

Framework and key considerations for designing and conducting critical mixed-methods research (cMMR)

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Received 23 May 2025

Accepted 29 August 2025

Published Online First

22 September 2025

ABSTRACT

Mixed-methods research leverages the strengths of qualitative and quantitative methodologies and methods to generate a comprehensive understanding of phenomena. There is ample guidance about traditional mixed-methods research, but limited discussion on critical mixed-methods research. To provide a conceptual framework and practical considerations for designing and conducting critical mixed-methods research. Contemporary and classical literature in critical research and mixed methods was used to guide the development of this framework. Critical mixed-methods research is informed by critical social theory, critical dialectical pluralism and transformative worldview. The seven core features of critical mixed-methods research are critique, insight, transformation, engagement, epistemic inclusion, critical reflexivity and intersectionality. Critical mixed methods is necessary and needed for studying social justice and equity-related research problems in health sciences and public health. Using the proposed framework and practical strategies can enable researchers to unravel complex social and healthcare phenomena through addressing power, oppression and social justice issues.

INTRODUCTION

Mixed-methods research (MMR) has emerged as a third methodology¹ and it is recognised for its added value of leveraging the strengths of qualitative and quantitative methodologies and methods to generate a comprehensive understanding of phenomena.² MMR is defined as the use and intentional integration of qualitative and quantitative worldviews, methodologies and methods of data collection, analysis and interpretation to generate higher-level insights (ie, metainferences) about studied phenomena.^{3,4} Integration is the core feature of MMR; inadequate integration affects the methodological quality of MMR.⁵ Integration is defined as 'purposeful interdependence between different sources, methods and approaches'² (p7) to generate metainferences (ie, conclusions drawn based on the integration of qualitative and quantitative inferences).⁶

Over the last decade, there has been exponential growth in methodological guidance in textbooks and peer-reviewed articles for designing and conducting traditional MMR,^{2,3,5} approaches to achieving meaningful integration^{5,7} and generating valuable metainferences to inform research, practice and policymaking.^{2,5,8,9} Researchers have argued that MMR is a valuable methodology to promote social justice and equity in everyday life

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Ample guidance is available on designing and conducting mixed-methods research.
- ⇒ Limited discussion in the literature on critical mixed-methods research.

WHAT THIS STUDY ADDS

- ⇒ Critical mixed methods combines critique, reflexivity and intersectionality.
- ⇒ Critical mixed-methods research can enable help study social justice and transformative issues.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ Critical mixed methods can enable researchers to unravel complex social and healthcare phenomena through addressing power, oppression and social justice issues.

and give voice to underserved and marginalised populations and break oppressive structures of knowledge and discourse.^{10–12} One promising way to thread social justice and equity lens within MMR is by doing it critically. However, there is limited discussion on how to design and conduct critical MMR (cMMR). To date, only Hernandez-Johnson and Bendixen¹³ provided an 11-phase research process for conducting cMMR. The phases include: (a) critical self-reflection—researcher identity and positionality, (b) theoretical and epistemological framework—critical epistemology and funds of knowledge, (c) diverse and collaborative research team, (d) strategic design rationale and selection, (e) data collection and exchange, (f) analysis, (g) validation—groundtruthing, (h) strategic integration, (i) interpretation, (j) reporting—problematization and counterstories and (k) critical action and social justice. This 11-phase cMMR process is valuable and offers many concrete and practical steps for undertaking cMMR. Our paper advances the discussion about cMMR by delving into the 'what' and 'why' of cMMR, the epistemological and ontological foundations that differentiate it from traditional MMR, and how to genuinely integrate social justice and equity lens in MMR inquiry. The aim is to provide a preliminary understanding of cMMR, its philosophical underpinnings and core features for designing and conducting cMMR, and offer a conceptual framework for designing and conducting cMMR. Additionally, practical considerations are offered for



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To cite: Younas A, Kvist T, Stolt M. *J Epidemiol Community Health* 2026;**80**:55–61.

operationalising the philosophical worldviews of cMMR and proposed core features.

