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Neither right nor wrong? Ethics of collaboration in transformative research for sustainable futures

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Transformative research is a broad and loosely connected family of research disciplines and approaches, with the explicit normative ambition to fundamentally question the status quo, change the dominant structures, and support just sustainability transitions by working collaboratively with society. When engaging in such science-practice collaborations for transformative change in society, researchers experience ethical dilemmas. Amongst others, they must decide, what is worthwhile to be researched, whose reality is privileged, and whose knowledge is included. Yet, current institutionalised ethical standards, which largely follow the tradition of medical ethics, are insufficient to guide transformative researchers in navigating such dilemmas. In addressing this vacuum, the research community has started to develop peer guidance on what constitutes morally good behaviour. These formal and informal guidelines offer a repertoire to explain and justify positions and decisions. However, they are only helpful when they have become a part of researchers' practical knowledge 'in situ'. By focusing on situated research practices, the article addresses the need to develop an attitude of leaning into the uncertainty around what morally good behaviour constitutes. It also highlights the significance of combining this attitude with a critical reflexive practice both individually and collaboratively for answering questions around 'how to' as well as 'what is the right thing to do'. Using a collaborative autoethnographic approach, the authors of this paper share their own ethical dilemmas in doing transformative research, discuss those, and relate them to a practical heuristic encompassing axiological, ontological, and epistemological considerations. The aim is to support building practical wisdom for the broader research community about how to navigate ethical questions arising in transformative research practice.

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Introduction

There is a growing recognition that current research has failed to adequately address persistent societal challenges, which are complex, uncertain, and evaluative in nature (Ferraro et al., 2015; Loorbach et al., 2017; Saltelli et al., 2016). Along with this recognition come calls for science to help address these increasingly urgent and complex challenges faced at a global and local level, such as biodiversity loss, climate change, or social inequalities (Future Earth, 2014; Parks et al., 2019; WBGU, 2011). This call is echoed from within academia (Bradbury et al., 2019; Fazey et al., 2018; Norström et al., 2020) and has also translated into corresponding research funding (Arnott et al., 2020; Gerber et al., 2020; Vermeer et al., 2020). The fundamental premise is that addressing complex societal challenges requires more than disciplinary knowledge alone and extends beyond the confines of academia (Gibbons et al., 1994; Hirsch Hadorn et al., 2008; Lang et al., 2012). That is, addressing them necessitates interactive knowledge co-production and social learning with societal actors to produce actionable and contextually embedded knowledge for societal transformations (Chambers et al., 2021; Hessels et al., 2009; Schäpke et al., 2018). This trend has prompted a (re)surge of socially engaged approaches to research, including transdisciplinary research, phronetic social sciences, participatory research, action- and impact-oriented research, and transformative research. These approaches involve collaboration between academics and various societal stakeholders, such as policymakers, communities, enterprises, and civil society organisations.

However, often, such socially engaged research approaches are at odds with the institutional traditions designed for monodisciplinary knowledge production. Transformative research, for instance, does not claim an objective observer position; instead, it explicitly embraces a normative orientation. Its goal, as many have argued, is to facilitate transformative societal change towards justice and sustainability by recognising and addressing the deep and persistent socio-ecological challenges inherent in our current society (Mertens, 2007; Wittmayer et al., 2021). This motive to transform existing systems through collaborative research, in our view, obliges researchers to be more critical and vigilant in their decisions (Fazey et al., 2018). As we will present later in this paper, many of these decisions constitute ethical dilemmas, such as who decides what 'good' research is, whose knowledge to prioritise, or who should engage and under which circumstances. These ethical dilemmas are only poorly addressed by the ethical review processes in place at most universities, which remain dominated by linear and positivist framings of knowledge production and research design (Wood and Kahts-Kramer, 2023). Consequently, transformative researchers are often left struggling to choose "*between doing good (being ethically responsive to the people being researched) and doing good research (maintaining pre-approved protocols)*" (Macleod et al., 2018, p. 10). The translation of the values and principles of transformative research into formal and informal ethical guidelines is only starting (Caniglia et al., 2023; Fazey et al., 2018; West and Schill, 2022).

Confronting these ethical dilemmas calls for greater reflexivity and dialogue with ourselves, among researchers, between researchers and their collaborators (including funders and professionals), and between researchers and the institutions within which they operate (Finlay, 2002; Horcea-Milcu et al., 2022; Pearce et al., 2022). Attesting to this call, the authors of this paper engaged in a 'collaborative autoethnography' (Lapadat, 2017; Miyahara & Fukao, 2022; Phillips et al., 2022) to explore the following research question: *Which ethical dilemmas do researchers face in research collaborations that seek to catalyse transformations? And how do they navigate these in their collaborative practice?* Thus, as an interdisciplinary group of researchers affiliated with academic research institutes, we shared, compared, and discussed our experiences concerning ethical dilemmas in our transformative research endeavours. In these discussions, we considered our interactions, engagements, and relationships with collaborators along with how institutional rules and norms influence or constrain our practices and relations.

This paper begins with an overview of transformative research and the challenges that arise when working collaboratively. It also testifies to the formal and informal attempts to support researchers in navigating those challenges ("Ethics in transformative research"). From there, we develop the argument that formal or informal guidelines are most meaningful when they have become a part of the practical wisdom of researchers. When they are, they support researchers in leaning into the uncertainty of what constitutes morally good behaviour and in navigating collaboration 'in situ'. Inspired by Mertens (2017), we relate our own dilemmas to the three philosophical commitments that comprise a research paradigm: axiology, ontology, and epistemology ("Transformative research practice investigated through collaborative autoethnography", also for an elaboration of the terms). We share concrete dilemmas while embedding and relating them to a broader body of knowledge around similar dilemmas and questions ("Collaboration in transformative research practice"). We close the paper by pointing to the importance of bottom-up ethics and the need to embed those into revalued and redesigned ethical standards, processes, and assessments that can provide external guidance and accountability ("Concluding thoughts").

Ethics in transformative research

In this section, we first introduce transformative research (TR) in terms of its underlying values and its ontological and epistemological premises (Mertens, 2007, 2017) ("Introducing transformative research"). We then connect it to its institutional context, where ethical standards and procedures fit the linear production of knowledge, leading to tensions with TR practices ("Institutional context: Formal ethical standards and processes"). Finally, we outline how the research community tries to address this misfit and the felt need for understanding what constitutes morally 'right' behaviour by providing peer guidance on the ethical conduct of TR ("Peer context: Informal heuristics for transformative research").

Introducing transformative research. TR refers to a broad and loosely connected family of research disciplines and approaches, with the explicit normative ambition to fundamentally question the status quo, change the dominant structures, and support just sustainability transitions (Hölscher et al., 2021; Jaeger-Erben et al., 2018; Mertens, 2021; Schneidewind et al., 2016; Wittmayer et al., 2021). Transformative researchers thus start from the basic premise that "*all researchers are essentially interveners*" (Fazey et al., 2018, p. 63). Consequently, they are explicit about the kind of normative orientation of their interventions to further a social justice and environmental sustainability agenda. There is no denying the fact that such research approaches can also be used with a different normative mindset and value orientation, which will have other ethical consequences.

TR builds on methodological and theoretical pluralism that knits together kindred, or even conflicting, perspectives to complement disciplinary specialism (Hoffmann et al., 2017; Horcea-Milcu et al., 2022; Midgley, 2011). As such, it also comes as a diverse phenomenon, and where such diversity is "*not haphazard […] we must be cautious about developing all-embracing standards to differentiate the 'good' from the 'bad'*" (Cassell and Johnson, 2006, p. 783). Such an ontological stance

involves letting go of the idea of absolute truth and the need to tightly control the research process and outcomes (van Breda and Swilling, 2019). Instead, TR encourages continuous societal learning to generate actionable knowledge and transformative action that manifests in real-world changes in behaviours, values, institutions, etc. (Bartels and Wittmayer, 2018; Hölscher et al., 2021). In doing so, TR is often based upon pragmatist assumptions about the ways knowledge and action inform one another, generating contingent knowledge in a process of action and experimentation (Harney et al., 2016; Popa et al., 2015). The research process serves as a means to assess ideas in practical application, blending a critical realist stance on socially constructed reality with acknowledging subjectivism and the existence of multiple realities (Cassell and Johnson, 2006).

TR also represents an epistemological shift from the notion of the distanced, presumably unbiased, and all-knowing researcher and recognises individuals as sense-makers, agency holders, and change agents (Horcea-Milcu et al., 2022; Hurtado, 2022). Collaboration enables the elicitation of different kinds of knowledge, including scientific knowledge across disciplines as well as phronetic and tacit knowledge from practice. It aims at capturing the plurality of knowing and doing that is relevant to specific contexts and actors (Frantzeskaki and Kabisch, 2016; Nugroho et al., 2018; Pohl, 2008). This sort of mutual social learning supports joint sense-making and experimental processes. These then invite us to rethink existing situations, (re)define desired futures, and (re)position short-term action (Fazey et al., 2018; Lotz-Sisitka et al., 2016; Schneider et al., 2019). The co-creation of knowledge and action can increase ownership, legitimacy, and accountability and can help facilitate trust-building among diverse societal groups (Hessels et al., 2009; Lang et al., 2012). The latter is an essential ingredient for tackling complex societal problems during times of discrediting science and the rise of populist, antidemocratic movements (Saltelli et al., 2016).

Institutional context: formal ethical standards and processes. The institutional environment is challenging for researchers engaging in TR for multiple reasons; one challenge is the formal ethical standards and processes. Current approaches to ethical assessment in social science emerged from several international conventions in the field of medical ethics (BMJ, 1996; General Assembly of the World Medical Association, 2014; National Commission for the Protection of Human Subjects of Biomedical, & Behavioural Research, 1979). Most formal research ethics reviews adopt the four principles of Beauchamp and Childress (2001), which include: (1) non-maleficence by attempting to not harm others; (2) respect for autonomy by attempting to provide information about the research that allows decisions to be taken; (3) beneficence by attempting to achieve useful outcomes outweighing the risks of participation; and (4) justice by attempting fairness in participation and distribution of benefits. These principles have found their way into formal ethical reviews, often practicing value-neutral and utilitarian ethics. This approach is debatable for TR approaches (Detardo-Bora, 2004) and seems more effective at protecting research institutions (foregrounding bureaucratically controllable compliance) than research participants (Christians, 2005). Indeed, many engaged in TR have raised concerns that neither these principles nor their formal translation account for the particularity, situatedness, epistemic responsibilities, and relationality that are key to the conduct and ethics of TR (Cockburn and Cundill, 2018; Lincoln, 2001; Parsell et al., 2014; Wijsman and Feagan, 2019). In the following paragraphs, we highlight several tensions between the understanding of research, as it informs many ethical standards in place, and an understanding of TR.

First, a pre-defined versus an emerging research design. Due to its real-world orientation, TR needs to be able to deal flexibly with changing contexts and windows of opportunity that might arise (Hurtado, 2022). Due to the relationality of TR, it requires ongoing interaction and negotiation between researchers and their collaborators (Bartels and Wittmayer, 2018; Bournot-Trites and Belanger, 2005; Williamson and Prosser, 2002). One-off general consent at the start (e.g., through informed consent forms), as is common for ethical review processes, is thus at odds with the emergent design of TR and is also argued to be insufficient in maintaining participants' autonomy (Smith, 2008). As an alternative, Locke et al. (2013) posit that informed consent should be seen as a collective, negotiated, continuous process, especially in collaborative action research.

