Reproducibility and replicability of qualitative research: an integrative review of concepts, barriers and enablers

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Abstract

The integrative review presented here examines how reproducibility and replicability are conceptualized and discussed in relation to qualitative research, and which factors and practices enable or undermine them. Both peer-reviewed and grey English-language literature that address reproducibility and/or Open Science in relation to qualitative research were eligible for inclusion. Initial searches were conducted in Scopus, Web of Science, Dimensions, PubMed, APA PsychInfo, and JSTOR, and followed with snowball sampling from included literature. Studies were screened and both quantitative and qualitative data were extracted using the SyRF online platform, with 248 papers included. We found that conceptualizations that stem from quantitative standpoints are overwhelmingly framed as inappropriate practices and epistemic criteria for (most) qualitative research. When conceptualized in alternative ways that are adapted

to the epistemic conditions, aims and practices of qualitative research, they can be both applicable and appropriate. Key barriers include the ontological and epistemological misalignment of reproducibility, replicability and Open Science and qualitative research, and ethical and practical concerns surrounding data sharing and reuse. Key enablers include practices that respond to ethical and practical concerns around data sharing and reuse (anonymization, ethical consent practices, context documentation, and ethical access management), adapting expectations and norms of openness, and established qualitative practices including documentation, reflexivity, and considering positionality. We conclude that reproducibility, replicability and Open Science practices must be adapted to the aims and epistemic conditions of qualitative research for them to be applicable and feasible, and that they will not always be both for all qualitative research.

1. Introduction

In recent years perceptions of a "reproducibility crisis" within some disciplines (Baker, 2016; Begley & Ellis, 2012; Open Science Collaboration, 2015) have prompted science policymakers, funders and publishers to push for more transparency in the scientific process and the reproducibility and replicability of its outputs through policy[1], funding[2] and publishing requirements[3], and specific funding instruments[4]. While the concepts of reproducibility and replication have many definitions, across research contexts (Plesser, 2018), there are two distinct, but related components of conceptualizations of reproducibility and replication: the practices involved (see e.g., Gundersen, 2021) and the epistemic functions (see e.g., Matarese, 2022). The practices can be further divided into practices of redoing the whole or parts of a study and practices that enable redoing or more general forms of intersubjective accountability (Ulpts & Schneider, 2024) Suspected drivers of the perceived reproducibility crisis are a lack of transparency, a lack of incentives for reproduction or replication, a bias toward publishing positive results only, and various other questionable research practices (Atmanspacher & Maasen, 2015). The responses to concerns about reproducibility and replication described above typically require the use of certain Open Science practices, like open/FAIR data (findable, accessible, interoperable and reusable), open code and software, and Open Access publishing.

[1] See, e.g., Academy of Science of South Africa, 2024; Directorate-General for Research and Innovation, 2024b; Environment and Climate Change Canada, 2022; Nelson, 2022; Policy and Strategy Branch, 2023.
[2] See, e.g., Austrian Science Fund, 2024; European Commission, 2024; Policy and Strategy Branch, 2023; UK Research and Innovation, 2024; U.S. National Science Foundation, 2024.
[3] See e.g., Open Research Europe, 2024; SpringerNature, 2024; The Royal Society, 2024. Open Research Europe, 2024; SpringerNature, 2024; The Royal Society, 2024.
[4] See e.g., Chan Zuckerberg Initiative, 2024; Directorate-General for Research and Innovation (European Commission) et al., 2020; Horizon Europe, 2022, 2023; NWO, 2023; U.S. National Science Foundation, 2022, 2024.

This reflects a normative shift towards evaluation, assessment and reward of research in accordance with the demonstration of Open Science practices, which are assumed to enable replication and reproducibility (see, e.g., Drummond, 2019; Penders et al., 2019). Hence, we understand these trends as demonstrating a focus on practices of redoing research, and on the transparent, open practices that potentially enable redoing, in keeping with the conceptualization offered by Ulpts & Schneider (2024).

The solutions proposed above are often expected to be applied across the full spectrum of research and scholarship, as indicated by the policies and requirements referenced above (unless researchers can justify exceptions). However, the framing of the crisis and policy responses to it are rooted in specific quantitative, positivist ontological and epistemological perspectives (Bazzoli, 2022; Bennett, 2021; Perrier et al., 2017; Wilkinson et al., 2016).[5] An oft-cited survey published in *Nature* (Baker, 2016), that established the perception of a reproducibility crisis among some, was answered primarily by biologists and researchers from other STEM fields. In contrast, a survey conducted with a more diverse group of Horizon 2020 funding beneficiaries found that the perception of a significant crisis was most prevalent in medical and health sciences and least prevalent in humanities and social sciences (among other disciplines) (Athena RC et al., 2022). Additionally, just 24 percent of social scientists surveyed believe that reproducibility is "very important" to their discipline, compared with 67 percent in medical and health sciences (Athena RC et al., 2022). These findings suggest that concerns about reproducibility are far from universal across the scientific research landscape and vary based on the conditions and aims of the research.

Therefore, while the use of some Open Science practices appears to be on the rise in some circles – the proportion of publications that are Open Access (Directorate-General for Research and Innovation, 2024a), protocol preregistration (Serghiou et al., 2021) and data sharing within biomedical fields (Serghiou et al., 2021; Wallach et al., 2018) have all steadily risen since the 2000s, and Bochynska et al. (2023) found increases within linguistics from 2008–2019 – there have also been critiques from researchers highlighting some negative implications of these practices. Some have noted the high cost, in terms of time and resources of practicing Open Science, including preregistering study protocols, making data open and FAIR (see, e.g., Evans et al., 2023; Fecher et al., 2015), and publishing analysis code (Hostler, 2023). Additionally, qualitative social scientists, and scholars of humanities and arts have pushed back conceptually on concerns with reproducibility and replication, arguing that both concerns about and responses to them are

[5] In the interest of brevity, we do not define all specialist and academic terms in the text. Instead, we provide a glossary of key terms as Supplement 1.

based on quantitative, positivist ontologies and epistemologies, and are therefore neither applicable to nor appropriate for their research (Bazzoli, 2022; Bennett, 2021; Drummond, 2019; Penders et al., 2019; Ulpts & Schneider, 2023). For example, qualitative researchers have noted a mismatch between their ontologies, epistemologies, research designs, methods and data, and the requirements of standardized data management plans (Karcher et al., 2016), preregistration templates and practices (Haven et al., 2020, 2020; Haven & Van Grootel, 2019), and data sharing (Feldman & Shaw, 2019; Freese et al., 2022; Joyce et al., 2022; Lorenz & Holland, 2020; Mauthner et al., 1998; Prosser et al., 2022). Some have pointed out that the time-cost for making data open and FAIR is especially high for qualitative researchers, due to the context-specific and often personalized and researcher-dependent nature of the data (Dienlin et al., 2021; Field et al., 2021; Karcher et al., 2016; Mozersky et al., 2021; Tonnesson, 2012).

Others fear that these aspects of science reform may have homogenizing effects on research processes and methods (Malich & Rehmann-Sutter, 2022) and exclusionary effects on what is considered "good", publishable research (Drummond, 2019). Critics fear that normalizing Open Science practices within science policy, funding and publishing, in pursuit of reproducibility and replicability, will foster (further) epistemic exclusion and marginalization of researchers and scholars working outside of quantitative, positivist research paradigms. As Penders et al. (2019) put it, "If fields of research exist for which replication is an unreasonable epistemic expectation, then policies for research that universalize the replication drive will perpetrate (some might say perpetuate) an epistemic injustice, ghettoizing the humanities and hermeneutic social sciences as either inferior research or not really research at all." Requiring Open Science practices could even impede the ability of qualitative researchers to carry out their work, due to ethical, practical, and epistemic dependencies of qualitative approaches (Bazzoli, 2022; Bennett, 2021).

Yet, at the same time, many qualitative research traditions have a long history of practicing transparency and reflexivity, achieved through extensive documentation of the research process, its sites, samples, and the observations and interactions that provide the basis for much qualitative data (Coombs, 2017; Friedhoff et al., 2013; Jesser, 2011; Karcher et al., 2021; Karhulahti et al., 2022; Kern & Mustasilta, 2023), and reflecting on the researcher's positionality while doing so (Bennett, 2021; Doyle et al., 2020; Thoresen & Öhlén, 2015). And, despite criticisms, the idea of open qualitative research is gaining traction, with a growing community of scholars, service providers, and IT and research support staff working to establish specialized tools, templates, guidance and platforms for open qualitative methods, analysis, and data.6 Additionally, some

[6] See, for example, the virtual Quala Lab (https://qualalab.org/about/) and the QualiFAIR project at resource hub at the University of Oslo

within the qualitative research community are working to illuminate the complexities in the relationship between reproducibility or replication and qualitative research, and to define them in ways relevant to and feasible for qualitative research (Büthe & Jacobs, 2015; Talkad Sukumar et al., 2020; Tuval-Mashiach, 2021). Others have conducted investigations into researchers' perceived applicability of reproducibility to qualitative approaches (Reischer & Cowan, 2020).

We therefore conceived this integrative review to gather the disparate and ongoing discourse on reproducibility and replication (redoing) and Open Science (enabling) across diverse qualitative research disciplines, fields, and areas, and to synthesize the debates surrounding and positions toward them within the broader qualitative research community. We aim to consolidate perceptions of relevance and feasibility, as well as barriers and enablers of reproducibility, replication, and Open Science practices for qualitative research. We do so to foster informed, epistemically just development of science reform, expectations, policies, and practices.

We pose the following two research questions:

1. How are reproducibility and replication conceptualized and discussed in relation to qualitative research?
2. Which factors and practices enable, and which are barriers to, the potential reproducibility or replication of qualitative research?

2. Materials and Methods

This review follows the rationale for conducting integrative reviews originally developed by Whittemore and Knafl (2005) and expanded upon by Torraco (2016) and Toronto and Remington (2020). An integrative review provides a broad synthesis of literature from both empirical studies of assorted designs and theoretical evidence. There is no extension to the PRISMA guidelines

(https://www.uv.uio.no/ils/english/about/organization/tlvlab/qualifair/), the specialized Qualitative Data Repository based at Syracuse University in New York (https://qdr.syr.edu/), the attention given to qualitative data sharing and reuse by UK Data Service (https://ukdataservice.ac.uk/learning-hub/qualitative-data/), the development of best practices and services for qualitative data sharing offered by ICPSR at the University of Michigan (https://www.icpsr.umich.edu/web/ICPSR/series/1780), the qualitative data sharing webinar hosted by the Center for Open Science (https://www.cos.io/blog/watch-the-data-sharing-for-qualitative-research-webinar) and its introduction of a template for qualitative preregistration (https://www.cos.io/blog/qualitative-preregistration), and international conference sessions (https://openlib.tugraz.at/download.php?id=6634c9a6b68f6&location=browse) and symposia (https://www.uv.uio.no/ils/english/about/organization/tlvlab/qualifair/events/project-meetings/closing-seminar.html) dedicated to such topics.

specifically for integrative reviews, therefore, we follow the PRSIMA-Scr checklist for scoping reviews (Tricco et al., 2018).

2.1. Protocol and registration

This study was pre-registered through the Open Science Framework under https://doi.org/10.17605/OSF.IO/Q4XWK on 13th July 2023 (Cole et al., 2023). The preregistration includes additional details on study and procedure. Deviations from the preregistered protocol are shared in Supplement 2.