Defining critical mixed-methods research

Broadly speaking, critical research is defined as research inquiry that goes beyond the conceptual and methodological status quo and recognises and addresses the issues and impact of power, marginalisation, social control and social forces on the inquiry process.^{14 15} Critical research appreciates the diversity of viewpoints, promotes the generation of universalistic theoretical and contextualised practical knowledge to build an egalitarian society and promote social justice.^{15 16} Critical research invites us to question our learnt approaches to doing traditional inquiry and views about the social world and engage in an inquiry which recognises and transforms in relation to the evolving nature of individuals, cultures and social worlds.¹⁷ Drawing from these views of critical research, for the sake of this paper, cMMR is defined as research incorporating critical worldviews to integrate diverse qualitative and quantitative methodologies and methods with the active participation of marginalised communities and cogenerate knowledge to understand multifaceted social and cultural phenomena, dismantle power structures and promote social justice. It acknowledges that knowledge is not neutral and actively seeks to give voice to those historically silenced, fostering a collaborative approach where communities are not

just subjects but active partners in the research process. Therefore, cMMR is not merely combining different types of methods and data; it is essentially driven by a commitment to exposing and challenging systemic inequalities.

Worldviews informing critical mixed-methods research

Three worldviews can inform cMMR because these worldviews are based on the assumptions that social injustices and inequalities are prevalent in the social world and researchers have an active role in bringing positive and radical change.^{18–20} Additionally, these three worldviews enable researchers to merge other unheard or contextualised worldviews from underserved populations with whom the cMMR is conducted, thereby emphasising the inclusion and integration of unheard voices throughout the research inquiry. A brief description of each of these worldviews is provided below and key tenets are presented in table 1.

Critical social theory

The roots of critical social theory can be traced to Plato's theory of mimesis (literary criticism) and his accounts of dialectical criticism,²¹ the Frankfurt School mainly the work of Walter Benjamin, Max Horkheimer, Theodor W Adorno, Hebert Marcuse, Erich Fromm and Jürgen Habermas,^{21 22} and French philosophers such as Michel Foucault and Jacques Derrida.^{21 22} The discussion of

Table 1 Applying worldviews informing critical mixed-methods research in practice examples of MMR studies

Critical social theory	Critical dialectical pluralism	Transformative
1. Question the dominant discourse, knowledge structures and modes of knowledge creation and use relevant disenfranchised approaches in research inquiry. 2. Further emancipation, empowerment and enlightenment of underserved populations. 3. Critical reflection should be integrated throughout the research process and work with disenfranchised population. 4. Fully engage research participants in the conceptualisation, design, implementation and mobilisation of research. 5. The data gathered should be analysed at a deeper level to uncover any dominant and/or biased discourses and make explicit unique interpretations, in relation to the context and research participants.	1. Acknowledge and embrace the diversity in worldviews and social, personal and value-based perspectives in research 2. Recognise and value disagreements and conflicts in research within self and team, and resolve these through constructive dialogue. 3. Actively work with research participants from the beginning of the research until completion, and cocreate research questions, protocols, instruments, interventions or other artefacts to be used in research. Also, value participants' input in data collection, analysis, interpretation and development of knowledge mobilisation materials and strategies. 4. Practise critical intrainter reflexivity to question inherent biases and assumptions about the studied phenomenon and/or social world and question dominant discourse and methodological approaches to study and address the research phenomenon under study. 5. Include diverse under-represented groups as collaborators and partners in the research process and promote participant-as-researcher role. 6. Researchers should only act as facilitators and hence provide maximum control and decision-making authority to research participants and partners throughout the research process.	1. The research problem being addressed should be directly related to social justice issues or pressing social and healthcare inequalities experienced by underserved populations. 2. Emphasise the emancipation of research participants and focus on radical transformative change. 3. Engage research participants from the beginning of the research until completion and cocreate research questions, protocols, instruments, interventions or other artefacts to be used in research. Value participants' input in data collection, analysis, interpretation and development of knowledge mobilisation materials and strategies. 4. Use theoretical tools offered by the research participants throughout the research inquiry. 5. Discuss and address sociohistorical and cultural contexts and power dynamics throughout the research process.
Exemplar studies		
Jones ³⁶ used Bourdieu's theory of practice in an MMR study for characterising changing seed systems in West Africa. The seed system was conceptualised as a sociospatial phenomenon, which refers to occurrences that take place within social systems and, in turn, influence these systems by shaping their ongoing spatial relationships. Seed system encompasses the market and non-market institutions that govern how farmers acquire and utilise seeds along with their genetic resources. The author illustrated the emancipation and empowerment of the farmers by incorporating their lived experiences and engagement throughout the inquiry.	Onwuegbuzie <i>et al</i> ³⁷ conducted a partially mixed concurrent MMR study with 8 women doctoral students to explore the impact of pursuing a doctorate on daily life experiences of select women. Critical reflexivity, participant engagement, embracing diversity of worldviews, dialogue and dialectics were integral parts of this research. The researcher merely acted as a facilitator and ensured that the emic views of participants were fully explored and described.	James <i>et al</i> ¹⁰ presented an example of transformative MMR study focused on developing and revising a model of emergency department utilisation among deaf and hard-of-hearing adults. A transformative lens was integrated by practising critical reflexivity across all stages of the research, developing and incorporating the voices of a community advisory group, emphasising the cocreation of the emergency department utilisation model, and addressing power issues throughout.
The recommendations are based on the following sources: Agger; ¹⁸ Freeman and Vasconcelos; ¹⁹ Myers and Klein; ¹⁴ Mertens ^{20 25} and Onwuegbuzie and Frels. ^{23 38} MMR, mixed-methods research.		