Second, assumed neutrality versus dynamic aspects of researchers' positionalities. Ethical review protocols are geared towards upholding the objective position of researchers as outsiders in the investigated context, ensuring that they will not influence this research context in any way. However, TR explicates its ambition to influence real-world problems through engagement, acknowledging that research needs to confront existing hegemonic orders and emancipate those involved through a democratic process (Cassell and Johnson, 2006). Furthermore, researchers co-design, facilitate, and participate in the process of knowledge co-production, making them also participants and subjects of their own research (Janes, 2016). To enhance the validity and integrity of the research, Wood, and Kahts-Kramer (2023), among others, suggest that transformative researchers explicitly state their positionality. This involves reflecting on their assumptions, values, and worldviews.

Third, the primacy of knowledge generation versus the importance of action. Ethical review protocols, given their historical roots in medical practice, assume that the act of falsifying, generating, or improving theories alone would benefit participants, collaborators, and the public at large. Yet, researchers engaged in TR take a step further, seeking to develop both scientific and actionable knowledge in a way that addresses persistent societal problems and stimulates social change (Bartels and Wittmayer, 2018; Caniglia et al., 2021; Greenwood and Levin, 2007). As put by Wood and Kahts-Kramer (2023, p. 7), "*the ethical imperative of participatory research is to bring about positive change and generate theory from reflection on the purposeful action*". This approach strengthens the responsiveness of research to societal and political needs (Stilgoe et al., 2013).

Transformative researchers thus perceive a lack of utility and guidance from ethical standards and processes in place that have institutionalised a certain understanding of research and related sets of principles. Following Clouser and Gert (1990), one might question whether such institutionalisation of a moral consciousness is possible in the first place. They argue that so-called 'principlism,' "*the practice of using 'principles' to replace both moral theory and particular moral rules and ideals in dealing with the moral problems that arise in medical practice*" (Clouser and Gert, 1990, p. 219), has reduced the much-needed debates on morality vis-à-vis research and results in inconsistent and ambiguous directives for morally 'right' action in practice. In response to the vacuum left by institutionalised ethics standards and processes and the perceived necessity of defining morally 'right' behaviour, the research community is turning inward to develop peer guidance on ethical conduct in TR. The subsequent section highlights several contributions to this endeavour.

Peer context: Informal heuristics for transformative research. Transformative researchers have started offering general principles or frameworks as informal heuristics for what constitutes

'ethical' TR. Caniglia et al. (2023), for example, argue that practical wisdom can serve as a moral compass in complex knowledge co-production contexts, and propose four central 'wills' for researchers to follow: committing to justice, embracing care, fostering humility, and developing courage. Under the framing of post-normal or Mode-2 science (Funtowicz and Ravetz, 1994; Gibbons et al., 1994; Nowotny et al., 2003), Fazey et al. (2018) present ten 'essentials' of action-oriented research on transforming energy systems and climate change research[1]. One of these essentials highlights that, as researchers, we intervene, and that failing to acknowledge and engage with this reality opens the doors to sustaining unjust power relations or positioning science as apolitical. To address this, they echo Lacey et al.'s (2015, p. 201) assertion that such acknowledgment means "*be[ing] transparent and accountable about the choices made about what science is undertaken, and how it is funded and communicated*".

Looking beyond sustainability scholarship, other researchers have also developed practical actions or strategies for enhancing their ethical behaviours in the research collaboration. Taking the unique attributes of community-based participatory research, Kwan and Walsh (2018, p. 382) emphasise a "*focus on equity rather than equality*" and on practicing a constructive or generative use of power "*rather than adopting a power neutral or averse position*". Others provide guiding questions to think about the forms and quality of relationships between researchers and participants (Rowan, 2000) and to support the navigation of the relationship between action research and other participants (Williamson and Prosser, 2002). Such questions should cover not only process-focused questions but also the risks and benefits of the intended outcomes, as well as questions around purpose, motivation, and directionalities (Stilgoe et al., 2013). Others also propose broader guidelines in which they pay attention to non-Western and non-human-centred virtue ethics, such as 'Ubuntu' (I am because we are) (Chilisa, 2020). In forwarding climate change as a product of colonisation, Gram-Hanssen et al. (2022) join Donald's (2012) call for an ethical relationality and reiterate the need to ground all transformation efforts on a continuous process of embodying 'right relations' (see also Chilisa, 2020; Wilson, 2020).

Yet, as argued before, ethics in collaboration cannot be approached through developing principles and strategies alone. Not only might they not be at hand or on top of one's mind when being immersed in a collaborative practice, which often requires a certain reaction on the spot. They also cannot or should not replace the quest for what morality means within that collaboration (cf. Clouser and Gert, 1990). Further questions have been prompted about the necessary skillsets for realising ethical principles in practice (Jaeger-Erben et al., 2018; Pearce et al., 2022; West and Schill, 2022). Caniglia et al. (2023), for example, propose that researchers need skills such as dealing with plural values with agility and traversing principles and situations with discernment. Others focus on competency building among research participants (Menon and Hartz-Karp, 2023). The subsequent section turns to the point of supporting researchers in navigating collaboration 'in situ' and in leaning into the uncertainty around what morally good behaviour constitutes—in concrete TR contexts that are plural and uncertain.

Transformative research practice investigated through collaborative autoethnography

Transformative research as a situated practice. The aforementioned institutionalised ethical standards and procedures, as well as the informal peer heuristics, are two vantage points for guidance on what constitutes morally good behaviour for transformative researchers. These existing vantage points are either developed based on theoretical and philosophical framings or based on researchers' actual experiences of doing TR. They do offer a repertoire to explain and justify positions and decisions in ethical dilemmas during research collaborations. However, it is not until such heuristics or principles have become part of the practical knowledge of researchers that they are useful for actual TR in situ.

Considering research more as a practice situates it as a social activity in a 'real-world context'. In such a practice, researchers often make decisions on the spot. Moreover, due to the constraints posed by available time and resources, researchers often engage in what Greenwood and Levin (2007, p. 130) term "*skilful improvisation*" or "*pragmatic concessions*" (Greenwood and Levin, 2007, p. 85). This "*improvisational quality*" (Yanow, 2006, p. 70) of the research process does not mean it is not carried out systematically. Such systematicity is based on "*action repertoires*" (Yanow, 2006, p. 71) that researchers creatively use and remake (Malkki, 2007). This improvisation is thus neither spontaneous nor random; rather, it builds on and is based on the practical knowledge of researchers (formed through their experiences and their situatedness) guiding their behaviours in normatively complex situations. Using 'organic design' (Haapala et al., 2016), the researchers blend real-world settings into formal spaces, fostering bricolage and driving sustainable institutional evolution over time. Such practical knowledge includes "*both 'know how' knowledge (techne), […] and ethical and political-practical knowledge (phronesis)*" (Fazey et al., 2018, p. 61). Research can thus be considered a craft (Wittmayer, 2016): the skilful mastery of which develops over time through learning based on experience and reflection (Kolb, 1984).

Such experiential learning should go beyond reflecting on what lies in view to include seeing how attributes of the viewer shape what is being viewed (cf. Stirling, 2006). Engaging in TR includes being one's own research instrument, which puts a researcher's positionality, i.e., their social, cultural, and political locations, centre stage. It reminds us that researchers are "*located within networks of power and participate in the (re)configuration of power relations*" (Wijsman and Feagan, 2019, p. 74). This positionality, the sum of what makes a person and how this informs their actions (Haraway, 1988; Kwan and Walsh, 2018; Marguin et al., 2021), is increasingly being acknowledged in academia. It has a long history in feminist theories, participatory action research, and the critical pedagogy of decolonisation. Positionality refers to the "*researcher's self-understanding and social vision*" (Coghlan and Shani, 2005, p. 539) as well as their motivation to 'better society' (Boyle et al., 2023; Kump et al., 2023) and how these affect how researchers interpret ethical guidelines, conduct research, interpret data, and present findings. Consequently, one's positionality can make certain research choices seem unethical. Mertens (2021, p. 2), for example, considers "*continuing to do research in a business-as-usual manner*" unethical as it makes the researcher "*complicit in sustaining oppression*".

Acknowledging one's positionality and normative role is part of a broader reflexive practice of critically questioning, reflecting on, and being transparent about values, as well as taking responsibility and accountability for research processes and outcomes (Fazey et al., 2018; Pearce et al., 2022; Wijsman and Feagan, 2019). Such a reflexive practice can support individual researchers to act ethically, but more so, to improve our collective ways of being and doing (i.e., an ethically informed research community) by constantly connecting what should be (i.e., the guidelines) and how it has been done (i.e., the practices) through critical reflexive practices. This improvement at the collective level includes a re-valuation and redesign of existing processes and guidelines for morally good research.

A collaborative autoethnography. Responding to this need for critical reflexivity, we engaged with our storied experience in navigating concrete and immediate ethical dilemmas that we have encountered when collaborating with others for TR in practice. We did so through collaborative autoethnography, a multivocal approach in which two or more researchers work together to share personal stories and interpret the pooled autoethnographic data (Chang et al., 2016; Lapadat, 2017; Miyahara and Fukao, 2022). Collaborative autoethnography is appropriate for our inquiry as it broadens the gaze from the dilemmas of the self to locate them within categories of experience shared by many. Interrogating our personal narratives and understanding the shared experiences through multiple lenses not only facilitates a more rigorous, polyvocal analysis but also reveals possibilities for practical action or intervention (Lapadat, 2017). Collaborative auto-ethnography can thus be considered an approach that moves "*beyond the clichés and usual explanations to the point where the written memories come as close as they can make them to 'an embodied sense of what happened'*" (Davies and Gannon, 2006, p. 3). It also supports developing researcher reflexivity (Miyahara and Fukao, 2022).

Overall, we engaged in two types of collaborative activities over the course of a period of 18 months: writing and discussing. In hindsight, this period can be divided into three phases: starting up, exploring, and co-working. The first phase was kicked off by an online dialogue session with about 30 participants convened by the Design Impact Transition Platform of the Erasmus University Rotterdam in April 2022. The session was meant to explore and share experiences with a wide range of ethical dilemmas arising from TR collaboration in practice. Following this session, some participants continued deliberating on the questions and dilemmas raised in differing constellations and developed the idea of codifying and sharing our experiences and insights via a publication. In a second phase, we started writing down individual ethical dilemmas, both those we had discussed during the seminar and additional ones. These writings were brought together in an online shared file, where we continued our discussions. This was accompanied by meetings in differing constellations and of differing intensity for the researchers involved.

A third phase of intense co-work was framed by two broader online sessions. During a session in May 2023, we shared and discussed a first attempt at an analysis and sense-making of our individual dilemmas. During this session, we discerned the heuristic by Mertens et al. (2017) and discussed how it could be helpful in structuring our different experiences. Inspired by Mertens et al. (2017), we re-engaged with the three critical dimensions of any research paradigm to scrutinise our philosophical commitments to doing TR. A re-engagement with issues of axiology (the nature of ethics and values), ontology (the nature of reality), and epistemology (the nature of knowledge), as illustrated in Table 1, allowed us to reconcile our ethical dilemmas and opened a space for a more nuanced understanding and bottom-up approach to the ethics of collaboration in TR. In moving forward, the heuristic also helped to guide the elicitation of additional dilemmas. This session kicked off a period of focused co-writing leading up to a second session in December 2023, where we discussed writing progress and specifically made sense of and related the ethical dilemmas to existing literature and insights.

Especially in this last phase, as we interacted dialogically to analyse and interpret the collection of storied experiences of ethical dilemmas, our thinking about the ethics of collaboration has evolved. It went beyond considering the inadequacy of institutional rules and how we navigated those, towards acknowledging their interplay with individual positionality and a researcher's situated practice. Closer attention to the contexts within which the ethical dilemmas have arisen has led us to return to our philosophical commitments as transformative researchers and reflect on our assumptions about collaboration and research from a transformative standpoint.

The author team thus comprises a high proportion of those participating in the initial session, as well as others who joined the ensuing collective interpretation and analysis resulting in this paper. An important characteristic of the authors is that we are all affiliated with academic research institutions and that all but one of these institutions are based in high-income countries. It is in this context that we have shared our experiences, which is also

Table 1 The heuristic guiding our collaborative autoethnography.

