFLEXIVE Position
COMPLEX KNOWLEDGE MANAGEMENT		**HUMBLE ATTITUDE TO KNOWING**	
TRANSLATIVE REAL WORLD IMPACT			

The authors declare there are no conflicts of interest in the submission of this paper.

	Positivist	Post- Positivist		BOTH Positivist AND Post p
	Empirical	**Interpretive**	**Critical**	**Transdisciplinary**
	SEEING	***LISTENING***	***QUESTIONING***	***DISCERNING***
eality, ing'[1]	Reality is **discoverable**, context free, independent of the observer's consciousness; eventually, adequate data will converge into a complete picture of reality.[2]	Reality is in people's minds; it is **conditional** upon human experiences and is socially and collectively constructed [3]	Reality is material, **of the world,** not imagined, and never fully understood [3] (shaped by politics, culture, power, gender)[2, 4]	**Multiple Levels of Reality** Reality is *multifaceted* and *in flux*. There is a (1) TD-S world - subjective consciousness and perspectives) (outer objective information) whose interface is me potential-rich Hidden Third zone; a new trans-R contradictions being temporarily rec **Hidden Third** **(**unifier, intuitive zone of non-resistance temporarily view points)[2-4]
ge re and counts ng)'[2, 5]	One truth out there **waiting to be discovered** [2, 5] Knowledge is objective, discoverable, observed by our senses and therefore bias-free. Scientific method of reductionism, determinism, linear causality and predictability creates reliable knowledge [2, 3]	Knowledge (truth) is **created or constructed** and there is more than one truth… Interactive, transactional, subjective, co-created, interpreted, subjective and value laden[2,3]	Knowledge (truth) is **grounded in context**, and social and historical practices, and is created through critical questioning, challenging 'the way things have always been done'; transformative, consensual, normative [2, 3]	**Knowledge as emergent compl** Is alive, **dynamic, in flux, moving** and perpe Co-created through **emergent iterative** process; TD by complexity, emergence, cross fertilization, reorga Knowledge is transcendent as those involved give domain to create a temporary space for new
rse our and ment of s and	**Deductive**, rational, linear formal logic, seeking consistency [2] Clear distinction between facts and values **Either/or** – no room for contradictions[3] Logic seeks to **explore, describe, predict, control** and **explain** [2]	**Inductive** logic (patterns, meanings and interpretations [2]), understand and make sense, suggests **probable** truth but does not ensure it. Logic seeks to **understand** lived experiences from the point of view of those living them [2]	**Inductive** logic aimed at emancipation is used to induce (to **persuade** or lead people to new insights); Logic seeks to **expose** domination, exclusion, privilege, marginalisation, structural violence [2, 4]	**Inclusive Logic** **Logic of the Included Middle** - employed in the fecu where disparate minds come together; used to reconciliation of contradictory points of view; repla exclusion. Contradictions can temporarily co-exist leading to u integration of facts and perspec
ental and s) [1] l value lue cepted rch?	**Value free or 'neutral'** Values objectivity, dualism, replicable, reliable (ignores intentions, perspectives and conscience of researcher and participant)[7]	**Value laden** Value-free knowledge is not possible Values rich evidence, credible, justifiable, reflexivity	**Value driven and oriented**; Researchers' proactive values drive things; participants and researchers are both transformed subjects [2, 4, 7]	**Integral Value Constellations and E** Individual values inform the interactions among d industries, non-government agencies and citizens AN arise (emerge) from the interactive region of

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De-Contextualised	Relationships, social context, environment and other 'confounding variables'	Loss of story, family, community and culture
Deterministic	Growth and change	Loss of humility, agency, meaning-making, spirituality and sense of story over time
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Table Three

Table 3: Principles of Transdisciplinary Generalism's Approach to Knowledge

TRANDISCIPLINARY GENERALISM PRINCIPLES			
INTEGRATIVE Purpose	INCLUSIVE Scope	COLLABORATIVE Understanding	PARTICIPATORY Co-creation
BROAD SCOPE		**RELATIONAL PROCESS**	
COMPLEX Problems	COHERENT Integration	EMERGENT Attitude	REFLEXIVE Position
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TRANSLATIVE REAL WORLD IMPACT			