core ideas of each of these critical theorists is not within the scope of this paper. Therefore, a broad account of the central tenets of critical social theory is provided. Critical social theory is a family of theories examining trends, conflicts and power dynamics within our social world, challenging and changing the status quo and further emancipation within society.²² Critical social theory aims at sustained ideological critique of dominant sociocultural, economic and political structures and sociological discourse.^{18 19} The critical social theory posits that the social world cannot be reduced to merely cause-and-effect relationships as articulated within the positivist worldview.¹⁸ The eventual goal of critical social theory is to use theory and research as tools for bringing change in the social world, emancipating and empowering underserved populations, and dismantling oppressive social and conceptual structures and dominant discourse.^{18–20}

Critical dialectical pluralism (cDP)

Onwuegbuzie and Frels²³ proposed cDP as a metaparadigm and metaphilosophy to inform MMR. cDP is based on DP, which posits that diverse worldviews can be incorporated to inform MMR. The ontological stance of cDP is pluralistic, which means that realities are multiple; hence, varied worldviews and ontological stances (eg, realist, relativist, subjective and objective) are appreciated in the research inquiry. The epistemological stance is that knowledge is constructed and construed based on the reality of our social world as we experience it. Therefore, the process of inquiry is dialectical (ie, diverse and opposing worldviews and perspectives are appreciated and valued), dialogical (ie, multiple viewpoints must be brought together, and useful ideas are harnessed to inform inquiry) and hermeneutical (ie, each reality is consciously interpreted, with each interpretation evolved because it builds on prior interpretations).^{23 24} The primary goal of cDP is to conduct research by drawing from multiple worldviews that inform progressive research for promoting democratic social world. cDP appreciates cocreation and codevelopment of knowledge by fully engaging research participants in the inquiry process.²³ Onwuegbuzie and Abrams²⁴ more recently articulated five core tenets of cDP—social justice, inclusion, diversity, equity and social responsibility. These tenets are also consistent with critical research inquiry, underscoring the usefulness of cDP to inform cMMR focused on critiquing, challenging and transforming oppressive social realities in order to make a positive impact on society.