Dimension	Philosophical commitments from a transformative research standpoint	Experiential encounters of the author team (described in more detail in Tables 2–4)
Axiology	Transformative researchers are part of the processes and contexts that they are researching, and they are actively committed to knowledge production and transformative action. TR aims to address persistent social-ecological problems to contribute to transitions towards more just and sustainable societies and democratic relations.	Encounter 1: Clear roles or conflict of interest? Encounter 2: Prioritising interests of patients or other groups? (marginalised vs other groups) Encounter 3: Improving learning journeys or testing a course design? (action vs. knowledge) Encounter 4: Fulfilling existential and career needs or furthering societal impact? (own existence vs improving others' existence) Encounter 5: Compromising own values or standing strong?
Ontology	Transformative research can start from different ontological stances, including critical realist, pragmatist, or subjectivist perspectives. This includes a strong acknowledgement of multiple versions of perceived reality.	Encounter 6: If maths anxiety and eco-anxiety can be a 'real' thing, why can't science anxiety also be real? Encounter 7: They are 'climate displaced persons', aren't they? Encounter 8: This is a 'marginalised' school, isn't it?
Epistemology	Knowledge is created through multiple ways of knowing by multiple knowers. The processes of knowledge development need to facilitate inclusivity of knowledge and recognise how power inequities shape the normative definition of what is considered legitimate knowledge.	Encounter 9: Shall we ignore them since they do not know better or enter into dialogue? Encounter 10: Shall I push harder to get heard or be silent? Encounter 11: Shall I go along with the powers that are or take the opportunity to create a new playing field? Encounter 12: Shall I make impact with my fellow policy officials or my academic colleagues? Encounter 13: We have established a shared understanding for our collaboration, didn't we?

limited by it. As such, this paper will mainly speak to other researchers affiliated with academic institutions in comparable settings. Acknowledging these limitations, we are from different (inter)disciplinary backgrounds[2], nationalities, and work in different national settings and urban and rural locations. This diversity of contexts impacts the constellation of ethical dilemmas that we were faced with. We thus synthesise lessons from disparate yet still limited contexts, whilst remaining cognisant of the ungeneralisable nature of such a study.

Collaboration in transformative research practice

At the heart of our collaborative autoethnographic experience was the sharing and sensemaking of ethical dilemmas. In this section, we share those dilemmas (see Tables 2–4) clustered along the three philosophical commitments that served to deepen the analysis and interpretation of our storied experience. We embed our dilemmas with the broader body of knowledge around similar issues to discuss ways forward for practical knowledge around 'what is good' TR practice and 'how to' navigate ethical dilemmas.

Axiological dimension. Axiology is the study of value, which concerns what is considered 'good', what is valued, and most importantly, what 'ought to be'. The axiological standpoint of TR is to address persistent societal problems and to contribute to transitions towards more just and sustainable societies. The commitment to knowledge development and transformative actions is also shaped by different personal judgements, disciplinary traditions, and institutional contexts. Together, these raise ethical concerns around the shape and form of research collaborations, the research lines being pursued, and where and for whom the benefits of the research accrue. Table 2 provides the details of the ethical dilemmas (described as encounters) that we discuss in the following.

Taking up a transformative stance goes hand in hand with individual researchers holding different roles at the same time (Hoffmann et al., 2022; Horlings et al., 2020; Jhagroe, 2018; Schut et al., 2014). Often resulting from this, they also perceive a wide range of responsibilities towards diverse groups (stakeholders, peers, the academic community, etc.). This is why transformative researchers face questions of who is responsible for what and whom in front of whom, and these questions influence and are influenced by what they consider the 'right' thing to do in relation to others in a collaborative setting. As a result, their axiological position is constructed intersubjectively in and through interactions unfolding in the communities of important others. It is thus relational and may differ depending on 'the other' in the research collaboration (Arrona & Larrea, 2018; Bartels and Wittmayer, 2018). *Encounter 1* illustrates this through a constellation of the research collaboration that holds the potential to become a conflict of interest.

Such conflicts of interest can also occur in the very choice of which 'community' is being considered as the main beneficiary of the collaboration. The emphasis on action in TR, especially with regards to the principles of beneficence and justice that we mentioned in "Ethics in transformative research", can increase this dilemma. Researchers are to continuously evaluate their (perceived) obligations. This includes, for example, obligations towards the scientific community (contributions to the academic discourse via publications) vs. obligations towards stakeholders (being a provider of free practical advice or consultant) vs. scientific requirements (academic rigour and independence) vs. stakeholder requests (answering practical questions). Researchers have to position themselves in this contested field of what 'good research' and 'useful outcomes' mean and sometimes question or challenge their peers or the academic system at large (see also Kump et al., 2023). This is the very question raised by *Encounter 2*, where researchers are forced to decide which stakeholders' values and needs should be prioritised in transforming clinical practice and improving the lives of patients.

Moreover, a similar prioritisation between the interests of different groups needs to be made between whether to create knowledge according to traditional scientific standards of systematicity and rigour or supporting collaborators in developing usable knowledge. This is surely a dilemma that arises from being embedded in an institutional context that judges according to different standards, but it also arises from the double commitment of TR to knowledge development and transformative action (Bartels et al., 2020). Huang et al. (2024) for example show how axiological assumptions serve as the base from which different notions of research excellence (e.g., scientific rigour, 'impactful' scholarship) are operationalised and supported institutionally. *Encounter 3* reflects a similar dilemma as the lecturer juggles conflicting priorities that are inherent to the axiological concerns of TR. That is, can the goals of knowledge development in the traditional academic sense and transformative action be achieved simultaneously? The answer provided by *Encounter 3* seems to suggest a redefinition of what 'good' scientific knowledge is, for immediate action to be possible.

Yet, perceived responsibilities—towards human and non-human actors, but also towards the own university, the institutional arrangements in which we partake, and what we understand as ethical behaviours—exist in a close, interdependent relationship with our inner ethical standards. Creed et al. (2022, p. 358) capture this "*collection of sedimented evaluations of experiences, attachments, and commitments*" as an 'embodied world of concern'. This can illustrate the complexity of how an individual researcher's values, emotions, or sentiments tend to intertwine, and can sometimes clash, with the concerns of their communities and the social-political situation where they operate. Given that one's embodied world of concern is not fixed but characterised by emerging pluralism, as *Encounter 4* illustrates, the consequence of an ethical decision tends to fall more heavily on those with less axiological privilege, such as early career researchers or those located in regions where the opportunity for scientific publishing is limited (Kruijf et al., 2022).

As transformative researchers seek systemic change, their values cannot help but influence their research collaboration, including the choice of whom they work with and which methods to use. However, the intention of strengthening the responsiveness of research to societal and political needs through TR collaborations risks being co-opted by the interests of those funding research activities (Bauwens et al., 2023; Strydom et al., 2010). As illustrated in *Encounter 5*, this might cause dilemmas when being approached by stakeholders (e.g., oil and gas companies) to do research, which may not sit well with the subjective judgements of the researcher or with an overall need for transformative change. Researchers can be caught in an odd position and left to wonder whether a compromise of values is worth the risks and end gain, depending on whether a positive contribution can still be achieved. Negotiating our axiological stances with collaborators thus allows researchers to be seen as social beings embedded in patterns of social interdependence, who are not only "*capable and can flourish*" but also "*vulnerable and susceptible to various kinds of loss or harm [and] can suffer*" (Sayer, 2011, p. 1).

Ontological dimension. Ontology is the philosophical study of being, which concerns the nature of reality and what really exists. TR can start from diverse ontological stances, including critical realist, pragmatist, or subjectivist perspectives. This includes a

Table 2 Axiological concerns in our experiential encounters.

Encounter 1: Clear roles or conflict of interest?
"My PhD project was transformative, as it initiated a collaboration between my university and a third party. This organisation was running a programme, the data of which I would receive and analyse. The lead of the programme would be one of my co-promotors and potentially co-author on the scientific articles that would be cumulating into my PhD thesis. To me, this appeared as a potential conflict of interest that could emerge from such a constellation, namely that even though I wouldn't be directly evaluating the programme, my research could lead to conclusions about the programme and how it was managed. Drawing also possibly critical conclusions was one of the pre-conditions for earning a doctorate and should not be overshadowed with the interest of the organisation nor be threatened by the dependency relationship between a PhD-student and their co-promotor. In the interview for the position, I therefore asked which rules they had in place to avoid a (perceived) conflict of interest. They looked at me with surprise and asked me "Why would there be a conflict of interest?". Thankfully, the other co-promotor agreed with my line of reasoning. After I was hired, we agreed that in articles concerning the data from the programme, the lead of the programme would not be involved or co-author. During the project, I had to remind them several times of this agreement, but in the end, the programme lead did not interfere in the content of the article about the programme." (PhD researcher, 2015, The Netherlands)
Encounter 2: Prioritising interests of patients or other groups?
"Doing collaborative design research in the healthcare sector is done with the goal to transform clinical practice, to ensure the quality of lives of patients, to improve the situation for every stakeholder involved, to improve … So, you have patients, health care professionals, maybe the hospital management, you have policy makers, etc. And all of these have different interests in a transformation process. One of the main challenges for me in doing collaborative design research is the question of who is the most important stakeholder in my research? So, when I'm doing my collaborative design research, my main interest is to improve the lives of patients. But you can always argue that, you know, some other group may be more important as well." (PhD-researcher, 2021, The Netherlands)
Encounter 3: Improving learning journeys or testing a course design?
"With an intention of transforming the ways we teach, we have set up a minor at our university, where we use a project-based student-centred pedagogical approach as well as systems thinking, transition thinking, resilience thinking, design thinking and transformative education theory to innovate in the way we deliver education, making it competencies focused and impact driven. This minor is considered an interdisciplinary experiment and we have conducted research on the minor to understand students' transformative learning journeys and their acquisition of competencies. The research was to focus on analysing learning reflections by students which they shared at different points of their transformative learning journey. As a researcher, I was thus supposed to use the learning reflections to test the course design, however, at a certain point in time, I felt that these reflections were also a great instrument for feedback on how to adjust the course 'on the go' and change elements that might contribute to improving the student's journey. Doing so, however would not allow me to 'test' the implementation of a finished design. I think that this somehow illustrates the difficulties of being a researcher that looks at things reflectively, but does not influence the trajectory of research while doing it, but also the challenge of being in a researcher position seeing that there are possibilities to use the research for immediate improvement that, at the same time, might make the research design too complex to fall into the scope of regular research to be published in academic journals. A focus on a more reflexive type of research could have been chosen instead, but I was not sure how to make observations or set-up changes 'on the go' as 'proper experiments'." (Lecturer, 2022, Netherlands)
Encounter 4: Fulfilling existential and career needs or furthering societal impact?
"Doing collaborative design research in the healthcare sector is partly driven by the urge to transform the healthcare system and to have an impact in and on the lives of people. So, a lot of the things that I was doing, I actually could not publish about because these actions were not living up to the scientific standards for publishing. While at the same time, I needed to publish to earn a PhD-degree within a formalised contract period. It was this kind of trade-off that I've made in my PhD-research, where I was spending most time on those projects that would result into publishable data. Being on a temporary contract, I couldn't afford spending time on projects that did not have the potential to lead to a publication with first authorship. So, there's definitely a big challenge of how one can stimulate researchers to be keener to actually do something and change the society instead of focusing on that research output" (PhD-researcher, 2021, The Netherlands).
Encounter 5: Compromising own values or standing strong?
"At one point, our research group was asked by a major oil and gas company if we could support them in their 'transition'. With our mission being to support sustainability transitions, we had and have ongoing, at times fierce, internal debates on whether we should in general work for oil and gas – the argument being the need to proactively phase out the fossil parts of their business model and transition towards a sustainable alternative. My position is that in principle we should be able to do it, if we can do it on our terms: independent, open science and with a focus on just, sustainability transitions. Based on this thinking, we made a proposal to organise a transformative research project in which we would work with change makers from within the organisation to explore a fundamental transition of the organisation into a fossil-free world within the timeframe climate science gives us. We also asked commercial rates for this research. The company came back, indicating it was too expensive and ambitious. They rather wanted a leadership process with some training in transition thinking and support in transformative research methods (while not using this specific term). Their understanding of 'transition' in other words, was an open-ended change management process doing things better rather than a fundamental rethink of their existence to create space for a truly just and sustainable alternative. Based on that we decided not to work with them. In the end, the question remains if we could have made a significant change and triggered some small-scale transformative change if we did have taken the smaller assignment." (Professor, 2021, Netherlands)

strong acknowledgement that "*there are multiple versions of what is believed to be real*" (Mertens, 2017, p. 21). Yet, such a pluralist stance remains a theoretical exercise up until the point that researchers ought to define what are 'the things' that need to be transformed and into what. In this situation, at least two debates arise: Do 'the things' exist based on a specific ontological commitment, such as the divide between measurable constructs and socially constructed understandings of risks and inequities. And is the existence of 'the things' universal or merely a construct of a specific time, space, or social group? As the researcher illustrated in *Encounter 6* (see Table 3 for the detailed encounters), if maths anxiety and eco-anxiety are recognised as 'real' because of growing clinical research, why can't the research team accept the construct of 'science anxiety' that their teacher collaborators have

Table 3 Ontological concerns in our experiential encounters.