2.2. Positionality of the research team

Our interdisciplinary, mixed-gender, Europe-based team includes those trained in psychology, sociology, philosophy, information studies, and innovation and entrepreneurship, with a mix of qualitative and quantitative methodological expertise. We are diverse in terms of academic age and seniority, and composed of researchers and research support providers, all with experience with and expertise in open and reproducible research. We all hold positive views of research openness, transparency, and reproducibility as guiding values and aims, yet collectively recognize that expectations of these are not appropriate for all research projects or settings, and that sometimes science reform policies have unintended negative consequences. For a collection of in-depth, individualized positionality statements from each member of our team, see Supplement 3.

2.3. Eligibility criteria

Our review includes English-language peer-reviewed papers, preprints, white papers and grey literature that discuss reproducibility and replication in the context of or in relation to qualitative research, qualitative methods or "mixed methods" (so as not to miss discussions relevant to qualitative research that might be situated within this literature rather than that focused exclusively on qualitative research). Because of their close conceptual link to reproducibility and replication and their prominence within qualitative research methods, we also considered eligible sources that discuss transparency and accountability in this context. Additionally, due to the assumed link between replication and reproducibility with Open Science, literature discussing or investigating the use of Open Science practices in qualitative and mixed methods research was included. For search string development, we included Open Science generally, and specific practices linked to efforts to promote and increase reproducibility and replication, including open data, open methods, and pre-registration (as opposed to other Open Science practices, like Open Access publishing, Citizen Science, and open evaluation, for example). While these criteria

shaped the development of search strings, they did not serve as firm exclusion criteria during our review. For example, other relevant practices present in the retrieved literature, like Open Analysis and registered reports, were documented during our data extraction process. No limitations were set in terms of publication date but inclusion required the availability of the full text.

2.4. Information sources

Academic databases including Scopus, Web of Science (WoS), Dimensions, PubMed, APA PsychInfo, and JSTOR were initially searched. Simultaneously, we conducted a grey literature search in various online sources based on our knowledge of key stakeholders in the science reform and policy landscape, including preprint archives (more detail is provided in our pre-registered protocol). During data extraction of included academic and grey literature, reviewers could mark a record as relevant for the snowball search. Reference lists for these records were visually scanned for additional relevant sources. The study team members also had the option to add literature manually for snowball screening.

2.5. Search

We developed search strings based on a set of keywords and adapted for each database and grey literature source. The list of keywords included reproducibility, replicability, open data, open science, accountability, transparency, preregistration, qualitative research, and mixed methods research. Search strings for all databases are listed in our preregistered protocol, with an example provided in Table 1. We validated our search strings by piloting in Scopus to check whether sources identified through background research were present within the search results, and by testing and developing search strings in each database to ensure maximal inclusion of relevant results and minimal inclusion of irrelevant ones. NLC and AB developed search strings collaboratively, with additional expertise offered by research librarians at the University of Oslo library. We carried out the initial academic database search on 13th July 2023.

Table 1. Exemplar academic search string

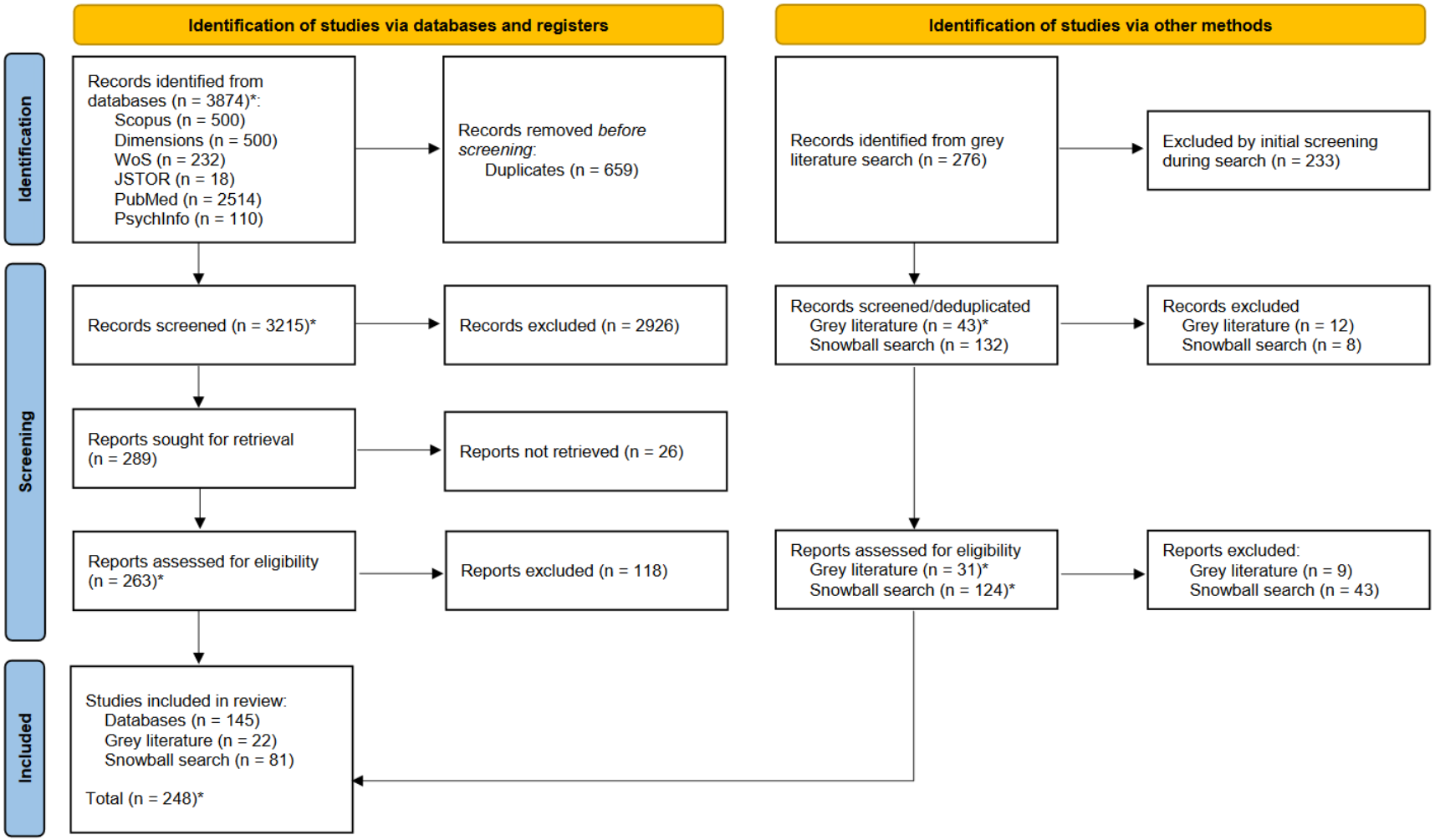
Database	**Search string(s)**
Scopus	ABS ((("reproducib*" OR "replica*" OR "open data" OR "data sharing" OR "data availability" OR "open science" OR "openness" OR "accountab*" OR "preregistration" OR "pre-registration" OR "transparen*") AND ("qualitative research" OR "qualitative methods" OR "mixed methods"))) AND (LIMIT-TO (LANGUAGE , "English"))

We conducted the grey literature search between 7th and 22nd August 2023 using the same keywords identified above and used Google search functionality to carry out site-specific searches on most sites (NLC and SU conducted this search). Details on the grey literature search and its outcomes are included in the relevant spreadsheet in our shared datasets (Kormann et al., 2024).

2.6. Selection of sources of evidence

All academic search results were first deduplicated using the ASySD tool (Hair et al., 2021) and then screened by two independent reviewers in Systematic Review Facility (SyRF) (Bahor et al., 2021), an online screening platform for literature reviews. Grey literature search results were initially abstract screened (by NLC and SU) during the search itself with only sources deemed relevant advanced to full-text screening. Sources were excluded if they contained neither a focus on reproducibility/replicability, transparency, or accountability of qualitative research, nor a focus on Open Science practices as they pertain to qualitative research. Detailed exclusion criteria are provided in our preregistered protocol. Following this, all included texts were full text screened by a single reviewer. Included full-texts were then used as a basis for a snowball search which advanced additional texts to full-text screening (see Figure 1 for the full process of selecting sources). A more detailed description of the full selection process is provided in Supplement 4.

Figure 1. PRISMA-P flow diagram.



*Indicates that there is a data set shared for this step of the process at https://doi.org/10.17605/OSF.IO/JAVZ2 (Kormann et al., 2024).

2.7. Data extraction process and quality appraisal

Data was extracted within SyRF by a single reviewer (the person making the decision on inclusion during full-text screening) using a purpose-built data extraction form. Items included in the form were developed collaboratively during the preparation of the study protocol to collect descriptive and general data from all sources and data on reproducibility, replicability, accountability, transparency, and Open Science practices (see Supplement 5). Additional comments could be entered for each question in the data extraction form if required. The form was designed to allow us to generate descriptive data about our sample and to facilitate responses to the research questions. The extraction form and process were piloted and adapted by NLC and AB during development of the study protocol. Quality appraisal criteria were developed by NLC based on existing criteria and formulated separately for distinct types of sources (theoretical and conceptual, empirical and reviews, methodological and guidance). Extraction instructions and questions, and quality assessment criteria (and their bases) are described in detail in our preregistered protocol.