Transformative

Mertens^{20 25} articulated the transformative paradigm to inform social justice focused MMR. Ontologically, the transformative paradigm posits that there are multiple socially constructed realities. However, it is necessary to understand and articulate how sociocultural, political, multiethnic and other social factors and forces define these multiple realities.²⁵ The epistemological stance is that generated knowledge requires direct and sustained interaction among researchers, participants and collaborators. Since knowledge is socially and historically constructed, a greater emphasis is placed on addressing the power issues and incorporating cultural humility.²⁰ The emphasis in the transformative paradigm is on a circular process of inquiry entailing the development of authentic partnerships and engaging partners in the inquiry from conceptualisation to the design and implementation phase.^{20 25} The emancipation of research participants and the community for/with whom research is conducted is also central to the transformative paradigm.²⁰

Core features of critical mixed-methods research

Drawing from the central tenets of critical social theory, cDP and transformative worldviews and prior work on how critical research is conducted, seven core features of cMMR are articulated. The first three features are directly drawn from the work of Myers and Klein,¹⁴ who, based on Jürgen Habermas, Michel Foucault and Pierre Bourdieu's critical social theories, developed a set of guidelines for conducting critical research in information systems. The remaining four features are based on personal reflection and reading of the critical social theory, cDP and transformative worldviews and intersectionality informed research.

Critique

A critique of accepted and dominated forms and discourse of knowledge forms and approaches to generate knowledge is a fundamental principle of critical research.^{14 18} Researchers are expected to go beyond mere critique of existing knowledge and its interpretations and focus on the power dynamics and structures which were foundational to dominant discourse.¹⁶ This feature of cMMR is directly drawn from the critical social theory, but is also supported by cDP and transformative worldviews, as both require researchers to question the existing methods and approaches to generating knowledge and/or conducting inquiry.^{20 23} For example, Room,²⁶ in an extended discussion of the transformative paradigm, highlighted that it offers space to incorporate critical systemic thinking and postcolonial Indigenous worldviews in the process of inquiry. Hernandez-Johnson and Bendixen¹³ also emphasised that researchers conducting cMMR should challenge dominant worldviews and aim to diversify and use frameworks which provide a more inclusive and comprehensive account of knowledge. This means researchers must move beyond singular, often Western-centric worldviews to incorporate a broader spectrum of perspectives, thereby enriching the research and ensuring it genuinely reflects the multifaceted realities of underserved communities involved in the research process. In summary, all three worldviews encourage researchers who are interested in cMMR to value diversity of viewpoints and interpretations and incorporate non-traditional and accepted forms of knowledge to inform research inquiry.

Insight

Gaining new understanding and interpretations of studied phenomena through dialectical work, dialogue and participatory and authentic engagement with underserved communities is an essential feature of MMR. Critical social theory places a great value on examining the social world before, during and after an inquiry and before attempting to bring desired social change.^{14 22 27} cDP posits that researchers must fully explore the emic viewpoint and use structural/historical insights during the inquiry process.²⁴ Also, Mertens²⁰ emphasised gaining insights about the social phenomenon, social justice issue and power issues impacting the inquiry process. She further dictated that involving community partners during the conceptualisation and design phase of research can yield important knowledge for contextualising the inquiry and tailoring it to the needs of the community. Hernandez-Johnson and Bendixen¹³ noted that researchers should be critical of their own assumptions and biases during inquiry, as it helps mitigate the influence of power dynamics inherent in analysis and interpretation, which could otherwise lead to relegating or diminishing the insights of underserved communities. As a whole, generating insights about the research inquiry and about the social world being studied is an important feature of cMMR as it allows for combining a wide

Theory and methods

range of qualitative and quantitative methods as well as diverse data forms to generate final knowledge claims.

Transformation

Critical social theory, cDP and transformative worldviews all view research methods and approaches as mere tools to study the social world and place greater emphasis on radical change in thinking, knowledge, practice and policy.^{14 20 23 25} Emancipation and liberation of thought, knowledge and underserved communities from dominated forms and interpretations of knowledge is highlighted in all three worldviews. Therefore, transformation is an integral feature of cMMR because it inspires researchers to hone onto the strengths of multiple diverse viewpoints, knowledge forms, participant and community experiences, enabling them to generate tangible claims for better understanding and explaining the social world and producing meaningful change in society. In cMMR, researchers should act as activists with the underserved communities to bring social change concerning the studied phenomena.