Encounter 6: If maths anxiety and eco-anxiety can be a 'real' thing, why can't science anxiety also be real?
"When I was as a graduate research assistant of a transdisciplinary team, I was caught in-between the ways in which neuroscientists, learning scientists, education researchers and teachers perceive what constitute as a 'real' educational issue to be problematised, researched, and invested in. When developing a follow-up funding proposal, many teachers suggested that evidence-based instruments were only effective when students were willing to engage. To better support their teaching, the research team should therefore take a step further and diagnose why students are not engaged in their science classes, such as the issues of attention deficit disorder and anxiety. On the one hand, part of the research team was reluctant to accepting the suggestion as these were considered as clinical issues that require professional medical diagnosis. On the other hand, those researchers who prioritised teachers' need and lived realities argued that teachers are also 'professionals', so their empirical observation in the classrooms should be taken seriously by the scientific and medical community. Against this backdrop, I was asked to review literature on maths anxiety and eco-anxiety to draw insights on how they were clinically diagnosed, with a view to 'prove' that teacher's perceptions thereof exist. I turned down the job because a part of me felt that this approach to problem identification was not 'scientific' at that time. However, as my experience in transformative research grew, I began to wonder if the given task of 'proving' the existence of teachers' perceptions was a form of joint problem identification that knowledge co-production scholars emphasise. I also wonder if I had overlooked an entry point that has a transformative potential for improving classroom teaching holistically." (Doctoral researcher, 2019, Canada)
Encounter 7: They are 'climate displaced persons', aren't they?
"In our research collaboration, we encountered tremendous challenges in defining who are those migrants and/or displaced populations impacted by climate change. Understandings of climate change impacts remain limited in the region of our study. For example, based on the official household survey, only half of the population in the government-planned relocation programme heard of the term 'climate change'. It is therefore not surprising that our study participants do not recognise themselves as the 'vulnerable' population affected by climate change, nor 'climate migrants' or even 'climate refugees'. They mostly attributed government's plans and their decisions to move as 'looking for a better job' or 'getting better health care services,' rather than climate change. However, for the sake of awareness raising and political campaign, the research team was asked by the funder to name this population as 'climate displaced persons'. We pushed back on the request, explaining that the issues of weather-related displacement and climate-induced migration are highly interconnected with other societal and ecological problems and treating climate change as the definitive condition in triggering migration can oversimplify the complexity of people's lived experience and decision-making process. Unfortunately, our efforts were only seen as a matter of scientific debate." (Postdoctoral researcher, 2022, Japan)
Encounter 8: Narratives of otherness – this is a 'marginalised' school, isn't it?
"For a study looking at e-cigarette litter as an environmental problem and proxy for youth e-cigarette use, we were conducting a Garbology study at local high schools in the San Francisco Bay Area. One of the high schools was a school with especially low socioeconomic and education status. We were picking up tobacco related trash on their campus, when one of the teachers from the school, who was having an afterschool programme, noticed what we were doing. While we always anonymise our data and were not planning to give the names of any of the schools in our final results, the teacher was visibly annoyed at what we were doing and asked us if we were just trying to give the school further a bad reputation. Notwithstanding communicating results to the teacher, he wanted to ensure that we weren't doing data collection at the expense of a school that already had been maligned because they were operating under duress financial and otherwise. This experience in the field with people and institutions that might already feel marginalised and feel that research about them will further entrench that sense of being behind, or otherised – it stuck with me since throughout my field research career." (Postdoctoral researcher, 2018, United States)

perceived in their classrooms? Collaboration thus remains especially challenging when researchers strive for academic rigour from an empiricist standpoint while having to cross paths or work with individuals from different ontological positions (Midgley, 2011).

Commitments to working collaboratively with members of 'marginalised' and 'vulnerable' communities add to this dilemma, as researchers are bound to encounter the ethical dilemmas of whose reality is privileged, whose reality can or should be legitimised and considered 'true' in a TR process (Kwan and Walsh, 2018). In *Encounter 7*, for instance, research participants do not recognise themselves as 'climate displaced persons' or 'climate migrants' because they have a long history of migration for a plethora of reasons. Now, should researchers continue using this term with a view to gain political attention to the issues of climate change, or should they abstain from doing so? How does this relate to their commitment to transformative action, including shaping political agendas? The intention to target system-level change in TR (Burns, 2014; Kemmis, 2008) also means that researchers ought to interrogate the mechanisms that inflict certain perceived realities on the powerless in the name of good causes (Edelman, 2018; Feltham-King et al., 2018), the ways in which these narratives are deployed by powerful stakeholders (Thomas and Warner, 2019) and how these are translated into (research) action.

Moreover, research and action on 'scientific' problems can deflect attention from other problems that local communities most care about or lead to unexpected, even negative, implications for some stakeholders. With increasing pressure on the societal impact of research and funding tied to certain policy goals, the issues of labelling and appropriation might only perpetuate a deficit perspective on specific groups (Eriksen et al., 2021; Escobar, 2011; van Steenbergen, 2020). *Encounter 8* highlights that, without caution, well-intended efforts risk perpetuating harm and injustice —upholding a certain deficit perspective of the community in question. Communities accustomed to 'helicopter' research, where academics 'fly-in, fly-out' to further their careers at the expense of the communities, may be reluctant to collaborate. This necessitates transparency, active listening, deliberative involvement, and trust building (Adame, 2021; Haelewaters et al., 2021). It also reminds us of the 'seagull syndrome',' which attests to the frustration felt by community members towards outsider 'experts' making generalisations and false diagnoses based on what is usually a superficial or snapshot understanding of local community dynamics (Porter, 2016). In some incidents, transformative researchers may need to redesign collaboration processes in TR that centre on the realities of people in the study (Hickey et al., 2018).

Epistemological dimension. Epistemology is the philosophical study of knowledge, and its primary concern is the relationship

between the knower and what can be known. Transformative researchers usually work at the interface of disciplines, each with their own ideas on what constitutes 'scientifically sound' but also 'socially robust' or 'actionable' knowledge (Mach et al., 2020; Nowotny et al., 2003). Many thus hold the epistemological assumption that knowledge is created through multiple ways of knowing, and the processes of knowledge generation need to recognise how power inequities may shape the normative definition of legitimate knowledge. This stance raises ethical concerns about whose knowledge systems and ways of knowing are included, privileged, and/or legitimised in TR practice. Moreover, it raises concerns about ways of ensuring a plurality of knowledge spaces (Savransky, 2017).

Using an epistemological lens to interrogate collaborative practice in TR can illuminate a wide range of ethical dilemmas associated with longstanding critiques of Western norms and 'scientific superiority' (Dotson, 2011; Dutta et al., 2022; Wijsman and Feagan, 2019). It also brings to the fore the power dynamics inherent within collaborative processes of TR for sustainability (de Geus et al., 2023; Frantzeskaki and Rok, 2018; Kanemasu and Molnar, 2020; Kok et al., 2021; Strumińska-Kutra and Scholl, 2022). A particular ethical challenge is related to the fact that it is typically researchers from the Global North who design and lead research collaborations, even when these take place in the Global South. This immediately creates "*an inequality that is not conducive to effective co-production*" and requires "*dedicated commitment to identify and confront the embodied power relations [and] hegemonic knowledge systems among the participants in the process*" (Vincent, 2022, p. 890). See Table 4 for details on the ethical dilemmas that we discuss in the following.

Concerns about epistemic justice (Ackerly et al., 2020; Harvey et al., 2022; Temper and Del Bene, 2016) and interpretation of voices (Komulainen, 2007) are largely rooted in the deficit narratives about the capacity of certain groups for producing knowledge or for being knowers. *Encounter 9* shows how easily certain voices can be muted as not being considered to speak from a position of knowledge. Research processes can usefully be expanded to include disinterested or disengaged citizens (Boyle et al., 2022), or those opposing a project or initiative so as to lay bare the associated tensions of knowledge integration and co-production (Cockburn, 2022). *Encounter 10* illustrates that such silencing also relates to the question of who holds legitimate knowledge. This research has three parties that may hold legitimate knowledge: the researcher, the corporation, and the local community. However, the extent to which the researchers' knowledge is heard remains unclear since the corporation does not consider it in its actions. It also illustrates common insecurities about what one can attain using certain research methods. The reliance of political institutions and citizens on expert advice, particularly when dealing with acute crises (e.g., Covid-19 pandemic), also tends to exacerbate the depoliticisation of decisions (Rovelli, 2021).

Moreover, TR practice nearly inevitably results in privileging certain ways of knowing and knowledges. Researchers make space for shared action or dialogue around a certain issue, inviting certain groups but not others, and choosing certain methods and not others. *Encounter 11* illustrates the issue of favouritism in research collaboration. It elaborates on how thoughtful facilitation can intervene to level the playing field and provide a way out of the dilemma going beyond the question of whose benefit it serves. This facilitation enables meaningful collaboration among all parties involved. Particularly in policy sectors dominated by political and economic considerations, which exhibit strong vested interests, there is a need to foster meaningful and safe participation (Nastar et al., 2018). Skilled facilitation is crucial for uniting marginalised groups, preparing them to deal with the intricacies of scientific jargon and technological hegemony (Djenontin and Meadow, 2018; Reed and Abernethy, 2018). The contextual dimensions of collaborators, their associated worldviews, and the social networks in which they are situated are important epistemological foundations. Yet, these are not static and can shift over time throughout collaborative partnerships.

As explicated in "Introducing transformative research", TR represents an epistemological shift to recognise researchers as sense-makers, agency holders, and change agents. This philosophical commitment can create dilemmas for 'embedded researchers' seeking to strengthen the science-policy interface. *Encounter 12* illustrates how occupying a dual role — to dive into action and to publish scientifically — can be at odds. This encounter alludes to the fact that transformative researchers often navigate different roles, which come with different, at times conflicting, epistemological priorities and ways of knowing (e.g., roles as a change agent and a reflective scientist, the approach of 'Two-Eyed Seeing' by Indigenous scholars) (Bulten et al., 2021; Temper et al., 2019; Wittmayer and Schäpke, 2014). Importantly, such roles change over time in a TR practice and over the course of a researcher's career (McGowan et al., 2014; Pohl et al., 2017).