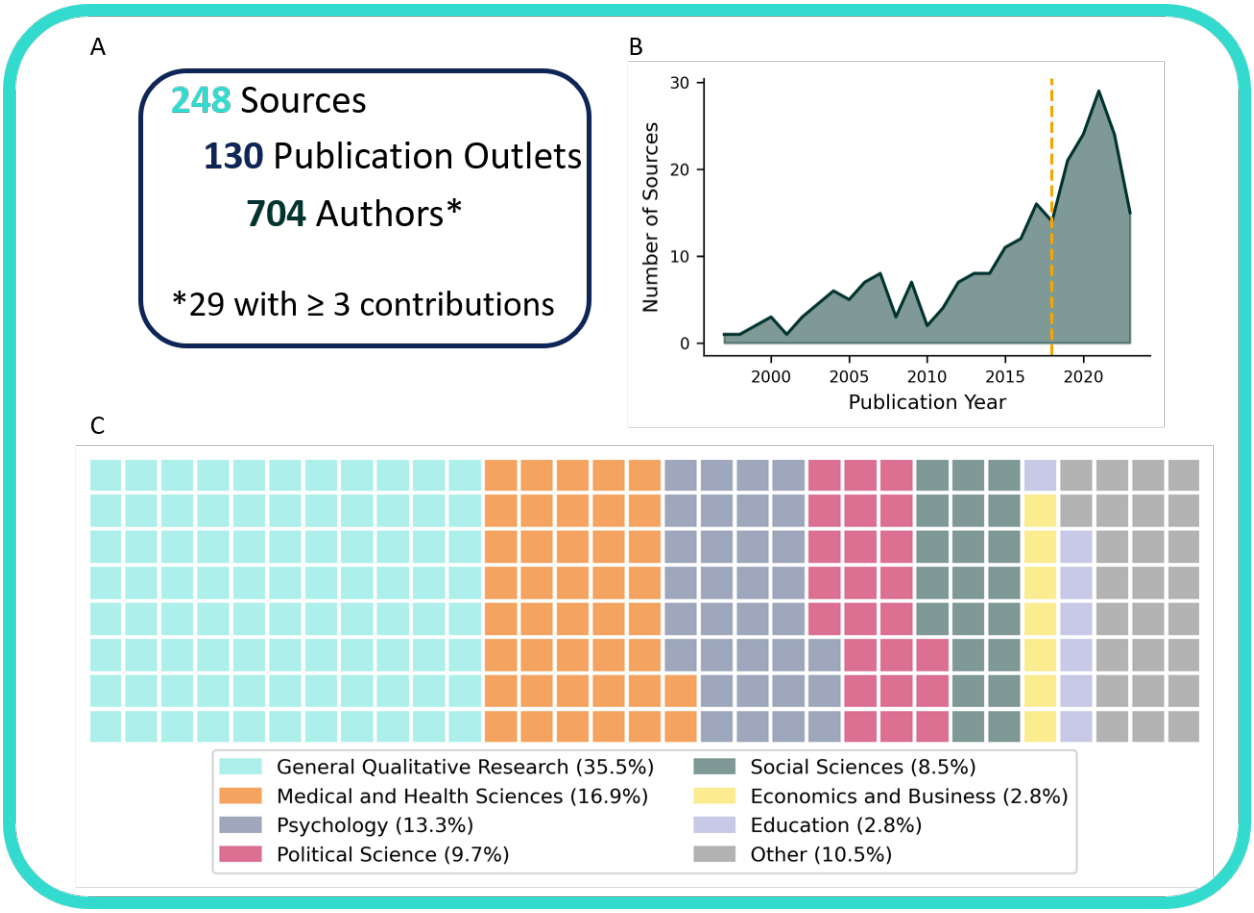
2.8. Sample

The final set of 248 included sources is diverse in terms of authorship and publication outlet, with more than 700 authors and 130 outlets present (see Figure 2A).[7] The year of publication ranges from 1997 to 2023, with a pronounced increase within the decade prior to our search (see Figure 2B). The median publication year was 2018, meaning that only half of all included sources were published over the two decades between 1997 and 2018. In terms of field, discipline or research area associated with the paper, more than a third of sources could not be allocated to one specific discipline but were coded as referring to General Qualitative Research (35.5% of included sources) (see Figure 2C). Where a more direct focus could be identified, the sources mainly related to medical and health sciences (16.9% of included sources) or psychology (13.3% of included sources). All sources included in this review are published and archived in an open Zotero library, though not all are cited in this paper.[8]

[7] Numbers of individual publication outlets and authors were estimated by checking all identified names for duplicates with deviations in spelling, correcting these manually and then calculating the number of unique values.

[8] https://www.zotero.org/groups/5443960/reproducibility_of_qualitative_research_-_an_integrative_review/library

Figure 2. Sample description of included sources. (A) Overview. (B) Number by publication year with median line indicated. (C) Sources as classified by their disciplinary orientation.



2.9. Analysis and synthesis of results

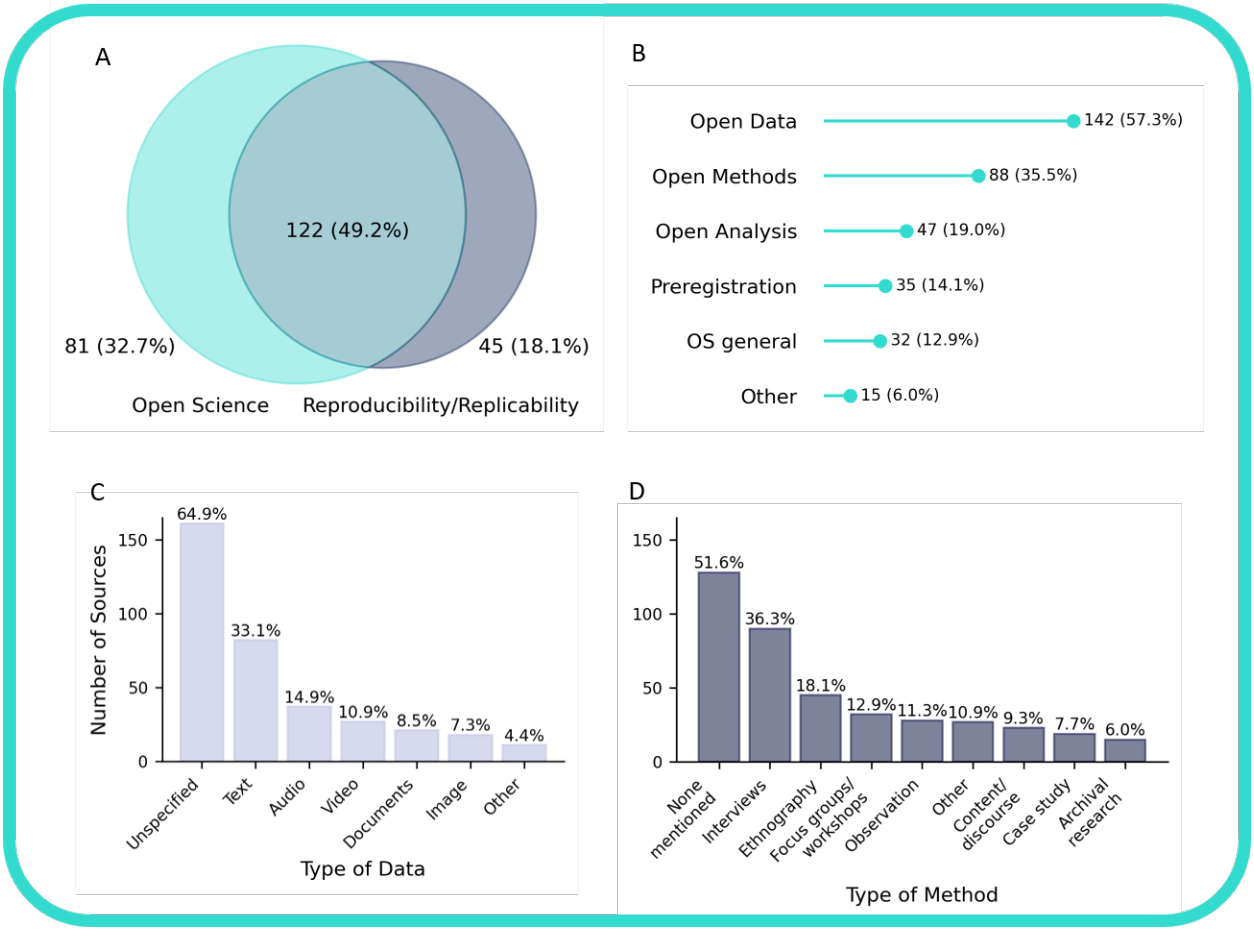
The primary aim of our analysis and synthesis processes was to identify trends in the literature to respond to our research questions with depth and nuance. As part of this, we aimed to identify attitudes toward, perceptions of, and evidence demonstrating how reproducibility, replication, and Open Science relate to qualitative research, as documented by the literature included in our sample. Our coding process for extracted qualitative data derived from open-ended questions began by creating a structure for the data (see Deterding & Waters, 2021), then moved into an inductive process (see Supplement 6 for our preliminary codebook), before transitioning to a (mostly) deductive process (see Supplement 7 for our final codebook). Coded data were then analyzed by specific members of the team to synthesize the trends in the data and respond to the research questions. A detailed description of these steps is provided in Supplement 8 and the full NVivo project is shared as part of our shared data package (Windows and REFI-QDA versions). Additionally, descriptive quantitative analysis of data derived from closed-ended questions was

conducted in Python to generate frequencies, proportions, crosstabs, and figures (Kormann, 2024).

3. Results

Of the 248 sources included in this study, 67.3% were identified as addressing reproducibility broadly (including discussions of replicability, accountability, and transparency) and 81.2% as addressing Open Science (including openness generally). Almost half of the sources were coded as discussing both (see Figure 3A). Open Data (including Open Data itself, data sharing, data availability, and data reuse) was the most discussed type of OS practices within our sample, with more than half of all sources discussing it (57.3%). This was followed by practices referring to open processes, such as Open Methods (35.5%), Open Analysis (19.0%), and Preregistration (including registered reports, 14.1%) (see Figure 3B). In the majority of our sample, no specific data types or methods were mentioned as the focus within the sources (see Figures 3C and 3D). Where a direct focus could be identified, text data was mentioned most often (33.1%), with interviews as the most specified method (36.3%).

Figure 3. Characteristics coded for the sample of included sources. (A) Sources identified as addressing OS, Reproducibility/Replicability, or both. (B) Number addressing specific OS practices (multiple practices per source possible). (C) Number addressing specific types of data (multiple types per source possible). (D) Number addressing specific types of methods (multiple methods per source possible).



In what follows, we present data in response to RQ 1 in section 3.1, and in response to RQ 2 in sections 3.2 and 3.3.

3.1. Conceptualizations of and discourse surrounding reproducibility and replication

In our sample 99 sources directly discuss reproducibility or replication (a subset of those indicated in Figure A). While there seems to be a balance between positive and critical attitudes (44 critical sources, 43 positive ones, and 12 neutral), what each means when they refer to replication or reproducibility varies. In this section we first present how the literature relates practices of reproducibility and replication to qualitative research, and then how it relates their assigned epistemic functions to qualitative research.

Often the meanings of replication and reproducibility are mentioned to discuss which practices of redoing and enabling are applicable to or appropriate for qualitative research, and which are not (Bienefeld et al., 2020; Tsai et al., 2016; Tuval-Mashiach, 2021). The conceptualizations focused on practices tend to be about various forms of redoing something, like parts or the whole of a study again to obtain findings or interpretations that are the same or similar to the original (see e.g., Aguinis & Solarino, 2019; Branney et al., 2019; Dubois & Gadde, 2014; Frohwirth et al., 2023; Huma & Joyce, 2022; Kern & Mustasilta, 2023; Lui et al., 2022; Moravcsik, 2014b; Noret et al., 2022; Reischer & Cowan, 2020; Tonnesson, 2012; Tuval-Mashiach, 2021). Different types of redoing are presented, like conceptual, exact, partial, empirical, and direct replication (Aguinis & Solarino, 2019; Bienefeld et al., 2020; Hoogeveen & Elk, 2021; Tuval-Mashiach, 2021). Some argue that certain types of replication that allow for variation or change in the redoing of previous research, like conceptual replication (Bienefeld et al., 2020; Hoogeveen & Elk, 2021; Tuval-Mashiach, 2021), can be appropriate for qualitative research. While Buckley et al. (2022) argue for methodological repeatability, Tsai et al. (2016) reject replication as verification for numerous reasons, but support Clemens' (2017) definition of "reproduction", which requires use of identical methods as an original study on a different sample from the same population; and Goodman et al.'s (2016) "result reproducibility", which means conducting an independent study using procedures as similar to an original study as possible and obtaining the same result (Tsai et al., 2016). However, some also outright reject the notion of replication as redoing because it is seen as foreign to their forms of qualitative research. Büthe and Jacobs (2015), for instance, argue that for immersive and hermeneutic research, it is neither a relevant goal nor an appropriate evaluative standard. Another class of definitions in the literature refers to practices that can enable others to redo the analysis of a study (Makel et al., 2022; Steltenpohl et al., 2023), or enable more general forms of intersubjective accountability by allowing others to trace, understand, and evaluate what was done in the research in its local conditions, both of which can mostly be achieved by providing enough depth and richness of detail in writing (Büthe & Jacobs, 2015; Frohwirth et al., 2023; Hall, 2016).

Beyond these references to practices of reproducibility and replication in the quantitative domains and how they relate to qualitative research, there are also attempts within the literature to adapt practices of replication and reproducibility to the practices, conditions, and aims of qualitative research (see section 3.3.3. on flexibility of open research practices). This reflects a perceived need to do so from various authors (Freese & Peterson, 2017; Huma & Joyce, 2022; Talkad Sukumar & Metoyer, 2019; Vuckovic Juros, 2022). For example, Büthe and Jacobs (2015), in an attempt to adapt replication, and make it applicable to and relevant for qualitative research, define replication-in-thought as:

> "…the provision of sufficient information to allow readers to trace the reasoning and analytic steps leading from observation to conclusions, and think through the processes of observation or engagement. Replication-in-thought involves the reader asking questions such as: Could I in principle imagine employing the same procedures and getting the same results? If I looked at the evidence as presented by the author, could I reason my way to the same conclusions? Replication-in-thought also allows a reader to assess how the researcher's choices or starting assumptions might have shaped her conclusions." (Büthe & Jacobs, 2015)

This is similar to Pratt et al.'s (2020) decoupling of transparency from replication and not about redoing or enabling acts of redoing, but about enabling more general forms of intersubjective accountability by presenting the research in a way that allows the reader to trace what happened and comprehend the logic of a study.