RESEARCH PARADIGMS	Positivist	Post- Positivist		BOTH Positivist AND Post positivist
AXIOMS	**Empirical**	**Interpretive**	**Critical**	**Transdisciplinary**
	SEEING	***LISTENING***	***QUESTIONING***	***DISCERNING***
REALITY (ontology) 'ontos'=being 'what counts as nature, reality, feeling, existence or being'[1]	Reality is **discoverable**, context free, independent of the observer's consciousness; eventually, adequate data will converge into a complete picture of reality.[2]	Reality is in people's minds; it is **conditional** upon human experiences and is socially and collectively constructed [3]	Reality is material, **of the world,** not imagined, and never fully understood [3] (shaped by politics, culture, power, gender)[2, 4]	**Multiple Levels of Reality** Reality is *multifaceted* and *in flux*. There is a (1) TD-Subject level (inner human world - subjective consciousness and perspectives) and a (2) TD-Object level (outer objective information) whose interface is mediated by (3) the unifying, potential-rich Hidden Third zone; a new trans-Reality is contingent on contradictions being temporarily reconciled[2, 3] **Hidden Third** **(**unifier, intuitive zone of non-resistance temporarily reconciling contradictory view points)[2-4]
KNOWLEDGE (epistemology) 'episteme'=knowledge 'Concerned with the nature and scope of knowledge (what counts as knowledge and knowing)'[2, 5]	One truth out there **waiting to be discovered** [2, 5] Knowledge is objective, discoverable, observed by our senses and therefore bias-free. Scientific method of reductionism, determinism, linear causality and predictability creates reliable knowledge [2, 3]	Knowledge (truth) is **created or constructed** and there is more than one truth… Interactive, transactional, subjective, co-created, interpreted, subjective and value laden[2,3]	Knowledge (truth) is **grounded in context**, and social and historical practices, and is created through critical questioning, challenging 'the way things have always been done'; transformative, consensual, normative [2, 3]	**Knowledge as emergent complexity** [6] Is alive, **dynamic, in flux, moving** and perpetually changing [6] Co-created through **emergent iterative** process; TD knowledge is characterised by complexity, emergence, cross fertilization, reorganisation and embodiment[3] Knowledge is transcendent as those involved give up ownership of their domain to create a temporary space for new ideas to emerge[3]
LOGIC 'logia'=logical discourse 'what is acceptable as rigour and inference in the development of arguments, judgements and insights' p420[1]	**Deductive**, rational, linear formal logic, seeking consistency [2] Clear distinction between facts and values **Either/or** – no room for contradictions[3] Logic seeks to **explore, describe, predict, control** and **explain** [2]	**Inductive** logic (patterns, meanings and interpretations [2]), understand and make sense, suggests **probable** truth but does not ensure it. Logic seeks to **understand** lived experiences from the point of view of those living them [2]	**Inductive** logic aimed at emancipation is used to induce (to **persuade** or lead people to new insights); Logic seeks to **expose** domination, exclusion, privilege, marginalisation, structural violence [2, 4]	**Inclusive Logic** **Logic of the Included Middle** - employed in the fecund space (Included Middle) where disparate minds come together; used to help with temporary reconciliation of contradictory points of view; replaces Aristotelean logic of exclusion. Contradictions can temporarily co-exist leading to unexpected but welcomed integration of facts and perspectives [2].
VALUES (axiology) 'axios'=worthy 'what counts as fundamental (moral choices, ethics, and normative judgements) [1] What do I value? How do I value and how do I make value decisions'[5] what is the accepted role of values in research?	**Value free or 'neutral'** Values objectivity, dualism, replicable, reliable (ignores intentions, perspectives and conscience of researcher and participant)[7]	**Value laden** Value-free knowledge is not possible Values rich evidence, credible, justifiable, reflexivity	**Value driven and oriented**; Researchers' proactive values drive things; participants and researchers are both transformed subjects [2, 4, 7]	**Integral Value Constellations and Emergence**[5] Individual values inform the interactions among disciplines, governments, industries, non-government agencies and citizens AND transdisciplinary values arise (emerge) from the interactive region of the Hidden Third [2]

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