Involving diverse stakeholders in knowledge co-production also inevitably leads to ethical questions concerning how to integrate diverse knowledge systems, especially those using multi-method research designs or models to aid decision-making (Hoffmann et al., 2017). Models can be useful in providing scenarios, however, they are constructed by people based on certain assumptions. These assumptions serve as the fundamental lenses through which complex real-world systems are simplified, analysed, and interpreted within the model framework. Despite the well-intention of researchers, the practice of establishing a shared understanding and reaching consensus about key constructs in a model is often unattainable. As *Encounter 13* illustrates, participatory model building requires the capacity and willingness of all involved to knit together kindred, or even conflicting, perspectives to complement disciplinary specialism.

We explored the dilemmas of researchers pertaining to knowing 'how to' act in a certain situation and considering 'what is doing good' in that situation. Transformative researchers (re) build their practical knowledge of what doing research means through cultivating a reflexive practice that puts experiences in context and allows to learn from them. From a meta-perspective, doing TR is a form of experiential learning (Kolb, 1984) and doing TR involves traversing an action research cycle: experiencing and observing one's action research practice, abstracting from it, building knowledge, and experimenting with it again to cultivate what has been referred to as first person inquiry (Reason and Torbert, 2001).

Concluding thoughts

In this article, we set out to explore which ethical dilemmas researchers face in TR and how they navigate those in practice. We highlighted that researchers engaging in TR face a context of uncertainty and plurality around what counts as ethically acceptable collaboration. With TR emphasising collaboration, it becomes important to discern the notion of 'right relations' with others (Gram-Hanssen et al., 2022), to attend to the positionality of the researcher, and to reconfigure power relations. Importantly, with TR emphasising the need for structural and systematic changes, researchers need to be aware of how research itself is characterised by structural injustices.

Using a collaborative autoethnography, we shared ethical dilemmas to uncover the messiness of collaborative TR practice. We established how guidance from institutionalised reference systems (i.e., ethical review boards and procedures) currently falls

Table 4 Epistemological concerns in our experiential encounters.

Encounter 9: Shall we ignore them since they do not know better or enter into dialogue?
"As part of a collaborative partnership concerning decarbonisation in a rural Irish community, the research team- including myself- acted as part of the project management team, together with other stakeholders from the local community. The goal of the project was to facilitate the emergence of sustainability initiatives in a range of sectors including agriculture. To this end, we were using the Internet of Things (IoT) sensors in farms to monitor soil temperature, soil oxygen levels, photosynthetic radiation etc. These sensors were operating on 2 G connectivity. During the project, we became aware that a local oppositional campaign against the installation of 5 G masts in the area had conflated our work with their issue in that they were acting under the presumption that 5G was essential to the operation of the sensors and that we were involved with the roll out of masts. Our local partners in the area did not see this as a major issue, and instead found the oppositional campaign to represent a small minority of people in the community who were not speaking from a position of knowledge on the topic they were discussing. There began to emerge some content on social media about what our project was doing and their own concerns regarding 5G. At this point, a colleague and I held a meeting with one of our research partners of the project management team to see a way forward on this issue, and to highlight the need to open discussion with the oppositional group, rather than downplaying the topic. We were also cognizant of our position as non-locals in the area, but we considered this opposition as important, because it acted- to our minds- as a form of participation rather than merely opposition to be avoided. We arranged a meeting between our local partner/ project leader and the two main leaders within the oppositional campaign. This meeting was facilitated by one of the researchers as a chair. The meeting gave the oppositional campaign an opportunity to voice concerns and learn more about what our own project was doing." (PhD Candidate, 2019, Ireland)
Encounter 10: Shall I push harder to get heard or be silent?
"During my master's, I had a research project planned in Indonesia, where I investigated the social impact of a smartphone app that was developed and implemented by a Dutch corporation to improve the production and livelihoods of smallholder farmers. The corporation had a comforting reputation for its sustainability efforts, and I was in good contact with them. With my bags packed and ticket in hand I was ready to leave for Indonesia, which is when the COVID19-pandemic struck. The company was really flexible and supported me to change my methods and set up online interviews. So far so good. However, during my research, I started to realise that the development of their project hadn't been very inclusive. Because of this, there were many problems with data protection, implementation, communication, and overall social outcomes of the app. I reflected on these concerns in my final report, which I shared with the corporation including recommendations. I don't remember getting a response, or at least after that the contact was short lived. Not too long ago, I saw they shared a news message on LinkedIn, boasting about the very practices of which I had informed them that they were harmful to the local community. Nothing had changed, my work didn't seem to have had a social impact that I had set out to achieve. On the one hand, I feel like I didn't fully capitalise on the opportunities that I had to contribute to a more inclusive social dialogue. On the other hand, I was a young researcher and had personally benefited from my contact with the corporation. Who was I to defy them? And what did I really know; I didn't even go to Indonesia. In hindsight, I regret not trying harder to bring my concerns to light although the situation was difficult." (Master student, 2020, Indonesia/the Netherlands)
Encounter 11: Shall I go along with the powers that are or take the opportunity to create a new playing field?
"As part of an India-Dutch collaborative project aimed at co-developing transition mechanisms for water-sensitive cities, I orchestrated a series of workshops in India. The objective was to engage stakeholders currently active in fields relevant to water management within India's secondary cities and to encourage them to reassess their roles, scrutinise their projects, and recalibrate their approaches, fostering water sensitivity. Contrary to our initial plan, local partnering organisations issued invitations for a prestigious workshop in Delhi to retired professors and influential figures. Many of these are resistant to endorsing transformative change, downplaying the urgency and scale of the challenges, due to potential challenges to their authority and the status quo. This deviation was motivated by a desire to strengthen existing relationships of the local organisation and rendered the framing of the event impervious to challenge, effectively aiming to silence other voices. This deviation raised concerns: it risked empowering autocratic individuals to eclipse the marginalised voices we aimed to support in our workshop. Given that our initiative was funded by the Centre, our starting point was inherently non-neutral, making the inclusion of change-resistant figures a potential obstacle to our transformative objectives. However, I later realised the importance for our local partners to involve these authoritative figures, essential for strengthening their relationships in the intricate political landscape. Embracing this challenge, I considered two potential strategic advantages from this new framing: (1) providing a transparent window into the existing governance landscape, and (2) should they embrace the workshop's message, their elevated status could render them potent change agents. Consequently, I negotiated with the local partnering institute to enable concerned PhD researchers to select stakeholders based on their research needs. This compromise diversified the workshop's representation, mirroring the real contestation occurring on the ground. Despite the partnering institute's chosen stakeholders' attempts to dilute the perceived need for extensive reforms, new voices—empowered by researchers' facilitation—spoke up. This experience underscored the need for a workshop environment that supports change as not just tolerable, but a positive and essential trajectory – and highlights the role of skilful facilitation and moderation. Eventually, this episode crystallised into a deeper comprehension of the decolonising process of knowledge production and a revaluation of co-production within the Global South context. When authoritative figures, whose actions mirror repressive structures of a colonial past, encounter a transformative initiative like this workshop—one that challenges their practices and advocates substantial change—they frequently respond with discernible resistance." (PhD researcher, 2023, India/Netherlands)
Encounter 12: Shall I make impact with my fellow policy officials or my academic colleagues?
"As an embedded researcher-bureaucrat, I have two dual roles: One is to be a senior policy official who carries out day to day climate change and sustainability administrative work and implements policy decisions based on research, regulatory and practical knowledge. Another role is to be a researcher who generates knowledge based on my own professional lived experiences, complemented by conventional research approaches. Can the dual roles (i.e., bureaucrats and researchers) co-exist and be recognised as legitimate producers and users of scientific knowledge? This tension was amplified when I initiated a sustainability transitions project to institutionalise the concept in South Africa. Putting on a policy official hat means that I sometimes had to suspend my scientific understanding of sustainability transitions for my fellow policy officials to come to a joint interpretation of the concept. This 'wait' for a co-productive moment is important because lacking holistic understanding of a sustainability problem would lead to insufficient solutions and negative unintended consequences. The dilemma is further intensified when I take up a transformative lens. That is, I recognise that publishing the results as a conventional scientist is not enough, but advocating for change in real-world problems also comes as an added responsibility/commitment. What is my right to do so as an embedded research-bureaucrat and what are the consequences of challenging the existing agenda to move forward into adopting the concept of sustainability transitions that my fellow academic colleagues strive for?" (PhD researcher, 2016, South Africa)
Encounter 13: We have established a shared understanding for our collaboration, didn't we?
"During my PhD studies, I was conducting research on qualities of urban transformations in a transdisciplinary project. The project included different, interdisciplinary research groups (e.g., Urban Planning Studies, Sustainability Sciences, Social Sciences) and a diverse group of >20 practice partners, ranging from planning departments of cities, transportation providers, private architectural and planning offices, and regional development and green space interest groups. During consortium meetings in the early phase of the project, lead partners planned time for developing a shared problem framing between science and practice partners. However, at the end of the first project year, it became clear that fundamentally different understandings of the notion of 'landscape' were used. By some of the architectural researchers' landscape was considered as non-urban, less populated territories, while other scholars and practitioners included all geographies and settlement types. Far from being innocent, such conceptualisations had implications for drawing system boundaries used in land use modelling. The assumptions underlying the model had to be revisited and revised – however, this contributed to practice partners becoming more critical about partly untransparent and hard to understand conditions and assumptions guiding the land use model. The model was critiqued and mistrusted by practitioners as a 'black box'. Still, the findings from the model were seriously discussed in terms of their practical validity and reliability, which instigated valuable reflections at the science-practice nexus." (PhD researcher, 2014, Switzerland)

Table 5 Ethical questions emerging from this collective autoethnography.

Philosophical considerations	Reflexive questions for transformative researchers in collaborative practice
Axiological concerns	Whose interests and values are prioritised, and whose are undervalued in TR practice?
	Who or what benefits in which ways from the TR practice, outcomes or outputs?
	What are the roles of subjective judgements in doing TR?
	What is the transformation that the researcher envisions?
Ontological concerns	Whose reality is privileged?
	Whose reality is legitimised and considered as 'truth' in TR practice?
	What are mechanisms for challenging views on reality that sustain an oppressive system?
Epistemological concerns	Whose knowledge systems and ways of knowing are included in TR practice?
	Whose knowledge systems and ways of knowing are privileged and/or legitimised in TR practice?
	What are mechanisms for ensuring a plurality of knowledge relations in TR practice?

short in recognising the particularities of TR. We described how the research community generates informal principles, or heuristics to address this gap. However, we also appreciated that in actual collaboration, researchers are often 'put on the spot' to react 'ethically' in situ, with limited time and space to withdraw and consult guidelines on 'how to behave'. Such informal heuristics are thus but a start and a helpful direction for developing the practical knowledge of researchers on how to navigate a plural and uncertain context.

This practical knowledge is based on an awareness of the uncertainty around what constitutes morally good behaviour and builds through experience and a critical reflexive practice. Our aim is not to share another set of principles, but rather to highlight the situatedness of TR and the craftsmanship necessary to navigate it and, in doing so, build practical knowledge through experiential learning and insight discovery (Kolb, 1984; Pearce et al., 2022). Such a bottom-up approach to research ethics builds on the experiences of researchers engaging in TR as a situated practice vis-à-vis their personal motivations and normative ambitions and the institutional contexts they are embedded in. This approach nurtures the critical reflexivity of researchers about how they relate to ethical principles and how they translate this into their normative assumptions, practical hypotheses, and methodological strategy.