In a similar attempt to adapt the practices of replication and reproducibility to qualitative research, Talkad Sukumar and Metoyer (2019) claim that for sociolinguistic research, "reproducibility in the constructivist sense as the alternative analyses of the gathered data and also including interpretive comparisons of the findings" (Talkad Sukumar & Metoyer, 2019) would be suited. Furthermore, they define qualitative replication as:

> "… a (novel) qualitative study conducted by independent researchers replicating one or more aspects (such as study design, research questions, context, methods, and participants) of an earlier qualitative study and embedding within its findings an interpretive comparison with a view to corroborate, elaborate, contrast, or clarify the elements corresponding to the replicated aspects with those of the earlier study." (Talkad Sukumar & Metoyer, 2019)

This quote illustrates that this form of replication in qualitative research does not aim for sameness or similarity of results, but it is broader and more flexible. Talkad Sukumar and Metoyer (2019) state that their conceptualization of replication is similar to the established qualitative research practices of triangulation and crystallization. While others argue that conceptual replication is like triangulation (Hoogeveen & Elk, 2021), Pownall (2022) suggests that replication, or the label, might be redundant or unnecessary for qualitative research, because similar practices and principles, like triangulation and crystallization, already exist and are more adapted to the ontologies of qualitative research.

Conceptions of the epistemic functions of reproducibility and replication in quantitative research, which are put in relation to qualitative research, tend to vary in the literature. Therefore, Tuval-Mashiach (2021) lists the aim or function of replication as one of four criteria that determine the

relevance of it for qualitative research (Tuval-Mashiach, 2021). Among the functions mentioned or taken from rather quantitative and positivist research traditions in our sample are establishing generalizability (Bienefeld et al., 2020; Borgstede & Scholz, 2021; Dienlin et al., 2021; Hoogeveen & Elk, 2021; Mozersky, Walsh, et al., 2020; Tucker, 2016), credibility (Lui et al., 2022), verification (Tsai et al., 2016), validity (Buckley et al., 2022; Tuval-Mashiach, 2021), trustworthiness (Noret et al., 2022), truthfulness (Reischer & Cowan, 2020), and reliability (Roberts et al., 2019; Vuckovic Juros, 2022).

Some authors (Talkad Sukumar & Metoyer, 2019; Tuval-Mashiach, 2021) argue that the epistemic functions of reproducibility and replication are inherently linked to or even dependent upon the different epistemological positions underlying the qualitative research at hand. This, in combination with the plurality of epistemologies that can underlie qualitative research, might explain the diversity and disagreement we find in the literature regarding opinions about the epistemic functions of reproducibility and replication. However, some scholars also argue that qualitative research has its own epistemic crisis because it lacks evaluative standards, while practices and criteria related to reproducibility and replication could function as such (Befani, 2020; Moravcsik, 2010). For instance, generalizability is one of the epistemic functions of replication in qualitative research mentioned in the literature (Aguinis & Solarino, 2019; Bienefeld et al., 2020; Moravcsik, 2014b). Aguinis and Solarino (2019) frame empirical replication as redoing the same procedure with a different population to test generalizability in positivist qualitative research. Related to generalizability, Tucker (2016) argues that replication could help extend local and limited theories of grounded theory approaches. However, this function of replication is also mentioned by others as not applicable and one of the reasons for rejecting a role for replication in qualitative research (Dienlin et al., 2021; Doyle et al., 2020; Hoogeveen & Elk, 2021; Høyland et al., 2017; Lui et al., 2022; Reischer & Cowan, 2020; Talkad Sukumar & Metoyer, 2019; Tuval-Mashiach, 2021). Dienlin et al. (2021), for instance, argues that qualitative research cannot have a replication crisis because it does not aim for generalizability (also see section 3.2.1.2. on epistemological barriers).

Some also attempt to adapt the epistemic functions of reproducibility and replication to qualitative research. In these attempts, scholars try to align the epistemic functions of reproducibility and replication with the ways knowledge is produced and assessed in qualitative research. Some argue that since non-positivist qualitative research builds on different ways of knowing compared to quantitative research, and aims to achieve distinct epistemic functions, to make replication and reproducibility applicable, they can and have to be redefined or adapted to the aims and conditions of qualitative research if they are to be used within qualitative research (Buckley et al., 2022; Talkad Sukumar & Metoyer, 2019; Tuval-Mashiach, 2021).

In attempts to move replication into qualitative research and adapt it to the evaluative standards of qualitative research, transferability is a frequently stated function of replication (Buckley et al., 2022; Hoogeveen & Elk, 2021; Porte & Richards, 2012; Reeping & Edwards, 2020; Tuval-Mashiach, 2021). However, Pownall (2022) notes in a commentary on Makel and colleagues (2022) referring to Tuval-Mashiach (2021), that while replicability and transferability are similar, they are also quite different. Tuval-Mashiach (2021) states that while transferability is about the ability to apply results of an original study to a new context, replication is about redoing an aspect or specific aspects of an original study in a new study. Consequently, Pownall (2022), in reference to Pratt et al. (2020), argues that equating transferability with replicability contributes to an "ongoing inappropriate transfer of quantitative practices and tools to qualitative research. This perpetuates the notion that quantitative practices are 'gold standard', and that qualitative work must mould itself around these standards" (Pownall, 2022). Additionally, concretizing how the appropriate functions of replication depend on the specific qualitative research approach and epistemology, Talkad Sukumar and Metoyer (2019) argue that for phenomenological qualitative research, replication can help in capturing the "essence" of an experience. They also claim that for critical qualitative research, replication can uncover and compare biases, prejudgments and thought processes within a study (Talkad Sukumar & Metoyer, 2019).

In sum, we find that while practices that enable others to trace, understand and evaluate research are mostly seen as suitable for qualitative research, replication as practices of redoing to get the same result are mostly seen as foreign practices or epistemic criteria to qualitative research. However, once replication and reproducibility are conceptualized more flexibly or adapted to the conditions, aims and practices of (non-positivist) qualitative research, some argue that there can be a place for them, with various functions depending on the underlying epistemology. Hence, the literature, and the diversity of opinions it contains, suggests that the place, form and function of replication are not uniform, but depend on the specific conditions and aims of the qualitative research in question. The subsequent sections elaborate on barriers and enablers of reproducibility, replication and Open Science practices in qualitative research, however, as this section indicates it is important to keep in mind that while the sources referred to in the following sections often use the same terms, they might be addressing different things.

3.2. Barriers to reproducibility, replication, and Open Science

Key barriers to reproducibility, replication, and Open Science (see Table 2) include the ontological and epistemological disparities between quantitative and qualitative research (found in 36.29% of sources), including specifically the context-based nature of much qualitative research (27.82%)

and the role of the researcher (21.37%) in qualitative research methodologies in which researcher subjectivity plays a central role. Other key barriers include those that are in direct relationship to the belief that open data is a requirement for reproducible/replicable research; namely, the ethical issues associated with qualitative research that involves human participants (31.85%), and related to this, participant anonymity (27.82%) and informed consent (18.15%). Indeed, most barriers articulated to Open Science practices (see Table 3) are specific to data sharing (42.74%) and reusability (25.00%). In what follows, we provide detailed findings on the key barriers described here.

Table 2. Coding references and sources coded to Barriers and Issues

Issue	Instances of coding when Barriers & Issues intersect	% of coded instances within Barriers & Issues	Sources coded to Barriers & Issues	% of all sources
Epistemology and ontology	136	12.77%	90	36.29%
Ethics	110	10.33%	79	31.85%
Anonymity	89	8.36%	69	27.82%
Context	92	8.64%	69	27.82%
Role of researcher - positionality	68	6.38%	53	21.37%
Consent	62	5.82%	45	18.15%
Publishers and publishing	55	5.16%	43	17.34%
Legal	50	4.69%	42	16.94%
Time use and personnel	49	4.60%	42	16.94%
Infrastructure and platforms	51	4.79%	40	16.13%
Evaluation	30	2.82%	28	11.29%
Data sovereignty	31	2.91%	27	10.89%
Standards	33	3.10%	26	10.48%
Repro meaning and function	32	3.00%	24	9.68%
Guidance and training	32	3.00%	23	9.27%
Cost	26	2.44%	20	8.06%
Funders and funding	23	2.16%	20	8.06%
Data management	25	2.35%	17	6.85%
Incentives and rewards	15	1.41%	13	5.24%
Access	11	1.03%	11	4.44%
Bias	11	1.03%	11	4.44%
Software and computational tools	12	1.13%	10	4.03%
Culture	13	1.22%	9	3.63%
Other issues	9	0.85%	9	3.63%

Table 3. Coding references and sources coded to Barriers and OS Practices

OS Practices	References coded to Barriers & OS Practices	% of coded references within group	Sources coded to Barriers & OS Practices	% of all sources
Data sharing	173	42.51%	106	42.74%
Data reusability	86	21.13%	62	25.00%
Open Analysis	39	9.58%	25	10.08%
Open Methods	36	8.85%	25	10.08%
Metadata	20	4.91%	17	6.85%
Preregistration	16	3.93%	16	6.45%
Open Materials	11	2.70%	8	3.23%
Active citation	8	1.97%	6	2.42%
OS general	7	1.72%	5	2.02%
Protocol	7	1.72%	6	2.42%
Open Access and Preprints	4	0.98%	2	0.81%
Open Code and Software	0	0.00%	0	0.00%
Other OS practices	0	0.00%	0	0.00%
Registered reports	0	0.00%	0	0.00%

3.2.1. Ontological and epistemological barriers to reproducibility, replication, transparency and Open Science

3.2.1.1. Ontological barriers

As discussed in detail in section 3.1, a key theme in our included literature is that reproducibility, replicability, and linked issues like transparency, reliability, and validity, developed within an objective ontological stance, are often perceived as in ontological and/or epistemological conflict with qualitative research. The key reason for these perceptions presented in our sample is that the ontological assumption of objectively measurable phenomena in pursuit of a singular, knowable truth does not apply to qualitative research (Haven & Van Grootel, 2019; Nixon & Power, 2007). In contrast, much qualitative research is constructivist or interpretivist and therefore subjective in nature, which means that it "has an ontological assumption that phenomena are understood differently by individuals with such understandings being socially and historically influenced (Creswell & Creswell, 2018; Kivunja & Kuyini, 2017)" (Buckley et al., 2022). In some cases, even defining the subject of a qualitative study may be difficult, given an

assumption of socially constructed meaning (e.g., when a person or community's religious experience is the phenomenon under study) (Anczyk et al., 2019). Under such conditions, Anczyk et al. (2019) claim that replicability is not possible. Therefore, applying a positivist conception of replicability to qualitative research has been framed as both "ontologically problematic and potentially harmful (Pratt et al., 2020)" (Buckley et al., 2022). Some authors offer similar accounts of the relationship between Open Science and qualitative research, asserting that Open Science is conceived based on and organized around quantitative, positivist logics and quality criteria of knowledge production (Bazzoli, 2022; Bennett, 2021; Branney et al., 2023; Chin et al., 2020; Huma & Joyce, 2022; Perreault & Dienlin, 2022; Pownall et al., 2021; Riley et al., 2019; Rubin, 2023; Steltenpohl et al., 2023), and that it is therefore designed to solve problems that exist within quantitative research (Bennett, 2021; Huma & Joyce, 2022) by focusing on issues that are not considered pressing or present in qualitative research, like statistical significance, replication and hypothesis testing (Bennett, 2021). Antonio et al. (2019) extends this critique to standard data management plans, while others suggest that established practices of data sharing (Camfield, 2019; McLeod & O'Connor, 2021; Pownall et al., 2022) and preregistration (Branney et al., 2023; Haven & Van Grootel, 2019; Perreault & Dienlin, 2022) are an ontological mismatch with qualitative research.