Engagement

Engagement of underserved and marginalised communities and research participants throughout the design and conduct of MMR inquiry is a necessary feature of cMMR. It is well supported by all three guiding worldviews as they advocate for conducting research with the participants rather than for them.^{14 20 23 25} Power issues are questioned in cMMR, and researchers and participants work as equal partners to dictate the process, methods and type of knowledge being generated about the social world.¹³ Research participants' engagement can have three levels: (a) non-participation, (b) symbolic and (c) engaged. Non-participation merely focused on reaching out to recruit research participants and relevant interest holders as advisors. Symbolic engagement involves their participation in coordinating research activities, such as recruitment, implementation and knowledge mobilisation. However, engaged participation focuses on true collaboration and involvement at all stages of research.²⁸ cMMR requires researchers to ensure an engaged level of participation of interest holders and research participants.

Epistemic inclusion

Epistemic inclusion is directly relevant to the engagement of research participants. However, it is more than mere token participation, and it focuses on their genuine involvement in codesign and cocreation knowledge.⁸ Critical social theory, cDP and transformative worldviews appreciate and recognise diverse forms of knowledge and inquiry methods, thereby valuing cognitive diversity in the research process.^{14 20 23 25} Cognitive diversity is the variety in knowledge, skills, thinking and expertise of participants from diverse groups.²⁹ It is linked with epistemic inclusion in a way that genuine inclusion promotes cognitive diversity within teams and the inquiry process, which in turn may be useful in generating more radical insights for bringing change in the social world. Therefore, epistemic inclusion is a necessary feature of cMMR.

Critical reflexivity

Critical reflexivity refers to examining one's biases and assumptions about the social world or a studied phenomenon, but also going beyond individual level to understanding the social, historical and cultural contexts that shaped those assumptions.³⁰ It also pertains to challenging the status quo and dominant ideologies

and discourses and scrutinising those for their relevance in cocreating and cogenerating transformative knowledge.^{31 32} Intrapersonal, interpersonal and collective reflexivity is particularly valued in cDP as it encourages researchers and participants to examine their assumptions, how they are linked to each other's assumptions and how these may affect the process of research inquiry.²³ Critical reflexivity is a promising feature of cMMR because it emphasises examining inherent biases, dominant views and discourses that may negatively influence interaction and engagement with underserved communities, research participants, the inquiry process and the knowledge generated to inform practice and policymaking. Practising critical reflexivity helps uncover deep-seated assumptions and beliefs in relation to sociocultural contexts, hence aligns well with the critical social theory lens to unravel the engrained dominant and oppressive structures which prevent the transformation of the social world.^{18 19} Hernandez-Johnson and Bendixen¹³ described that researchers can practise reflexivity by exploring their personal, academic and professional experiences. This involves acknowledging and identifying how their identity influences the development of research questions, choice of methodologies, process and methods employed for data interpretation and the overall narrative of research. Critical reflexivity should be threaded across both qualitative and quantitative phases of cMMR. In the qualitative phase, researchers can use strategies such as member checking, reflective writing, journaling, memo writing, member reflection, reader-response exercises and structured team-reflexive discussion.³³ Reflexivity in the quantitative phase can be promoted by explicitly noting the thoughtful process behind the generation of research question and the choice of methods. It also involves transparently confronting researchers' biases during the preregistration stage of the research, preregistration of sample size, sample characteristics and recruitment strategies, and maintaining field notes and logs of decision-making during analysis.³⁴

Intersectional

Intersectionality is a feminist framework (often considered one of the social critical theories) which is described as 'the way of understanding and analyzing complexity in the world, in people and human experiences. The events and conditions of social and political life and the self can seldom be understood as shaped by one factor. They are generally shaped by many factors in diverse and mutually influencing ways. Intersectionality as an analytical tool gives people better access to the complexity of the world and of themselves'³³ (p2). The intersectional feature of cMMR focuses on understanding the influence and examining the intersections of multiple personal and social identities (eg, race and gender) and oppressive and dominant social structures and individuals' experience of privilege, power and oppression in social world.³³ Mertens²⁰ also emphasised that in transformative and cDP worldview, attention should be on genuine engagement of communities and participants disenfranchised based on sex, gender, race, disability and other social and structural forces, and working with them to understand and disrupt the biased and dominant social discourses and assemblies which prevent the transformation of society.