Next to continuous learning, this critical reflexivity on TR as craftmanship can enhance practical wisdom not only for the individual but also for the broader community of researchers. We envision such wisdom not as a set of closed-ended guidelines or principles, but rather as a growing collection of ethical questions enabling the TR community to continuously deepen the interrogation of their axiological, ontological, and epistemological commitments (see Table 5). Only through this ongoing process of reacting, reflecting, and questioning—or as referred to by Pearce et al. (2022, p. 4) as "an insight discovery process"—can we collectively learn from the past to improve our future actions.

However, such a bottom-up approach to ethics can only form one part of the answer, set in times of an evolving research ethics landscape. Researchers engaging in transformative academic work cannot and should not be left alone. Additionally, researchers' ethical judgements cannot be left to their goodwill and virtuous values alone. Therefore, another important part of the answer is the carving out of appropriate institutions that can provide external guidance and accountability. This will require nothing less than structural and cultural changes in established universities and research environments. Rather than having researchers decide between doing good and doing 'good' research, such environments should help to align those goals.

From this work, questions arise on how institutional environments can be reformed or transformed to be more conducive to the particularities of TR, and to help nurture critical reflexivity. We highlight the critical role that ethic review boards can play in starting to rethink their roles, structures, and underlying values. Practical ideas include employing mentors for transformative research ethics, having ethical review as a process rather than as a one-off at the start of the project, or continuously investing in moral education. Thus, we underscore the importance of individual reflexivity and learning. However, we would like to set this in the broader context of organisational learning, and even unlearning, among academic institutions to overhaul our academic systems in response to the urgent imperative of tackling socio-ecological challenges globally. In this transformative endeavour, careful consideration of how the ethics of research and collaboration shape academics' socially engaged work is indispensable.

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Notes

1 The full set of essentials is the following: (1) Focus on transformations to low-carbon, resilient living; (2) Focus on solution processes; (3) Focus on 'how to' practical knowledge; (4) Approach research as occurring from within the system being intervened; (5) Work with normative aspects; (6) Seek to transcend current thinking; (7) Take a multi-faceted approach to understand and shape change; (8) Acknowledge the value of alternative roles of researchers; (9) Encourage second-order experimentation; and (10) Be reflexive. Joint application of the essentials would create highly adaptive, reflexive, collaborative, and impact-oriented research able to enhance capacity to respond to the climate challenge.

2 Disciplines include amongst others anthropology, business administration, climate change adaptation, cultural economics, economics, economic geography, education, health sciences, human geography, international development studies, philosophy, political science, sociology, urban planning.

References

Ackerly BA, Friedman EJ, Menon K, Zalewski M (2020) Research ethics and epistemic oppression. Int. Feminist J Politics 22(3):309–311. https://doi.org/10.1080/14616742.2020.1771006

Adame F (2021) Meaningful collaborations can end 'helicopter research'. Nature d41586-021-01795–1. https://doi.org/10.1038/d41586-021-01795-1

Arnott JC, Neuenfeldt RJ, Lemos MC (2020) Co-producing science for sustainability: can funding change knowledge use? Glob Environ Change 60:101979. https://doi.org/10.1016/j.gloenvcha.2019.101979

Arrona A, Larrea M (2018) Soft resistance: balancing relationality and criticality to institutionalise action research for territorial development. In: Bartels KPR, Wittmayer JM (eds.) Action research in policy analysis. critical and relational approaches to sustainability transitions. Routledge Taylor & Francis Group, London and New York, pp 134–152

Bartels KPR, Greenwood DJ, Wittmayer JM (2020) How action research can make deliberative policy analysis more transformative. Policy Stud 41(4):392–410. https://doi.org/10.1080/01442872.2020.1724927

Bartels KPR, Wittmayer JM (eds) (2018) Action research in policy analysis. critical and relational approaches to sustainability transitions. Routledge Taylor & Francis Group, London and New York

Bauwens T, Reike D, Calisto-Friant M (2023) Science for sale? Why academic marketization is a problem and what sustainability research can do about it. Environ Innov Soci Transit 48:100749. https://doi.org/10.1016/j.eist.2023.100749
Beauchamp T, Childress J (2001) Principles Biomedical Ethics (5th ed.). Oxford University Press
BMJ. (1996) The Nuremberg Code (1947). 313(7070), 1448. https://doi.org/10.1136/bmj.313.7070.1448
Bournot-Trites M, Belanger J (2005) Ethical dilemmas facing action researchers. J Educ Thought (JET)/Rev de La Pensée Éducative 39(2):197–215
Boyle E, Galvin M, Revez A, Deane A, Ó Gallachóir B, Mullally G (2022) Flexibility & structure: community engagement on climate action & large infrastructure delivery. Energy Policy 167:113050. https://doi.org/10.1016/j.enpol.2022.113050
Boyle E, McGookin C, O'Mahony C, Bolger P, Byrne E, Gallachóir BÓ, Mullally G (2023) Understanding how institutions may support the development of transdisciplinary approaches to sustainability research. Research for All, 7(1). https://doi.org/10.14324/RFA.07.1.07
Bradbury H, Waddell S, O'Brien K, Apgar M, Teehankee B, Fazey I (2019) A call to action research for transformations: the times demand it. Action Res 17(1):3–10. https://doi.org/10.1177/1476750319829633
Bulten E, Hessels LK, Hordijk M, Segrave AJ (2021) Conflicting roles of researchers in sustainability transitions: balancing action and reflection. Sustain Sci 16(4):1269–1283. https://doi.org/10.1007/s11625-021-00938-7
Burns D (2014) Systemic action research: changing system dynamics to support sustainable change. Action Res 12(1):3–18. https://doi.org/10.1177/1476750313513910
Caniglia G, Freeth R, Luederitz C, Leventon J, West SP, John B, Peukert D, Lang DJ, von Wehrden H, Martín-López B, Fazey I, Russo F, von Wirth T, Schlüter M, Vogel C (2023) Practical wisdom and virtue ethics for knowledge co-production in sustainability science. Nat Sustain 6(5):493–501. https://doi.org/10.1038/s41893-022-01040-1
Caniglia G, Luederitz C, von Wirth T, Fazey I, Martín-López B, Hondrila K, König A, von Wehrden H, Schäpke NA, Laubichler MD, Lang DJ (2021) A pluralistic and integrated approach to action-oriented knowledge for sustainability. Nat Sustain 4(2):93–100. https://doi.org/10.1038/s41893-020-00616-z
Cassell C, Johnson P (2006) Action research: explaining the diversity. Hum Relat 59(6):783–814. https://doi.org/10.1177/0018726706067080
Chambers JM, Wyborn C, Ryan ME, Reid RS, Riechers M, Serban A, Bennett NJ, Cvitanovic C, Fernández-Giménez ME, Galvin KA, Goldstein BE, Klenk NL, Tengö M, Brennan R, Cockburn JJ, Hill R, Munera C, Nel JL, Österblom H, Pickering T (2021) Six modes of co-production for sustainability. Nat. Sustainability 4(11):983–996. https://doi.org/10.1038/s41893-021-00755-x
Chang H, Ngunjiri F, Hernandez K (2016) *Collaborative autoethnography* (Vol. 8). Routledge. https://www.taylorfrancis.com/books/mono/10.4324/9781315432137/collaborative-autoethnography-kathy-ann-hernandez-heewon-chang-faith-ngunjiri
Chilisa B (2020) Indigenous research methodologies. SAGE Publications, Thousand Oaks
Christians C (2005) Ethics and politics in qualitative research. In: Y Lincoln (ed) The Sage Handbook of Qualitative Research. SAGE Publications, Thousand Oaks, pp 139–164
Clouser K, Gert B (1990) A critique of principlism. J Med Philos 152(2):219–236. https://doi.org/10.1093/jmp/15.2.219
Cockburn J (2022) Knowledge integration in transdisciplinary sustainability science: Tools from applied critical realism. Sustain Dev 30(2):358–374
Cockburn J, Cundill G (2018) Ethics in transdisciplinary research: Reflections on the implications of 'Science with Society'. In: Macleod CI, Marx J, Mnyaka P, Treharne GJ (eds) The Palgrave Handbook of Ethics in Critical Research. Springer, Cham, pp 81–97
Coghlan D, Shani ABR (2005) Roles, Politics, and Ethics in Action Research Design. Syst Pract Action Res 18(6):533–546. https://doi.org/10.1007/s11213-005-9465-3
Creed WED, Hudson BA, Okhuysen GA, Smith-Crowe K (2022) A place in the world: vulnerability, well-Being, and the Ubiquitous evaluation that animates participation in institutional processes. Acad Manag Rev 47(3):358–381. https://doi.org/10.5465/amr.2018.0367
Davies B, Gannon S (2006) The practices of collective biography. In: Davies B, Gannon S (eds) Doing collective biography. Investigating the production of subjectivity, Open University Press, Maidenhead, pp 1–15
de Geus T, Avelino F, Strumińska-Kutra M, Pitzer M, Wittmayer JM, Hendrikx L, Joshi V, Schrandt N, Widdel L, Fraaije M, Iskandarova M, Hielscher S, Rogge K (2023) Making sense of power through transdisciplinary sustainability research: insights from a transformative power lab. Sustain Sci. 18(3):1311–1327. https://doi.org/10.1007/s11625-023-01294-4
Detardo-Bora K (2004) Action research in a world of positivist-oriented review boards. Action Res 2(3):237–253
Djenontin INS, Meadow AM (2018) The art of co-production of knowledge in environmental sciences and management: lessons from international practice. Environ Manag 61(6):885–903. https://doi.org/10.1007/s00267-018-1028-3
Donald D (2012) Indigenous Métissage: a decolonizing research sensibility. Int J Qual Stud Educ 25(5):533–555. https://doi.org/10.1080/09518398.2011.554449
Dotson K (2011) Tracking epistemic violence, tracking practices of silencing. Hypatia 26(2):236–257. https://doi.org/10.1111/j.1527-2001.2011.01177.x
Dutta U, Azad AK, Hussain SM (2022) Counterstorytelling as epistemic justice: decolonial community-based praxis from the global south. Am J Commun Psychol 69(1–2):59–70. https://doi.org/10.1002/ajcp.12545
Edelman NL (2018) Researching sexual healthcare for women with problematic drug use: returning to ethical principles in study processes. In: In: Macleod CI, Marx J, Mnyaka P, Treharne GJ (eds) The Palgrave Handbook of Ethics in Critical Research, Springer, Cham, pp 47–62
Eriksen S, Schipper ELF, Scoville-Simonds M, Vincent K, Adam HN, Brooks N, Harding B, Khatri D, Lenaerts L, Liverman D, Mills-Novoa M, Mosberg M, Movik S, Muok B, Nightingale A, Ojha H, Sygna L, Taylor M, Vogel C, West JJ (2021) Adaptation interventions and their effect on vulnerability in developing countries: Help, hindrance or irrelevance? World Dev 141:105383. https://doi.org/10.1016/j.worlddev.2020.105383
Escobar A (2011) Encountering development: the making and unmaking of the Third World, vol 1. Princeton University Press, Princeton
Fazey I, Schäpke N, Caniglia G, Patterson J, Hultman J, van Mierlo B, Säwe F, Wiek A, Wittmayer J, Aldunce P, Woods M, Wyborn C (2018) Ten essentials for action-oriented and second order energy transitions, transformations and climate change research. Energy Res Soc Sci 40:54–70. https://doi.org/10.1016/j.erss.2017.11.026
Feltham-King T, Bomela Y, Macleod CI (2018) Contesting the nature of young pregnant and mothering women: critical healthcare nexus research, ethics committees, and healthcare institutions. In: Macleod CI, Marx J, Mnyaka P, Treharne GJ (eds) The Palgrave Handbook of Ethics in Critical Research, Springer, Cham, pp 63–79
Ferraro F, Etzion D, Gehman J (2015) Tackling grand challenges pragmatically: robust action revisited. Organ Stud 36(3):363–390. https://doi.org/10.1177/0170840614563742
Finlay L (2002) Negotiating the swamp: the opportunity and challenge of reflexivity in research practice. Qua Res 2:209–230. https://doi.org/10.1177/146879410200200205
Frantzeskaki N, Kabisch N (2016) Designing a knowledge co-production operating space for urban environmental governance—Lessons from Rotterdam, Netherlands and Berlin, Germany. Environ Sci Policy 62:90–98. https://doi.org/10.1016/j.envsci.2016.01.010
Frantzeskaki N, Rok A (2018) Co-producing urban sustainability transitions knowledge with community, policy and science. Environ Innov Soc Transit 29(August):47–51. https://doi.org/10.1016/j.eist.2018.08.001
Funtowicz SO, Ravetz JR (1994) The worth of a songbird: ecological economics as a post-normal science. Ecol Econ 10(3):197–207. https://doi.org/10.1016/0921-8009(94)90108-2
Future Earth (2014) Future Earth 2025 Vision. International Council for Science (ICSU), Paris. Online at: https://futureearth.org/wp-content/uploads/2019/03/future-earth_10-year-vision_web.pdf
General Assembly of the World Medical Association (2014) World Medical Association Declaration of Helsinki: Ethical principles for medical research involving human subjects. J Am Coll Dent 81(3):14–18
Gerber A, Forsberg E-M, Shelley-Egan C, Arias R, Daimer S, Dalton G, Cristóbal AB, Dreyer M, Griessler E, Lindner R, Revuelta G, Riccio A, Steinhaus N (2020) Joint declaration on mainstreaming RRI across Horizon Europe. J Responsible Innov 7(3):708–711. https://doi.org/10.1080/23299460.2020.1764837
Gibbons M, Limoges C, Nowotny H, Schwartzmann S, Scott P, Trow M (1994) The new production of knowledge. The dynamics of science and research in contemporary societies. Sage Publications, London
Gram-Hanssen I, Schafenacker N, Bentz J (2022) Decolonizing transformations through 'right relations. Sustain Sci 17(2):673–685. https://doi.org/10.1007/s11625-021-00960-9
Greenwood DJ, Levin M (2007) Introduction to Action Research. Social Research for Social Change. Sage, Thousand Oaks
Haapala J, Rautanen S-L, White P, Keskinen M, Varis O (2016) Facilitating bricolage through more organic institutional designs? The case of water users' associations in rural Nepal. Int J Commons 10(2):1172. https://doi.org/10.18352/ijc.688
Haelewaters D, Hofmann TA, Romero-Olivares AL (2021) Ten simple rules for Global North researchers to stop perpetuating helicopter research in the Global South. PLOS Comput Biol 17(8):e1009277. https://doi.org/10.1371/journal.pcbi.1009277