3.2.1.2. Epistemological barriers

Building on these ontological barriers, many assert that epistemological differences between quantitative and qualitative research, and *within* qualitative research, are barriers to reproducibility, replication, and Open Science (Bazzoli, 2022; Branney et al., 2023; Pownall et al., 2021, 2023; Rubin, 2023) (see Table 2 and Table 3). Central to this argument are the constructivist (Buckley et al., 2022; Campbell et al., 2022; Rubin, 2023; Talkad Sukumar & Metoyer, 2019; Tuval-Mashiach, 2021) and interpretive nature of qualitative research (Haven & Van Grootel, 2019; Jacob et al., 2021; Karhulahti et al., 2022; Kern & Mustasilta, 2023; Tuval-Mashiach, 2021; Yardley, 2000), particularly participatory and ethnographic research (Dubois & Gadde, 2014; Tuval-Mashiach, 2021), and the often open-ended, dynamic and exploratory nature of it (Bennett, 2021; Bienefeld et al., 2020; Chin et al., 2020; Pownall et al., 2021). Some frame this barrier as a distinction between inductive and abductive theory generation (qualitative), which are constructivist in nature, versus deductive theory testing (quantitative) (Buckley et al., 2022). Pratt et al. (2020) states that replication is not appropriate for qualitative research because it is not an aim of inductive research, while Silverman et al. (2002) states, "...for social constructionist approaches, the very notion of wanting to replicate findings … is erroneous."

Other aspects of qualitative research epistemologies and research designs that are framed as barriers to replicability include the differing circumstances in which research is set (Buckley et al., 2022; Camfield, 2019; Dubois & Gadde, 2014; Hammersley, 1997; Makel et al., 2022), that

situations studied are often fluid and dynamic (Camfield, 2019; Yardley, 2000), and that they are bound by history, context, time, and composed of individual relationships (Campbell et al., 2022). Despite the best efforts of researchers, Hammersley (1997) points out that there are limits to how much context one can convey in study reports. Summing this up and framing replication as suspicious, Pratt et al. (2020) wrote, "In the transcendental realist world of open, fluid, and complex systems, exact replications would not be acclaimed as contributions to cumulative knowledge; they would be anomalies needing to be explained. From this view, replication would, or should, evoke skepticism rather than confidence."

Some authors make similar arguments against certain definitions of transparency (Abramson & Dohan, 2015; Freese et al., 2022; McGrath & Nilsonne, 2018; Pratt et al., 2020; Tamminen et al., 2021; Thoresen & Öhlén, 2015), rigor (Abramson & Dohan, 2015; Kern & Mustasilta, 2023; Roberts et al., 2019), integrity (Hall, 2016), reliability and validity (Nixon & Power, 2007) and generalizability (Lui et al., 2022; Mozersky, Walsh, et al., 2020; Reischer & Cowan, 2020; Tuval-Mashiach, 2021), for how they are associated with what reproducibility and replicability mean in the context of quantitative science, as described in section 3.1. For example, inter-coder reliability, often considered a standard of rigor and integrity in qualitative research, will not always be achievable due to the subjective nature of interpretive research (Roberts et al., 2019), while Freese and Peterson (2017) fear that attempting to make qualitative coding more "scientific" through practices aimed at increasing rigor may obscure the process of interpretive work (citing Biernacki, 2012).The context-based nature of qualitative research (Lui et al., 2022), its in-depth analysis of specific objects of study (Hoogeveen & Elk, 2021) and its use for "local inference" (Reischer & Cowan, 2020) are viewed as barriers to generalizability. When research is focused on "rare phenomena," generalizability would not be an aim (Tuval-Mashiach, 2021). And, because it is "rarely meant to be representative or generalizable", Mozersky et al. (2020) state that replicability is not an appropriate expectation for qualitative research. Regarding transparency, Pratt et al. (2020) state the "author's ontological and epistemological assumptions about research" determine which aspects should be transparent. Therefore, associating transparency with replication, reproducibility or trustworthiness is problematic for qualitative research (Pratt et al., 2020). As Tamminen et al. (2021) put it, transparency is "in conflict with the underlying philosophies used in qualitative research." Jacobs et al. (2021) take a firmer stance against it, by stating that transparency is "an intellectually incoherent notion grounded in a narrow and questionable set of presumptions about how knowledge is produced" which ignores the diversity of methods and settings within qualitative research. They also argue that, despite the provision of context information and the practice of reflexivity being normal facets of qualitative research, one cannot evaluate (interpretive) qualitative research on the basis of its transparency or lack thereof, because "we never have full, conscious access to the deep theoretical constructs that structure our perceptions and understandings" (Jacobs et al., 2021).

Some argue that the epistemological barriers to Open Science stem from a lack of engagement with and understanding of epistemic diversity within the Open Science community, particularly regarding exploratory, interpretive, and feminist research traditions (Bennett, 2021; Chin et al., 2020; Pownall et al., 2021). This disconnect is articulated by some as a reason preregistration is incompatible with qualitative research. Those who feel this way point to the exploratory, emergent, and flexible nature of qualitative research as key barriers (Haven et al., 2020; Haven & Van Grootel, 2019; Tamminen & Poucher, 2018). As Haven and Van Grootel (2019) argue, preregistration is not compatible with qualitative research because it does not aim to predict or test theories, but rather to generate them. In addition, the fact that the researcher is typically "an active participant in the research" appears to be disregarded by those developing Open Science policies, practices, and services, which is problematic when Open Science practices are meant to facilitate reproducibility or replication (Perreault & Dienlin, 2022).

We note that the majority of epistemological barriers to Open Science are focused on data sharing and reuse (see Table 4). The logics of positivist epistemologies, associated with quantitative research, are perceived by authors as structuring data management plans (Karcher et al., 2016), data sharing expectations and practices (Alexander et al., 2020; Büthe & Jacobs, 2015; Feldman & Shaw, 2019; Field et al., 2021; Freese et al., 2022; Jacobs et al., 2021; Jones & Alexander, 2018; Joyce et al., 2022; Lorenz & Holland, 2020; Mauthner et al., 1998; Mauthner & Parry, 2009; McLeod & O'Connor, 2021; Parry & Mauthner, 2004; Prosser et al., 2022; Yoon, 2015) and how platforms/repositories operate (Antonio et al., 2019; Guishard, 2018), which make them incompatible with much qualitative research. As Antonio et al. (2019) point out, "current designs of data repositories may not be supporting the messy, unknown, and emergent aspects of qualitative analysis." Guishard (2018) notes that certain methodologies, like participatory action research and critical ethnographic scholarship, result in the "messiness" that Antonio et al. (2019) describe, because they "include multi-perspectival analyses and unsettle what is ordinarily conceptualized as data and results of research" (Guishard, 2018). Additionally, McLeod and O'Connor (2021) argue that the empiricist and quantitative logics of data sharing presume a fixity and stasis of data, and a detachment from the researcher that does not apply to qualitative data.

Table 4. Key issues as barriers to OS practices as number of sources coded for this intersection and % of all sources

Issues	Data sharing		Data reusability		Metadata		Open Analysis		Open Methods		Preregis-tration		Open Materials		Active citation		Protocol	
Anonymity	80	32.26%	40	16.13%	13	5.24%	5	2.02%	7	2.82%	4	1.61%	3	1.21%	2	0.81%	2	0.81%
Ethics	79	31.85%	39	15.73%	11	4.44%	10	4.03%	11	4.44%	4	1.61%	6	2.42%	2	0.81%	5	2.02%
Context	70	28.23%	46	18.55%	18	7.26%	19	7.66%	15	6.05%	5	2.02%	6	2.42%	3	1.21%	1	0.40%
Epistemology and ontology	66	26.61%	38	15.32%	10	4.03%	27	10.89%	25	10.08%	20	8.06%	9	3.63%	3	1.21%	4	1.61%
Consent	52	20.97%	29	11.69%	11	4.44%	2	0.81%	3	1.21%	2	0.81%	2	0.81%	0	0.00%	1	0.40%
Infrastructure and platforms	50	20.16%	23	9.27%	9	3.63%	9	3.63%	9	3.63%	6	2.42%	2	0.81%	4	1.61%	3	1.21%
Legal	41	16.53%	20	8.06%	8	3.23%	4	1.61%	5	2.02%	0	0.00%	2	0.81%	2	0.81%	2	0.81%
Role of researcher – positionality	33	13.31%	20	8.06%	8	3.23%	14	5.65%	17	6.85%	5	2.02%	4	1.61%	0	0.00%	1	0.40%
Time use and personnel	33	13.31%	18	7.26%	5	2.02%	6	2.42%	4	1.61%	6	2.42%	1	0.40%	4	1.61%	0	0.00%
Publishers and publishing	31	12.50%	12	4.84%	2	0.81%	11	4.44%	9	3.63%	10	4.03%	4	1.61%	5	2.02%	2	0.81%
Data sovereignty	25	10.08%	15	6.05%	2	0.81%	0	0.00%	0	0.00%	1	0.40%	1	0.40%	2	0.81%	0	0.00%
Evaluation	22	8.87%	12	4.84%	2	0.81%	19	7.66%	18	7.26%	6	2.42%	6	2.42%	3	1.21%	0	0.00%
Standards	18	7.26%	6	2.42%	6	2.42%	12	4.84%	7	2.82%	2	0.81%	0	0.00%	0	0.00%	0	0.00%

Karcher et al. (2016) point out that the reliance on established repository categories used to classify archived data, like samples, variables, codebooks, descriptive statistics, and survey instruments, is incompatible with the diversity of data types present within qualitative research. Similarly, many authors argue that there is a fundamental epistemological mismatch between standard practices of data sharing (Feldman & Shaw, 2019; Freese et al., 2022; Joyce et al., 2022; Lorenz & Holland, 2020; Mauthner et al., 1998; Prosser et al., 2022) and reuse (Alexander et al., 2020; Chauvette et al., 2019; Feldman & Shaw, 2019; Kuula, 2011; Tsai et al., 2016; Yoon, 2015) and qualitative research, echoing the points about subjectivist, interpretive, constructivist, exploratory, and inductive or abductive research given in section 3.2.1. Some point to epistemic diversity *within* qualitative research as a barrier to data sharing and reuse (Jacobs et al., 2021; Jones & Alexander, 2018), as well as the diversity of methodologies (van den Berg, 2008), forms of evidence, and research settings that epistemic diversity implies (Jacobs et al., 2021). On this theme, Yoon (2015) states that researchers who attempted to reuse the qualitative data of others felt that they were trying to make "a square fit into a circle in some ways." Feldman and Shaw (2019) highlight the efficiency argument for data sharing as a key aspect that makes it epistemologically incompatible with qualitative data, writing, "we query the adequacy and appropriateness of these efficiency criteria for meaningfully capturing the knowledge that is produced by interpretive practices with different underlying assumptions and purposes."