Framework for critical mixed-methods research

Based on the above discussion, a conceptual framework is proposed for cMMR. This framework includes three core components: (a) philosophical worldviews, (b) core features of cMMR and (c) potential outcomes of cMMR (figure 1). As

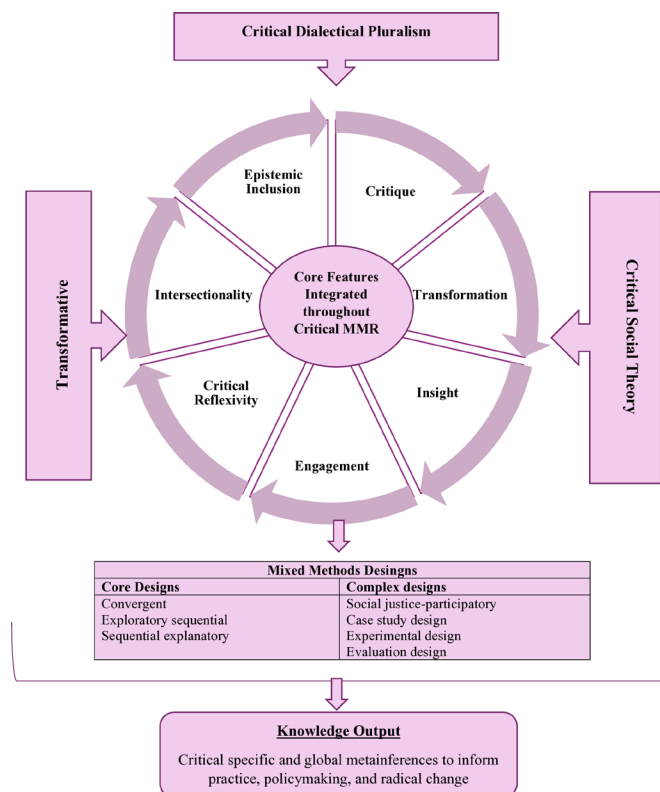


Figure 1 Framework for designing and conducting critical mixed-methods research.

illustrated, cDP, critical social theory and transformative worldviews and their stances are holistically integrated as a whole to inform the design and implementation of cMMR. Many underlying principles and stances of these three worldviews are applied to generate seven core features, which are further operationalised for conducting cMMR. The novelty of the proposed framework lies in its explicit linkage between philosophical worldviews, a set of operationalisable features (including emphasis on intersectional lens, epistemic inclusion and engagement) and MMR designs. Table 2 provides practical considerations on how the three worldviews and core seven features of cMMR can be integrated throughout the different phases of cMMR. Traditional MMR research focuses on integration, but our framework introduces the concept of critical integration and critical metainferences, for which the selection and tailoring of MMR core and complex design is informed by critical worldviews and seven core features. Our framework offers the opportunity to go beyond using traditional joint displays and integration features and updating these approaches for actively serving social justice aims and cocreation of knowledge.

The third component is MMR core and complex designs, which can be tailored to the needs of the subject matter, purposes, context and type of other participant-centred worldviews and approaches being employed in a cMMR inquiry. The detailed description of these designs is beyond the scope of this paper as these are widely known; however, readers can refer to Creswell and Plano Clark³ for more in-depth understanding. The fourth component of this framework is the knowledge output generated at the completion and integration of qualitative and quantitative phases of an MMR study. Two types of metainferences can be generated, namely global and specific. Global metainferences are insights about larger population, context, social world or phenomenon based on

the study results. These types of metainferences aim for more universal applicability and contribute to broader knowledge base concerning the phenomena of interest and widespread policy implications. Specific metainferences are narrow in scope and are not generalisable beyond specific population and participants in the research. Unlike global metainferences, they are not intended to be generalisable to broader contexts. Instead, specific metainferences provide rich, detailed understandings that are crucial for localised interventions, nuanced policy adjustments within a specific setting or for shedding light on unique experiences that might otherwise be overlooked in broader analyses.³⁵