Haraway D (1988) Situated knowledges: the science question in feminism and the privilege of partial perspective. Feminist Stud 14(3):575. https://doi.org/10.2307/3178066

Harney L, Mccurry J, Wills J (2016) Developing ' process pragmatism ' to underpin engaged research in human geography. Prog Hum Geogr 40(3):316–333. https://doi.org/10.1177/0309132515623367

Harvey B, Huang Y-S, Araujo J, Vincent K, Sabiiti G (2022) Breaking vicious cycles? A systems perspective on Southern leadership in climate and development research programmes. Clim Dev 14(10):884–895. https://doi.org/10.1080/17565529.2021.2020614

Hessels LK, van Lente H, Smits R (2009) In search of relevance: the changing contract between science and society. Sci Public Policy 36(5):387–401. https://doi.org/10.3152/030234209X442034

Hickey G, Richards T, Sheehy J (2018) Co-production from proposal to paper Three examples show how public participation in research can be extended at every step of the process to generate useful knowledge. Nature 562:29–31. https://doi.org/10.1038/d41586-018-06861-9

Hirsch Hadorn G, Hoffmann-Riem H, Biber-Klemm S, Grossenbacher-Mansuy W, Joye, D, Pohl, C, Wiesmann U, Zemp E (2008) Handbook of transdisciplinary research. Handbook of Transdisciplinary Research. Springer Science + Business Media B.V., Cham https://doi.org/10.1007/978-1-4020-6699-3

Hoffmann S, Deutsch L, Klein JT, O'Rourke M (2022) Integrate the integrators! A call for establishing academic careers for integration experts. Hum Soc Sci Commun 9(1):147. https://doi.org/10.1057/S41599-022-01138-Z

Hoffmann S, Pohl C, Hering JG (2017) Exploring transdisciplinary integration within a large research program: empirical lessons from four thematic synthesis processes. Res Policy 46(3):678–692. https://doi.org/10.1016/j.respol.2017.01.004

Hölscher K, Wittmayer JM, Hirschnitz-garbers M, Olfert A, Schiller G, Brunnow B (2021) Transforming science and society? Methodological lessons from and for transformation research. Res Eval 1–17. https://doi.org/10.1093/reseval/rvaa034

Horcea-Milcu A-I, Leventon J, Lang DJ (2022) Making transdisciplinarity happen: Phase 0, or before the beginning. Environ Sci Policy 136:187–197. https://doi.org/10.1016/j.envsci.2022.05.019

Horlings LG, Nieto-Romero M, Pisters S, Soini K (2020) Operationalising transformative sustainability science through place-based research: the role of researchers. Sustain Sci. 15(2):467–484. https://doi.org/10.1007/s11625-019-00757-x

Huang YS, Harvey B, Vincent K (2024) Large-scale sustainability programming is reshaping research excellence: Insights from a meta-ethnographic study of 12 global initiatives Environ Sci Policy 155:103725. https://doi.org/10.1016/j.envsci.2024.103725

Hurtado S (2022) The transformative paradigm. In: Pasque PA (ed) Advancing culturally responsive research and researchers: Qualitative, quantitative, and mixed methods, Routledge, London, pp 15–17

Jaeger-Erben M, Nagy E, Schäfer M, Süßbauer E, Zscheischler J (2018) Von der Programmatik zur Praxis: Plädoyer für eine *Grounded Theory* transformationsorientierter Forschung. GAIA - Ecol Perspect Sci Soc 27(1):117–121. https://doi.org/10.14512/gaia.27.1.5

Janes J (2016) Democratic encounters? Epistemic privilege, power, and community-based participatory action research. Action Res 14(1):72–87

Jhagroe S (2018) Transition scientivism: on activist gardening and co-producing transition knowledge 'from below'. In: Bartels KPR, Wittmayer JM (eds) Action Research in Policy Analysis. Critical and Relational Appoaches to Sustainability Transitions, Routledge Taylor & Francis Group, London and New York, pp 64–85

Kanemasu Y, Molnar G (2020) Representing' the voices of Fijian women rugby players: Working with power differentials in transformative research. Int Rev Sociol Sport 55(4):399–415. https://doi.org/10.1177/1012690218818991

Kemmis S (2008) Critical theory and participatory action research. In: Reason P, Bradbury H (eds) The Sage Handbook of Action Research. Participative inquiry and practice, 2nd edn. SAGE Publications, London, pp 695–707

Kok KPW, Gjefsen MD, Regeer BJ, Broerse JEW (2021) Unraveling the politics of 'doing inclusion' in transdisciplinarity for sustainable transformation. Sustain Sci 16(6):1811–1826. https://doi.org/10.1007/s11625-021-01033-7

Kolb, D (1984) The Process of Experiential Learning. In: Experiential Learning. Experience as The Source of Learning and Development. Prentice Hall, pp 20–38. https://doi.org/10.1016/B978-0-7506-7223-8.50017-4

Komulainen S (2007) The Ambiguity of the Child's 'Voice' in Social Research. Childhood 14(1):11–28. https://doi.org/10.1177/0907568207068561

Kruijf JV, Verbrugge L, Schröter B, den Haan R, Cortes Arevalo J, Fliervoet J, Henze J, Albert C (2022) Knowledge co-production and researcher roles in transdisciplinary environmental management projects. Sustain Dev 30(2):393–405. https://doi.org/10.1002/sd.2281

Kump B, Wittmayer J, Bogner K, Beekman M (2023) Navigating force conflicts: a case study on strategies of transformative research in the current academic system. J Clean Prod 412:137374. https://doi.org/10.1016/j.jclepro.2023.137374

Kwan C, Walsh C (2018) Ethical issues in conducting community-based participatory research: a narrative review of the literature. Qual Rep. https://doi.org/10.46743/2160-3715/2018.3331

Lacey J, Howden SM, Cvitanovic C, Dowd A-M (2015) Informed adaptation: ethical considerations for adaptation researchers and decision-makers. Glob Environ Change 32:200–210. https://doi.org/10.1016/j.gloenvcha.2015.03.011

Lang DJ, Wiek A, Bergmann M, Moll P, Swilling M, Thomas CJ (2012) Transdisciplinary research in sustainability science: practice, principles, and challenges. Sustainability Sci. 7:25–43. https://doi.org/10.1007/s11625-011-0149-x

Lapadat JC (2017) Ethics in autoethnography and collaborative autoethnography. Qual Inq 23(8):589–603. https://doi.org/10.1177/1077800417704462

Lincoln Y (2001) Engaging sympathies: Relationships between action research and social constructivism. In: Reason P, Bradbury H (eds) The Sage Handbook of Action Research. Participative inquiry and practice, SAGE Publications, London, pp 124–132

Locke T, Alcorn N, O'Neill J (2013) Ethical issues in collaborative action research. Educ Action Res 21(1):107–123. https://doi.org/10.1080/09650792.2013.763448

Loorbach D, Frantzeskaki N, Avelino F (2017) Sustainability transitions research: transforming science and practice for societal change. Annu Rev Environ Resour 42(1):599–626. https://doi.org/10.1146/annurev-environ-102014-021340

Lotz-Sisitka H, Ali MB, Mphepo G, Chaves M, Macintyre T, Pesanayi T, Wals A, Mukute M, Kronlid D, Tran DT, Joon D, McGarry D (2016) Co-designing research on transgressive learning in times of climate change. Curr Opin Environ Sustain 20:50–55. https://doi.org/10.1016/j.cosust.2016.04.004

Mach KJ, Lemos MC, Meadow AM, Wyborn C, Klenk N, Arnott JC, Ardoin NM, Fieseler C, Moss RH, Nichols L, Stults M, Vaughan C, Wong-Parodi G (2020) Actionable knowledge and the art of engagement. Curr Opin Environ Sustain 42:30–37. https://doi.org/10.1016/j.cosust.2020.01.002

Macleod CI, Marx J, Mnyaka P, Treharne GJ (eds) (2018) The Palgrave Handbook of Ethics in Critical Research. Springer, Cham

Malkki LH (2007) Tradition and Improvisation in Ethnographic Field Research. In: Cerwonka A, Malkki LH, Improvising Theory. Process and Temporality in Ethnographic Fieldwork, The University of Chicago Press, pp 162–187

Marguin S, Haus J, Heinrich AJ, Kahl A, Schendzielorz C, Singh A (2021) Positionality Reloaded: Über die Dimensionen der Reflexivität im Verhältnis von Wissenschaft und Gesellschaft: Ein EditorialPositionality Reloaded: Debating the Dimensions of Reflexivity in the Relationship Between Science and Society: An Editorial. Historical Soc Res 46:734. https://doi.org/10.12759/HSR.46.2021.2.7-34

McGowan KA, Westley F, Fraser EDG, Loring PA, Weathers KC, Avelino F, Sendzimir J, Roy Chowdhury R, Moore M-L (2014) The research journey: travels across the idiomatic and axiomatic toward a better understanding of complexity. Ecol Soc 19(3):art37. https://doi.org/10.5751/ES-06518-190337

Menon S, Hartz-Karp J (2023) Applying mixed methods action research to explore how public participation in an Indian City could better resolve urban sustainability problems. Action Res 21(2):230–253. https://doi.org/10.1177/14767503209436662