3.2.1.3. The role of the researcher as a barrier

A key barrier related to the epistemological ones stated above is the central role of the researcher within qualitative research (Branney et al., 2019; Dienlin et al., 2021; Tamminen et al., 2021) – even "an active participant in the research", as one qualitative researcher surveyed by Perreault and Dienlin (2022) put it. As Tamminen et al. (2021) frame it, this is a barrier to replication because the social reality as it is documented by qualitative researchers does not exist independent of the researcher, who creates data through observation and interaction. Guishard (2018) argues that this is particularly the case with ethnographic or participatory research, which are "relational analyses", and Büthe and Jacobs (2015) present the same argument about "immersive research". Additionally, some argue that qualitative researchers interpret data in inherently subjective ways (Dienlin et al., 2021; DuBois et al., 2018; Frohwirth et al., 2023), which makes reproducibility (and verification (Tsai et al., 2016)) unlikely to be achievable and an inappropriate evaluation criterion for qualitative research (Frohwirth et al., 2023). This is framed by some as a barrier to data sharing and reuse, because in such research epistemologies and methods, qualitative data is often co-constructed by researcher and participants (Büthe & Jacobs, 2015; Field et al., 2021; Parry & Mauthner, 2004). It is, as Field et al. (2021) call it, "researcher-laden" data, and according to Büthe and Jacobs (2015) never truly "raw" because it is socially constructed. Some authors even assert that nobody who is unfamiliar with the research context and the social relationships within the

field in which the data were collected can truly understand the data and use them responsibly (Chauvette et al., 2019; Feldman & Shaw, 2019).

3.2.2. Context as a barrier to data sharing and reuse

The role of the research context in qualitative research is identified within our sample as a key barrier to data sharing and reuse (see Table 4). This is because it is generally understood that reuse of qualitative data requires contextual information about the study and wherein data were generated (Bishop, 2007; Broom et al., 2009; Cliggett, 2013; Coltart et al., 2013; Corti, 2000, 2006b; Corti & Thompson, 2004; Gervais et al., 2021; Grinyer, 2009; Hall, 2016; Hocker et al., 2021; Jones & Alexander, 2018; Kern & Mustasilta, 2023; Mauthner & Parry, 2009; McLeod & O'Connor, 2021; Moore, 2007; Opitz & Witzel, 2005; Pool, 2017; Pownall et al., 2023; van den Berg, 2008; Yoon, 2015). In fact, context is viewed as so central to qualitative data reuse, that as Mauthner and Parry (2009) argue, context is not separate from qualitative data but must be treated as part of the data. Therefore, many authors believe that qualitative data stripped of their context cannot be reused (Coltart et al., 2013; Guishard, 2018; Mason, 2007; Moore, 2007; van den Berg, 2008; Vučković Juroš, 2022). For some, context is so important to shaping the data and how a researcher interprets it that they believe that it *cannot* be reused outside of its original context (Coltart et al., 2013; Guishard, 2018; Moore, 2007), particularly those from interpretive studies (Chauvette et al., 2019), and not for alternative research purposes (Yoon, 2015). Even when (some) context is provided, reuse may still be limited because a secondary researcher will not have first-hand knowledge of or experience in the original context of the study (Carusi & Jirotka, 2009; Chauvette et al., 2019; Corti & Thompson, 2004; DuBois et al., 2018; Irwin, 2013; Tamminen & Poucher, 2018). For example, Chauvette et al. (2019) note that trying to reuse field notes from ethnographic research would pose a challenge for a secondary researcher who was never immersed in the field where the data were generated. Attempting to do so, they conclude, might lead to misunderstandings about the meaning of the data. Karcher et al. (2021) note that some believe that even an original researcher cannot revisit their own data, let alone enable a secondary researcher to do so, once they are removed temporally from the context of the research. Some believe that the act of archiving qualitative data makes them "detached" and "disembodied" from both context and the researchers that created them. Camfield (2019) suggests that this makes shared qualitative data a "danger" (Broom et al., 2009) because data may have unintended meanings imposed upon them by secondary users (Branney et al., 2019; Feldman & Shaw, 2019).

Therefore, because it is understood by many to be a barrier to reuse, context is also understood to be a barrier to sharing data in the first place (Branney et al., 2019; Broom et al., 2009; Corti, 2006a; Huma & Joyce, 2022; Humphreys et al., 2021; Karhulahti, 2022; Mannheimer et al., 2018; Mauthner et al., 1998; Tamminen & Poucher, 2018; Yoon, 2015). Authors state that this is the case

because it is difficult to fully document qualitative research context (Broom et al., 2009; Carusi & Jirotka, 2009; Coltart et al., 2013; Hardy et al., 2016; Joyce et al., 2022; Verburg et al., 2023). Doing so is highly time-consuming (Jones & Alexander, 2018; Weller, 2023), and as others argue, it will never be possible to fully and completely document the original research context (Coltart et al., 2013; Corti, 2006a; Feldman & Shaw, 2019; Hall, 2016; Mannheimer et al., 2018) and the experience of the original researcher within it (Pool, 2017; Tsai et al., 2016). Others note that documenting context can present ethical issues in regard to obligations to participants (Morris MacLean et al., 2019; Vučković Juroš, 2022). Raising another ethical issue, Alexander et al. (2020) state that a researcher may not want to share context-bound data for reuse when the secondary aim is to create generalizability (and this is at odds with the original research aims).

3.2.3. Ethical barriers to data sharing and reuse

Within our sample, ethical barriers are mainly articulated around data sharing and reuse (see Table 6). Some note that the qualitative nature of the data requires additional ethical sensitivity to that required for quantitative data (Branney et al., 2019; McLeod & O'Connor, 2021), especially regarding raw data (Branney et al., 2023). Others state that there are conflicting ethical considerations at play. For example, there is a conflict between the ethical position that data should be shared for maximum benefit to science and society with the ethical duty among researchers to protect the safety, wellbeing and dignity of their participants (Alexander et al., 2020; Jacobs et al., 2021; Jones & Alexander, 2018; Prosser et al., 2022), and to respect the relationships that are forged with them (Feldman & Shaw, 2019; Prosser et al., 2022), especially when they are collaborators in data creation and analysis (Guishard, 2018). Writing from a feminist decolonial standpoint, Prosser et al. (2022) state, "...it could be argued that the imperatives of open science may at times directly oppose and prevent researchers from being able to act in accordance with their research ethics of accountability and treat their participants' data with consideration and care." Jacobs et al. (2021) concur and conclude that "researchers' ethical obligations to protect human participants and their communities ought to take priority over the sharing of information with research consumers." Taking a more hardline approach, many authors within our study not only flag ethical issues as needing consideration but argue that they are often immovable barriers to sharing and reusing qualitative data (Abramson & Dohan, 2015; Closa, 2021; Jacobs et al., 2021; Joyce et al., 2022; Karcher et al., 2016; Karhulahti, 2022; Kern & Gleditsch, 2017; Lui et al., 2022; McGrath & Nilsonne, 2018; Perreault & Dienlin, 2022; Pool, 2017; Pownall et al., 2021; Pratt et al., 2020; Prosser et al., 2022; Steltenpohl et al., 2023; Tonnesson, 2012; Tucker, 2016; Vučković Juroš, 2022).

Others note the conflict between various institutional and governmental policies and laws that seek to safeguard privacy, on the one hand, and foster shared data on the other (Carusi & Jirotka,

2009; Reeves et al., 2023). Verburg (2023) notes that there may be legal constraints to sharing qualitative data, even when it is anonymized. Others point to the risk averse stance of institutional review boards (IRBs) as often being a barrier to qualitative data sharing (Mannheimer et al., 2018; McCarthy et al., 2023; Mozersky, Walsh, et al., 2020). In some research settings, the need to get approval from community ethics boards or commissions, like those that work on behalf of indigenous communities, prevents some researchers from pursuing data sharing in the first place (Mannheimer et al., 2018). Other concerns raised by this group of authors include a lack of clarity on who bears responsibility for what happens with shared data (Mozersky, Walsh, et al., 2020; Vučković Juroš, 2022), and concern for the misuse or misappropriation of shared data (Bishop, 2014; Carusi & Jirotka, 2009; Corti, 2006b; Feldman & Shaw, 2019; Field et al., 2021; Freese et al., 2022; Guishard, 2018; Kuula, 2011; McLeod & O'Connor, 2021; Mozersky, Parsons, et al., 2020; Pool, 2017) – either of which may breach the duty of care that researchers have with their participants, and the relationship of trust that was established between them. Carusi and Jirotka (2009) suggest that these issues arise because "existing practice[s]" for the ethical handling of qualitative data have not caught up with the technological advancements that have enabled data sharing: "...the technologies are pushing us beyond existing practice and is often challenging its moral grounds."

3.2.3.1. Participant anonymity as a barrier to data sharing and reuse

Authors within our sample see the imperative to protect research participant anonymity, confidentiality and privacy as a key barrier to data sharing due to risks to participants (Broom et al., 2009; Campbell et al., 2019; Chauvette et al., 2019; Cliggett, 2013; Corti, 2000; Corti et al., 2000; Corti, 2012; Field et al., 2021; Freese et al., 2022; Hammersley, 1997; Huma & Joyce, 2022; Jones & Alexander, 2018; Joyce et al., 2022; Karcher et al., 2016; Kirilova & Karcher, 2017; Kuula, 2011; Mannheimer et al., 2018; McGrath & Nilsonne, 2018; McLeod & O'Connor, 2021; Monroe, 2018; Moravcsik, 2014a; Mozersky et al., 2021; Myrick, 2021; Opitz & Witzel, 2005; Parry & Mauthner, 2004; Prosser et al., 2022; Ruggiano & Perry, 2019; Talkad Sukumar et al., 2020; Tamminen & Poucher, 2018; Yoon, 2015), especially when data are audio and/or visual in nature (Carusi & Jirotka, 2009; Corti et al., 2000). Taking a hardline stance, Bishop (2009) believes that the act itself of archiving qualitative data "violates confidentiality".

Concern about the risk of re-identification of participants after "anonymized" data is shared is a common theme (Branney et al., 2017; Campbell et al., 2019; Dienlin et al., 2021; Feldman & Shaw, 2019; Guishard, 2018; Humphreys et al., 2021; Jacobs et al., 2021; Opitz & Witzel, 2005; Pownall et al., 2021; Tsai et al., 2016). The spreading use of computational methods compounds this risk, because such methods can be used to reconstruct a de-identified participant profile from a dataset (Karhulahti, 2022). Reeves et al. (2023) point out the risk this poses to those who participate in life

course studies, when data are shared repeatedly over a lengthy period (Reeves et al., 2023), while Tsai et al. (2016) note that sharing "unstructured data" like interview transcripts can compromise anonymity. This concern is especially great when the research is sensitive in nature (Jesser, 2011; Kirilova & Karcher, 2017; Mozersky et al., 2021), like that pertaining to health (Gupta et al., 2022), trauma (Campbell et al., 2022), survivors of violence (Campbell et al., 2019), or conducted within vulnerable communities (Lui et al., 2022; Pownall et al., 2021; Tucker, 2016). In some cases, reidentification may pose not just risks to privacy but to physical safety (Campbell et al., 2022; DuBois et al., 2018; Mozersky, Parsons, et al., 2020). In the case of research that deals with political and legal circumstances, risks to participants' freedom and liberty may be present (Büthe & Jacobs, 2015; Corti et al., 2000; McCurdy & Ross, 2018), and risks in the context of political violence may not be fully knowable when data are shared (Büthe & Jacobs, 2015). Others may face less serious, though no less consequential, social risks if they are reidentified (Carusi & Jirotka, 2009). In some cases, it may not be possible to fully anticipate such risks, as social circumstances are ever changing, and what is perceived as safe data at the point of sharing may become risky at a later stage (Prosser et al., 2022). Therefore, some conclude that "sensitive research" is not aligned with data sharing (Campbell et al., 2019; Kirilova & Karcher, 2017). Some point out that these risks are (of course) even greater when raw data are shared (Branney et al., 2023; Fielding, 2004).