Implications for community-based and public health research

Despite the increasing use of MMR in health sciences and public health, limited guidance is available about cMMR. This paper fills this critical methodological gap and attempts to advance researchers' understanding of the meaning, philosophical paradigms and core features of cMMR. Our framework uniquely integrates intersectionality and epistemic inclusion as core foundational features of cMMR, ensuring a comprehensive consideration of intersecting identities, systemic oppression and tokenism in ways that prior frameworks¹⁴ have not explicitly centralised. Also, our framework complements the prior work and offers practical considerations for operationalising cMMR's philosophical worldviews and proposed core features, suggesting how to move beyond conventional integration practices, such as mere joint displays, to foster truly transformative methodological engagements. The framework may be useful for understanding the nuances of cMMR and improving the research conducted with underserved communities (eg, visible minorities, 2SLGBTQIA+, culturally and linguistically diverse individuals). Using the proposed framework and practical strategies can enable researchers to unravel and address complex social and healthcare phenomena through addressing power, oppression and social justice issues and disrupting dominant social and knowledge structures, hence promoting genuine engagement of underserved communities in research and furthering the emancipation of these individuals.

Limitations

It is also important to acknowledge key limitations of the proposed framework. First, the framework provides conceptual guidance, philosophical grounding for conducting cMMR, but does not offer step-by-step guidance for every possible MMR design and research scenario. Therefore, researchers would need to translate these principles to inform context-dependent research designs and processes. Second, the emphasis on philosophical engagement and ongoing reflexivity across both qualitative and quantitative phases and in MMR integration may present practical challenges, particularly for novice researchers or those working within time- or resource-constrained settings. Implementing features like genuine epistemic inclusion and comprehensive critical reflexivity requires significant training, time and commitment, which may not always be readily available. Finally, by incorporating intersectionality as a core feature, our framework articulates what this entails philosophically and conceptually. However, additional work is required to develop more concrete, detailed methodological guidance for operationalising intersectional MMR designs and analytical procedures for truly incorporating intersectionality in data collection, analysis and interpretation.