Mertens DM (2007) Transformative paradigm: mixed methods and social justice. J Mixed Methods Res 1(3):212–225. https://doi.org/10.1177/1558689807302811

Mertens DM (2017) Transformative research: Personal and societal. Int J Transform Res 4(1):18–24. https://doi.org/10.1515/ijtr-2017-0001

Mertens DM (2021) Transformative research methods to increase social impact for vulnerable groups and cultural minorities. Int J Qua Methods 20:160940692110515. https://doi.org/10.1177/16094069211051563

Midgley G (2011) Theoretical pluralism in systemic action research. Syst Pract Action Res 24:1–15. https://doi.org/10.1007/s11213-010-9176-2

Miyahara M, Fukao A (2022) Exploring the use of collaborative autoethnography as a tool for facilitating the development of researcher reflexivity. System 105:102751. https://doi.org/10.1016/j.system.2022.102751

Nastar M, Abbas S, Aponte Rivero C, Jenkins S, Kooy M (2018) The emancipatory promise of participatory water governance for the urban poor: Reflections on the transition management approach in the cities of Dodowa, Ghana and Arusha, Tanzania. Afr Stud 77(4):504–525. https://doi.org/10.1080/00020184.2018.1459287

National Commission for the Protection of Human Subjects of Biomedical, & Behavioral Research. (1979) The Belmont report: Ethical principles and guidelines for the protection of human subjects of research *(Vol. 1)*. United States Department of Health, Education, and Welfare. Online available here: https://www.hhs.gov/ohrp/regulations-and-policy/belmont-report/read-the-belmont-report/index.html

Norström AV, Cvitanovic C, Löf MF, West S, Wyborn C, Balvanera P, Bednarek AT, Bennett EM, Biggs R, de Bremond A, Campbell BM, Canadell JG, Carpenter SR, Folke C, Fulton EA, Gaffney O, Gelcich S, Jouffray JB, Leach M, Österblom H (2020) Principles for knowledge co-production in sustainability research. Nat. Sustainability 3(3):182–190. https://doi.org/10.1038/s41893-019-0448-2

Nowotny H, Scott P, Gibbons M (2003) Mode 2' Revisited: The New Production of Knowledge. Minerva 41(3):179–194
Nugroho K, Carden F, Antlov H (2018) Local knowledge matters: Power, context and policy making in Indonesia. Policy Press, Bristol
Parks S, Rincon D, Parkinson S, Manville C (2019) The changing research landscape and reflections on national research assessment in the future. RAND. https://www.rand.org/pubs/research_reports/RR3200.html
Parsell M, Ambler T, Jacenyik-Trawoger C (2014) Ethics in higher education research. Stud High Educ 39(1):166–179. https://doi.org/10.1080/03075079.2011.647766
Pearce BJ, Deutsch L, Fry P, Marafatto FF, Lieu J (2022) Going beyond the AHA! moment: insight discovery for transdisciplinary research and learning. Hum Soc Sci Commun 9(1):123. https://doi.org/10.1057/s41599-022-01129-0
Phillips L, Christensen-Strynø MB, Frølunde L (2022) Thinking with autoethnography in collaborative research: a critical, reflexive approach to relational ethics. Qual Res 22(5):761–776. https://doi.org/10.1177/14687941211033446
Pohl C (2008) From science to policy through transdisciplinary research. Environ Sci Policy 11(1):46–53. https://doi.org/10.1016/j.envsci.2007.06.001
Pohl C, Krütli P, Stauffacher M (2017) Ten reflective steps for rendering research societally relevant. GAIA-Ecol Perspect Sci Soc 26(1):43–51. https://doi.org/10.14512/gaia.26.1.10
Popa F, Guillermin M, Dedeurwaerdere T (2015) A pragmatist approach to transdisciplinarity in sustainability research: from complex systems theory to reflexive science. Futures 65:45–56. https://doi.org/10.1016/j.futures.2014.02.002
Porter A (2016) Decolonizing policing: indigenous patrols, counter-policing and safety. Theor Criminol 20(4):548–565
Reason P, Torbert W (2001) The action turn: toward a transformational *social* science. Concepts Transform 6(1):1–37. https://doi.org/10.1075/cat.6.1.02rea
Reed MG, Abernethy P (2018) Facilitating Co-production of transdisciplinary knowledge for sustainability: working with canadian biosphere reserve practitioners. Soc Nat Resour 31(1):39–56. https://doi.org/10.1080/08941920.2017.1383545
Rovelli C (2021) Politics should listen to science, not hide behind it. Nat Mater 20(2):272–272. https://doi.org/10.1038/s41563-020-00891-3
Rowan J (2000) Research ethics. Int J Psychother 5(2):103–110
Saltelli A, Ravetz JR, Funtowicz S (2016) Who will solve the crisis in science? In: Benessia A, Funtowicz S, Giampietro M, Guimaraes Pereira A, Ravetz J, Saltelli A, Strand R, van der Sluijs JP (eds) The rightful place of science: Science on the verge. Consortium for Science, Policy & Outcomes
Savransky M (2017) A decolonial imagination: sociology, anthropology and the politics of reality. Sociology 51(1):11–26
Sayer A (2011) Why things matter to people: Social science, values and ethical life. Cambridge University Press, Cambridge
Schäpke N, Bergmann M, Stelzer F, Lang DJ (2018) Labs in the real world: advancing transdisciplinary research and sustainability transformation: mapping the field and emerging lines of inquiry. Gaia 27:8–11. https://doi.org/10.14512/gaia.27.S1.4
Schneider F, Giger M, Harari N, Moser S, Oberlack C, Providoli I, Schmid L, Tribaldos T, Zimmermann A (2019) Transdisciplinary co-production of knowledge and sustainability transformations: three generic mechanisms of impact generation. Environ Sci Policy 102(October):26–35. https://doi.org/10.1016/j.envsci.2019.08.017
Schneidewind U, Singer-Brodowski M, Augenstein K (2016) Transformative science for sustainability transitions. In: Handbook on sustainability transition and sustainable peace, Springer, pp 123–136
Schut M, Paassen AV, Leeuwis C, Klerkx L (2014) Towards dynamic research configurations: A framework for reflection on the contribution of research to policy and innovation processes. 41(August 2013), 207–218. https://doi.org/10.1093/scipol/sct048
Smith L (2008) Ethical principles in practice. Evidence from participatory action research. Kairaranga 9(3):16–21. https://doi.org/10.54322/kairaranga.v9i3.135
Stilgoe J, Owen R, Macnaghten P (2013) Developing a framework for responsible innovation. Res Policy 42(9):1568–1580. https://doi.org/10.1016/j.respol.2013.05.008
Stirling A (2006) Precaution, foresight and sustainability: Reflection and reflexivity in the governance of science and technology. In: Voß JP, Bauknecht D, Kemp R (eds) Reflexive governance for sustainable development, Edward Elgar Publishing, Cheltenham, pp 225–272
Strumińska-Kutra M, Scholl C (2022) Taking power seriously: towards a power-sensitive approach for transdisciplinary action research. Futures 135(December 2021):1–9. https://doi.org/10.1016/j.futures.2021.102881
Strydom WF, Funke N, Nienaber S, Nortje K, Steyn M (2010) Evidence-based policymaking: a review. South Afr J Sci 106(5/6):8 pages. https://doi.org/10.4102/sajs.v106i5/6.249
Temper L, Del Bene D (2016) Transforming knowledge creation for environmental and epistemic justice. Curr Opin Environ Sustain 20:41–49. https://doi.org/10.1016/j.cosust.2016.05.004
Temper L, McGarry D, Weber L (2019) From academic to political rigour: insights from the 'Tarot' of transgressive research. Ecol Econ 164:106379. https://doi.org/10.1016/j.ecolecon.2019.106379
Thomas KA, Warner BP (2019) Weaponizing vulnerability to climate change. Glob Environ Change 57:101928. https://doi.org/10.1016/j.gloenvcha.2019.101928
van Breda J, Swilling M (2019) The guiding logics and principles for designing emergent transdisciplinary research processes: learning experiences and reflections from a transdisciplinary urban case study in Enkanini informal settlement, South Africa. Sustain Sci 14(3):823–841. https://doi.org/10.1007/s11625-018-0606-x
van Steenbergen F (2020) Zonder marge geen centrum. Een pleidooi voor een rechtvaardige transitie. [PhD-Thesis]. Erasmus University Rotterdam
Vermeer J, Pinheiro H, Petrosova L, Eaton D (2020) Evaluation of the Belmont Forum: Final report. Technolopolis Group. https://www.belmontforum.org/wp-content/uploads/2023/09/Belmont-Forum-External-Evaluation.pdf
Vincent K (2022) Development geography I: Co-production. Prog Hum Geogr 46(3):890–897. https://doi.org/10.1177/0309132522107905
WBGU (2011) Flagship report: world in transition—a social contract for sustainability. In: Berlin: German Advisory
West S, Schill C (2022) Negotiating the ethical-political dimensions of research methods: a key competency in mixed methods, inter- and transdisciplinary, and co-production research. Hum Soc Sci Commun 9(1):294. https://doi.org/10.1057/s41599-022-01297-z
Wijsman K, Feagan M (2019) Rethinking knowledge systems for urban resilience: Feminist and decolonial contributions to just transformations. Environ Sci Policy 98:70–76. https://doi.org/10.1016/j.envsci.2019.04.017
Williamson GR, Prosser S (2002) Action research: politics, ethics and participation. J Adv Nurs 40(5):587–593. https://doi.org/10.1046/j.1365-2648.2002.02416.x
Wilson S (2020) Research is ceremony: Indigenous research methods. Fernwood Publishing. https://fernwoodpublishing.ca/book/research-is-ceremony-shawn-wilson
Wittmayer JM (2016) Transition Management, Action Research and Actor Roles: Understanding local sustainability transitions. Erasmus University Rotterdam
Wittmayer JM, Loorbach D, Bogner K, Hendlin Y, Hölscher K, Lavanga M, Vasques A, von Wirth T, de Wal M (2021) Transformative Research: Knowledge and action for just sustainability transitions (Design Impact Transition Platform Working Paper Series). Design Impact Transition Platform Erasmus University Rotterdam. https://pure.eur.nl/en/publications/transformative-research-knowledge-and-action-for-just-sustainabil
Wittmayer JM, Schäpke N (2014) Action, research and participation: roles of researchers in sustainability transitions. Sustain Sci 9(4):483–496. https://doi.org/10.1007/s11625-014-0258-4
Wood L, Kahts-Kramer S (2023) But how will you ensure the objectivity of the researcher?' Guidelines to address possible misconceptions about the ethical imperatives of community-based research. Res Ethics 19(1):1–17. https://doi.org/10.1177/17470161221135882
Yanow D (2006) Neither rigorous nor objective? Interrogating criteria for knowledge claims in interpretive science. In: Yanow D, Schwartz-Shea P, Interpretation and Method. Empirical Research Methods and the Interpretive Turn, M.E. Sharpe, pp 67–88

Author contributions

Julia M. Wittmayer and Ying-Syuan Huang drafted the work for important intellectual content, substantially contributed to the concept and design of the work, and contributed to the analysis and interpretation of data for the work. Kristina Bogner, Evan Boyle, Katharina Hölscher, and Timo von Wirth substantially contributed to the concept or design of the work and contributed to the analysis or interpretation of data for the work. Tessa Boumans, Jilde Garst, Yogi Hendlin, Mariangela Lavanga, Derk Loorbach, Neha Mungekar, Mapula Tshangela, Pieter Vandekerckhove, and Ana Vasues contributed to the analysis or interpretation of data for the work.

Competing interests

The authors declare no competing interests.

Ethical approval and Informed consent

This article does not contain any studies with human participants performed by any of the authors.

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