Beyond the risks posed to participants, many authors observe that anonymizing qualitative data for sharing is challenging (Carusi & Jirotka, 2009; Gervais et al., 2021), especially when it is sensitive data (Humphreys et al., 2021). The process is time-intensive (Campbell et al., 2019; Jacobs et al., 2021; Jones & Alexander, 2018; McCarthy et al., 2023; McCurdy & Ross, 2018; Prosser et al., 2022; Tsai et al., 2016; Weller, 2023) and costly (Camfield, 2019; Campbell et al., 2019; Jacobs et al., 2021; McCarthy et al., 2023; McCurdy & Ross, 2018; Prosser et al., 2022) – both of which can prohibit researchers from doing it. Some may not know how to go about effectively doing so (Freese et al., 2022), resulting in a risk of inconsistent de-identification (Antonio et al., 2019). For example, Campbell et al. (2022) state that there is a lack of confidence in practices of de-identification within trauma studies. Others observe that providing anonymity can be a challenge when some participants want to be associated with their data (Field et al., 2021), and that despite a researcher's best efforts, participants may be able to identify each other and may identify themselves via social media (McCurdy & Ross, 2018).

When data is properly and sufficiently anonymized for sharing, this fact itself may be a barrier to reuse because it may be rendered virtually useless due to the lack of detail and context (Alexander et al., 2020; Campbell et al., 2019; Corti et al., 2000; McCarthy et al., 2023; McCurdy & Ross, 2018; Opitz & Witzel, 2005; Parry & Mauthner, 2004; Tsai et al., 2016; Verburg et al., 2023) – what Verburg et al. (2023) refer to as "information loss." Others point out that the integrity and trustworthiness of the data may be compromised as a result (Antonio et al., 2019; Weller, 2023).

Antonio et al. (2019) note that data security practices at some repositories may also limit the reuse of archived data.

3.2.3.2. Participant consent as a barrier to data sharing and reuse

Participant consent is framed as a barrier to data sharing and reuse for a variety of reasons (Alexander et al., 2020; Bishop, 2014; Branney et al., 2019; Carusi & Jirotka, 2009; Chauvette et al., 2019; Corti, 2000, 2006b; Corti & Thompson, 2004; Feldman & Shaw, 2019; Jones & Alexander, 2018; Kern & Mustasilta, 2023; Mannheimer et al., 2018; McCarthy et al., 2023; Mozersky et al., 2021; Prosser et al., 2022; Ruggiano & Perry, 2019; Tamminen & Poucher, 2018). A key reason for this is that many authors believe that fully informed prior consent is impossible to establish for reuse because the consent established between participants and a researcher is not responsive to future scenarios of use and interpretation by other researchers (Bishop, 2009, 2014; Branney et al., 2019; Campbell et al., 2019; Feldman & Shaw, 2019; Grinyer, 2009; Kuula, 2011; McLeod & O'Connor, 2021; Mozersky et al., 2021; Parry & Mauthner, 2004; Pool, 2017). Sharing ethnographic fieldnotes as data raises additional challenges because the scope of participation is sometimes wide in a field setting (all people who pass before the ethnographer's gaze for observation) and direct contact with all involved is not necessarily established (in public settings, for example) (Kern & Gleditsch, 2017). Kern and Gleditsch (2017) therefore conclude that one cannot share ethnographic fieldnotes as data because it is impossible to establish consent to share from all relevant persons. As Feldman and Shaw (2019) point out, the trust established through the consent process does not automatically extend to other researchers who might reuse data, and private sector reuse of data available through public institutions may "breach the guarantee of informed consent" (Feldman & Shaw, 2019, citing Bishop 2009 and Broom et al. 2009). Therefore, 'one-off' consent is not appropriate for data sharing and reuse. As Kern and Gleditsch (2017) state, it is unreasonable for a researcher to expect participants to consent to anyone and everyone having access to data that documents their lives. In a similar vein, Vučković Juroš (2022) notes that participant consent does not release researchers from the responsibility for caring for shared data and the trust-based relationships established with participants that made data generation possible, suggesting that primary researchers have a potentially unending duty of care to participants when data are shared. This is understood to be especially important when participants are located in marginalized or vulnerable communities, or the data are sensitive. Sharing such data may lead to the breaching of trust (Broom et al., 2009; Carusi & Jirotka, 2009) and "radical solidarities" (Guishard, 2018) established between researchers and participants/communities and may foster harm through unsanctioned reuse that might conflict with participant values or beliefs (Carusi & Jirotka, 2009; Guishard, 2018). As Guishard (2018) put it, "The last thing that racialized, marginalized, poor/working-class folks, dis/abled people,

LGBTQIA persons, and folk at the intersections of these diverse groups need is more research about them, without them" (Guishard, 2018).

Additionally, authors note that a lack of familiarity with and understanding of data sharing and reuse practices among research participants can make establishing informed consent difficult (Carusi & Jirotka, 2009; VandeVusse et al., 2021). A lack of awareness on the part of researchers may also be a barrier to data sharing, when they fail to specifically ask for this during the consent process (Alexander et al., 2020; Karcher et al., 2022).

3.3. Enablers of transparency, reproducibility, and replication

Key enablers of reproducibility and replication of qualitative research identified in our included sources include data sharing (40.73% of included sources), data reusability (22.98%), open analysis (21.37%) and open methods (20.16%) (Table 5). In turn, our data show that established qualitative research practices can be key enablers of these. We found that the practice of documentation and the process of establishing rapport and trust with research participants are thought to enable data sharing (19.35% and 10.48% of all sources, respectively); and that authors believe that documentation and qualitative data coding enable open analysis (16.13%, 13.31% respectively) and open methods (16.13%, 10.08% respectively). Additionally, we found that many authors in our sample offer responses to key barriers to data sharing described in section 3.2, with participant anonymity, informed consent, ethics, and research context framed as enablers of data sharing and reusability (Table 6). We also found that qualitative research practices of coding (12.90% of included sources), documentation (18.95%) and reflexivity (14.11%) are framed as enablers of transparency (Table 7). In what follows, we provide detailed findings on the key enablers described here.

Table 5. Enablers and OS practices as number of sources coded for this intersection and % of all sources

OS practices	Instances of coding when Enablers & OS practices intersect	% of coded instances within Enablers & OS practices	Sources coded to Enablers & OS Practices	% of all sources
Data sharing	160	32.59%	101	40.73%
Data reusability	81	16.50%	57	22.98%
Open Analysis	72	14.66%	53	21.37%
Open Methods	66	13.44%	50	20.16%
Preregistration	27	5.50%	20	8.06%
Metadata	22	4.48%	20	8.06%
Open Materials	18	3.67%	16	6.45%
Active citation	12	2.44%	10	4.03%
Protocol	11	2.24%	7	2.82%
OS general	9	1.83%	7	2.82%
Open Access and Preprints	5	1.02%	3	1.21%
Open Code and Software	3	0.61%	3	1.21%
Registered reports	3	0.61%	3	1.21%
Other OS practices	2	0.41%	2	0.81%

Table 6. Number of sources and % of all sources with intersections of key issues and selected OS practices, filtered through 'enablers' code

OS practices	Anonymity		Consent		Context		Ethics		Role of researcher/ positionality	
Data sharing	80	32.26%	52	20.97%	70	28.23%	79	31.85%	33	13.31%
Data reusability	40	16.13%	29	11.69%	46	18.55%	39	15.73%	20	8.1%
Metadata	13	5.24%	11	4.44%	18	7.26%	11	4.43%	8	3.23%

Table 7. Qualitative research practices as enablers of values, showing number of sources and % of all sources.

Qualitative practices	**Trans-parency**		**Rigor**		**Validity**		**Trust-worthiness**		**Credibility**		**Quality**		**Confirm-ability**		**Reliability**		**Generaliz-ability**		**Transfer-ability**	
Documentation	47	18.95%	8	3.23%	3	1.21%	8	3.23%	7	2.82%	9	3.63%	2	0.81%	5	2.02%	0	0.00%	2	0.81%
Reflexivity	35	14.11%	10	4.03%	4	1.61%	11	4.44%	8	3.23%	7	2.82%	4	1.61%	3	1.21%	0	0.00%	2	0.81%
Coding	32	12.90%	6	2.42%	5	2.02%	5	2.02%	3	1.21%	5	2.02%	0	0.00%	8	3.23%	2	0.81%	1	0.40%
Fieldnotes	9	3.63%	2	0.81%	1	0.40%	2	0.81%	4	1.61%	1	0.40%	0	0.00%	1	0.40%	0	0.00%	0	0.00%
Rapport-trust	9	3.63%	1	0.40%	1	0.40%	0	0.00%	1	0.40%	2	0.81%	0	0.00%	0	0.00%	1	0.40%	0	0.00%
Triangulation	7	2.82%	3	1.21%	2	0.81%	3	1.21%	5	2.02%	1	0.40%	1	0.40%	4	1.61%	2	0.81%	3	1.21%
Thick description	6	2.42%	4	1.61%	1	0.40%	1	0.40%	2	0.81%	2	0.81%	1	0.40%	1	0.40%	0	0.00%	1	0.40%

3.3.1. Data sharing as an enabler of transparency, reproducibility and replication

In general, and despite many barriers to making qualitative datasets available for reuse, there is a shared understanding that data sharing, wherever possible, would support transparency (Dienlin et al., 2021; Elman, 2014; Gupta et al., 2022; Rainey et al., 2022; Tonnesson, 2012), verification (Dienlin et al., 2021; Freese et al., 2022; Gupta et al., 2022; Mozersky, Walsh, et al., 2020) and traceability of findings in qualitative research (e.g., through a paper trail by implementing active citations, data citations, anonymized data and coded data together with coding strategies) (Dienlin et al., 2021; Freese et al., 2022). Some also suggest that data sharing can enable reproducibility of qualitative research (Verburg et al., 2023), because some think that replicating and/or reproducing research studies relies on and is possible only when data has been shared (Aguinis & Solarino, 2019; Anczyk et al., 2019; Crosas et al., 2018; Feldman & Shaw, 2019; Jacobs et al., 2021; Opitz & Witzel, 2005; Steinhardt, 2020). However, Tsai et al. (2016) point out that data sharing is not required for reproduction, and that detailed descriptions of the methods together with a reporting checklist is sufficient. Others suggest that even though replication or reproducibility does not apply to qualitative research, data sharing still promotes transparency, trustworthiness, quality and reuse (Antes et al., 2018), and enables secondary data analysis (Gupta et al., 2022; Mozersky, Walsh, et al., 2020).

3.3.2. Enablers of data sharing and reuse

However, most often raw data sharing is particularly challenging for qualitative researchers, as discussed in section 3.2. While many epistemological barriers to qualitative data sharing are believed to exist, some authors within our sample see the possibility for qualitative data sharing, but still state that it is conditional on the epistemological approach of the research (Alexander et al., 2020; Prosser et al., 2022). To enable data sharing in qualitative research, the reviewed literature points to anonymization, de-identification and minimization of data (i.e., not collecting unnecessary identifying information) (Cliggett, 2013; Corti et al., 2000; Lin, 2009; Mozersky, Walsh, et al., 2020) to tackle the challenge of possible re-identification of research participants from the shared material. Note, however, that at the same time authors stress the importance of balancing anonymity with reusability of qualitative data (i.e. maximizing anonymity might reduce the content or substance in the research material which will in turn limit reusability) (Neale & Bishop, 2012). In this context, fully informing research subjects about what exactly will happen to the data, how it will be de-identified and shared, in addition to obtaining consent for data collection, is described as an important enabler of qualitative data sharing (Branney et al., 2023; Campbell et al., 2019; Corti et al., 2000; Mozersky, Walsh, et al., 2020; Steltenpohl et al., 2023).