Table 2 Considerations for integrating core features of critical MMR

Core features	Practical considerations for applying in cMMR	Examples
Critique	1. Choose critical concepts and constructs from critical social theory, cDP and transformative lens and integrate those across all stages of research 2. Take a critical stance on predetermined epistemological and methodological principles and appreciate value-based perspectives from research collaborators to tailor knowledge generation process and mechanisms 3. Identify biased and oppressive principles and challenge those; use value-based perspective from collaborators, disenfranchised methods and discourses 4. Criticise the status quo by drawing from the cultural context and underexplored epistemological viewpoints of collaborators from underserved populations 5. Critique colonial discourse and approaches to research and include more postcolonial lenses of inquiry.	A researcher conducting cMMR to examine disparities among Indigenous communities should not report quantitative health statistics (prevalence of diabetes) only. Instead, they should critique the dominant Western biomedical models that often pathologise Indigenous health without acknowledging the historical impact of colonialism, trauma or strengths of Indigenous healing practices. Qualitatively, researchers can explore colonial policies and critically deconstruct public health discourse to expose underlying power dynamics and disparities.
Insight	6. Generate unique knowledge (that does not align with the dominant viewpoint) to capture the social reality from underserved populations' view 7. Create new and illuminating ideologies and stances to contribute to the existing discourse about the social world 8. Use a hermeneutic lens to gather multiple interpretations of the same reality and combine these interpretations to develop a wholistic yet diverse interpretation	A researcher could investigate migrant worker housing insecurity. Quantitative data can show high prevalence of substandard housing conditions and income levels. To align with cMMR, qualitative interviews would gather emic perspectives on daily struggles, exploitation and distress. Integrated, these insights reveal how systemic policies and weak legal protections perpetuate housing injustice.
Transformation	9. Emancipate underserved populations by providing conducive situations and environments where they can fully use their skills, knowledge and potential 10. Eradicate power issues across all stages of research and offer full authority to participants to bring radical change in the research and potential outcomes 11. Revisit and reform existing theoretical and conceptual resources about the underserved communities and social and cultural realities being examined through generating radical thinking and knowledge 12. Radical change within the society should be the primary goal of research	A researcher could explore educational inequities for students with developmental disabilities; quantitatively measuring opportunity achievement gaps and qualitatively exploring the structural discrimination. The transformative aspect would entail using integrated findings to codevelop and advocate for specific policy changes within the school for inclusive curriculum design.
Engagement	13. Involve research participants and collaborators at all stages of the research 14. Develop advisory committees for separate phases of the research based on their skills, knowledge and expertise to involve more interest-holders in the knowledge generation and mobilisation process. 15. Take a more facilitative role rather than an authoritative role in the research and support research participants and collaborators	A researcher could investigate the mental health services access for immigrant women. The Engagement aspect of this cMMR study could be developing an advisory committee comprising immigrant women and other interest holders from the start until the completion of the project.
Epistemic inclusion	16. Move beyond mere token representation of research partners and collaborators 17. Inclusivity at individual and team level through appreciating diverse and conflicting viewpoints and solutions to studied research or social problem 18. Give voice to underserved and unheard populations in your discourse, interpretation and work and work with them to develop epistemic resources for future use 19. Effectively use cognitive diversity and multiple stances to improve the research process and generate meaningful insights for bringing social change	A researcher can design a cMMR study on food sovereignty in Indigenous communities and assess the food access metrics (eg, food prices). A truly epistemically inclusive approach would integrate Indigenous knowledge systems about traditional food practices, land stewardship and spiritual connections to food. Methods like community-led mapping or ceremonies can be used, valuing these equally with data to achieve understanding that prioritises Indigenous self-determination.
Critical reflexivity	20. Critically reflect on your role across the research process 21. Challenge and reject your preconceived biases and assumptions and the dominant social discourses that led to those assumptions 22. Become aware of multiple privileges, true intentions and motivations to conduct certain research with a specific community 23. Respect participants and collaborators' views and accept your limitations 24. Use 'so what' and 'why' questions throughout the process of research inquiry to ensure that you do not align with dominant biased views 25. Understand how to act, react and respond to disenfranchised communities	A researcher could design a cMMR study to understand the structural barriers faced by 2SLGBTQIA+ immigrants. Throughout all stages of research, the researcher should identify and address any personal biases about this community.
Intersectionality	26. Consider the influence of social, structural and political factors and intersections and their potential influence at all stages of research process 27. Deliberately invite individuals with varied sex, gender, racial and ethnic backgrounds to be engaged in the research inquiry as collaborators 28. Ensure that data collection tools include sensitive language 29. Involve sex and gender diverse communities in refining research tools 30. Deliberately incorporate an intersectional lens for analysis and interpretation by examining differences in views, experiences and interpretations of diverse groups (eg, intersection 1: men, black, high income; intersection 2: transgender, South Asian, living with homelessness)	A cMMR study to explore the barriers to healthcare access among visible minority groups, and thread an intersectionality lens across the study by moving beyond mere sex and gender-based analysis. The data collection and analysis may entail examining how perceived barriers differ among groups based on race, gender, ethnicity, socioeconomic status, disability status and geographic location.

The recommendations are based on the following sources: Agger;¹⁸ Freeman and Vasconcelos;¹⁹ Myers and Klein;¹⁴ Mertens;^{20 25} Onwuegbuzie and Frels;^{23 38} and Collins and Bilge.³³ cMMR, critical mixed-methods research; MMR, mixed-methods research.

CONCLUSIONS

There is an ongoing need to understand and address social justice and equity issues across all disciplines, mainly health and social sciences. Employing cMMR is valuable for addressing power issues, marginalisation of underserved communities

and token engagement of interest holders and researcher partners across all stages of research. A preliminary framework for designing and conducting cMMR is proposed, and practical strategies are offered on how to use this framework effectively when conducting critical research. Nevertheless, future work

is needed to assess the applicability and use of this framework when conducting research with underserved communities on health and social issues which are essential to the communities.

Contributors Conceptualised the idea: AY. Manuscript writing and editing: AY, TK and MS. Revisions for intellectual content: AY. AY is the guarantor.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not applicable.

Ethics approval Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data sharing not applicable as no data sets generated and/or analysed for this study.

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