Campbell et al. (2019) suggest that participants should be actively involved in the decision-making process regarding data sharing and that offering different levels of consent (to how much data can be shared) can be useful. The practice of establishing rapport and trust with research participants is framed as important here, because this is the basis for having ethical discussions with participants about data sharing and reuse (Jones & Alexander, 2018; Mannheimer et al., 2018), and for involving them in decisions on these matters, which can then enable openness (Bishop, 2009; Campbell et al., 2019; Jones & Alexander, 2018; Roller & Lavrakas, 2018; VandeVusse et al., 2021). Managing access to the archived data and providing different levels of access to data can respond to some of the barriers to data sharing articulated in section 3.2 (Corti, 2012; Jones & Alexander, 2018; Mozersky, Walsh, et al., 2020). Here, authors suggest new approaches to managing access to data such as, for example, a membership model where only approved members who receive training and advice for managing and analyzing data would receive access (Corti, 2012). Others suggest graded levels of access were, depending on the type of the data, appropriate levels of openness can be chosen (Jones & Alexander, 2018). Here, the role of data repositories in enabling sharing and reuse is key, as asserted by several authors (Antonio et al., 2019; Bishop, 2005; Corti, 2005; DuBois et al., 2018; Jesser, 2011; Karcher et al., 2021, 2022; Mozersky et al., 2021). For example, the development of robust infrastructures for sharing and which include the provision of expertise of competent staff that can assist with preparation of data for long-term archiving (e.g., de-identification, organization and documentation of data) are mentioned as critical (Antonio et al., 2019; DuBois et al., 2018; Jesser, 2011; Mozersky et al., 2021). Authors also stress that it is important for researchers to actively collaborate with data curators and repositories throughout the archiving process (Antonio et al., 2019; Bishop, 2005; Karcher et al., 2021).

Additionally, capturing and conveying context information is a recurring theme in discussions around facilitating data sharing and reuse in qualitative research, and careful documentation of that information is framed as an important enabler (Bishop, 2006; Corti, 2006a; Jesser, 2011; Karcher et al., 2021; Kern & Mustasilta, 2023; Tsai et al., 2016), with some authors stressing that full and rich documentation is a prerequisite to data sharing (Corti, 2006b). For example, annotations to research material are mentioned as helpful in making data sharing possible (Jacobs et al., 2022; Karcher et al., 2016) and active citations – in-text links to data sources – are noted as one of the practices that can enable sharing of textual material (Karcher et al., 2016; Moravcsik, 2010). These observations link to the broader view that open methods and analyses are viewed by some as enablers of data reuse (Hesse et al., 2019; Kern & Mustasilta, 2023). Reflecting this, some note that the practice of researcher reflexivity can aid secondary analyses of shared data or any future work with the material by providing insight into the interpretive process and the role of researcher positionality in shaping it (Walters, 2009).

Finally, education and training of qualitative researchers (Karcher et al., 2022; Kirilova & Karcher, 2017; Mannheimer et al., 2018) that supports improved data management and early planning for data sharing are also enablers (Fielding, 2000; Jones & Alexander, 2018; Karcher et al., 2021; Karhulahti et al., 2022; Mannheimer et al., 2018). Karcher et al. (2022) assert that data repositories are well poised to improve the training in qualitative data management and sharing.

3.3.3. Flexibility and adaptation as enablers of transparency, reproducibility and replicability

Because qualitative practices are often ontologically and epistemologically different from methodologies of quantitative research, as discussed in section 3.2, there are still different views around what open and reproducible research practices are, or would be, within the epistemically diverse terrain of qualitative research (Field et al., 2021; Karcher et al., 2021). Therefore, several authors point out the importance of awareness raising and training in this area more broadly (Corti, 2006b; Field et al., 2021; Lui et al., 2022; Prosser et al., 2022; Walters, 2009). Providing guidance and workshops for researchers, reviewers, and journal editors (Corti, 2006b; Prosser et al., 2022), mentoring that respects epistemic diversity and helps to engage with open research (Field et al., 2021), developing community standards (Corti, 2006b) and getting hands-on help from the librarians and repositories (Karcher et al., 2021) are some of the core enablers that are thought to contribute to higher awareness and competencies among researchers and various stakeholders in open research.

However, just as training, support, and awareness raising are prominent topics, others urgently call for the increased flexibility of definitions and requirements for open research practices, which were developed predominantly with quantitative research in mind, and tailoring open research tools and solutions to fit qualitative approaches (Branney et al., 2023; Huma & Joyce, 2022; Kirilova & Karcher, 2017; Pownall et al., 2021; Pujol Priego et al., 2022; Torka et al., 2023). Authors point out that open science reforms should accommodate epistemically diverse perspectives (Pownall et al., 2021), that open research practices should be collectively constructed, and that infrastructures and workflows must be appropriate to, and maximize the potential of, the full range of different epistemic approaches (Pujol Priego et al., 2022). For example, some suggest that generalizability of qualitative research applies more to concepts and theories than it does to results, as is the case in quantitative research (Tamminen & Poucher, 2018), and that methods sharing and not data sharing could be more central to qualitative research (Tsai et al., 2016). Thus, authors recommend considering a range of sharing options and diversity of practices (Kirilova & Karcher, 2017; Lorenz & Holland, 2020) that ought to be accepted by those requiring openness (Büthe & Jacobs, 2015). For example, this could include, encouraging metadata sharing (Branney et al., 2023; Jones & Alexander, 2018), which can provide rich information about the context of the

research process, including methodological and practical considerations that could have influenced the content (Jones & Alexander, 2018), especially when raw or derived data cannot be shared due to legal or ethical reasons. Additionally, Tsai et al. (2016) advocate for sharing other aspects of the research process, like coding queries, instead of datasets (Tsai et al., 2016).

Some authors mention the development of qualitative-specific infrastructures and templates as tailored solutions that would help enable transparency and reproducibility in qualitative research, for example reporting templates for sharing of the qualitative analytic process (Abramson & Dohan, 2015; Antonio et al., 2019; Chauvette et al., 2019; Field et al., 2021; Guishard, 2018; Karcher et al., 2021; Torka et al., 2023); among those are examples of codebooks and code scheme sharing (Field et al., 2021; Hocker et al., 2021; Kern & Mustasilta, 2023; Roberts et al., 2019). Preregistration has been proposed by some as an important enabler of transparency in qualitative research, provided it is adapted to the specific needs of qualitative research, e.g., through better tailored templates (Chin et al., 2020; Field et al., 2021; Haven et al., 2020; Kern et al., 2020; Ross & Ballsun-Stanton, 2021).

3.3.4. Enabling transparency through sharing the research and analytic processes

Several authors focus on the importance of research process transparency (Aguinis & Solarino, 2019; Dolan et al., 2023; Elman, 2014; Frohwirth et al., 2023; Hendren et al., 2023; Jacobs et al., 2021; Lui et al., 2022; S. Smith, 2018) for enabling open research, rather than focusing on sharing research outputs. As Frohwirth et al. (2023) point out, reproducibility might not be achievable in qualitative research, but transparency of the process is – and for that materials, procedures, and analysis elements that include coding schemes, memos and analytic plans are important to share openly. Reflecting this same approach, Fujiura (2015) defines transparency itself as the ability of the reader to follow and evaluate the research process as well as the interpretation of the study. Going further, for improving transparency and replicability in qualitative research, Closa (2021) suggests sharing every decision made during the research process. Some point to careful documentation of the research process – a practice that is already established within many qualitative methodologies – to illuminate the iterative process of qualitative research, and make it possible to follow and interpret the methodological and analytic steps in the study, which according to some, increase research transparency, reproducibility, replicability and rigor (Coombs, 2017; Friedhoff et al., 2013; Jesser, 2011; Karcher et al., 2021; Karhulahti et al., 2022; Kern & Mustasilta, 2023). Additionally, documentation is framed by some as important to ensure that findings are trustworthy, rigorous and of high quality (Dolan et al., 2023; Jacobs et al., 2021; H. J. Smith et al., 2008). Lui et al. (2022) argue that documentation practices are enablers of open research, generally, regardless of research method or epistemic approach.

Others focus specifically on fostering analytic transparency by providing the details of the analytic process. For example, standardized transcriptions and implementing practices for "intersubjective verifiability of analytic claims" (Huma & Joyce, 2022), code sharing (Renbarger et al., 2023) or providing information about the analysis software used (Paulus et al., 2017) are some of the suggestions for helping others to understand analytic and interpretive processes (Tamminen & Poucher, 2018). According to some, doing so can facilitate reproducibility (Huma & Joyce, 2022) or replicability (Anczyk et al., 2019; Andriopoulos & Slater, 2013; Closa, 2021; Tonnesson, 2012) of the findings, improve the quality and rigor of qualitative research (Coombs, 2017; Paulus et al., 2017; H. J. Smith et al., 2008; Thompson et al., 2004), reliability (Davies & Dodd, 2002), and can enable verification of results (Freese et al., 2022; Renbarger et al., 2023; Thompson et al., 2004) through the provision of paper trails (Freese et al., 2022) or materials sharing (Renbarger et al., 2023).

Many state that documenting research context in shared methods and analyses is critical and an important enabler (Davidson et al., 2017; Friedhoff et al., 2013; Jesser, 2011; Kern & Mustasilta, 2023). Additionally, some methods of generating qualitative data and documentation, including field notes (Cramer, 2015; Koch, 2006; Phillippi & Lauderdale, 2017) and the provision of thick description (Hadi & Closs, 2016; Hendren et al., 2023; Renbarger et al., 2023; Roller & Lavrakas, 2018) have been proposed as existing practices that can help register context information and through that, facilitate transparency, trustworthiness and reproducibility, particularly in ethnography and cultural anthropology. By providing context information, which captures details of the data collection and its setting (Bishop, 2007; Feldman & Shaw, 2019; Fielding, 2004; Friedhoff et al., 2013; Karcher et al., 2021; Kern & Gleditsch, 2017; Tamminen & Poucher, 2018; Walters, 2009), some argue that field notes can be used to aid multi-synthesis, secondary analyses or any future analyses of the material (Cramer, 2015; Phillippi & Lauderdale, 2017). Likewise, some point out that thick description can be similarly helpful by providing essential details on the research context, participants and analytic process (Renbarger et al., 2023). Even though journals often do not provide enough space for including these details in the manuscript itself, Renbarger et al. (2023) point out that they could be included as additional materials and/or in an online repository.

Related to documentation, some claim that sharing the coding process through codebooks and coding schemes can be done relatively easily and can make the research process more transparent and reproducible, including supporting re-use and helping to accurately replicate methodological aspects of the original study (Becker et al., 2021; Field et al., 2021; Hocker et al., 2021; Kern & Mustasilta, 2023; Roberts et al., 2019; Tsai et al., 2016). For example, some authors included guidance on how to keep a transparent codebook (e.g., for thematic analysis, Roberts et al., 2019) or how to use a newly developed coding tool (e.g., QualiCO, Hocker et al., 2021) to

support sharing of coding schemes, since data repositories have historically been unable to support qualitative coding sharing (Hocker et al., 2020). Some authors identify that technological improvements of existing software and formats also aid coding sharing, such as the standardization across the major qualitative data analysis software (QDAS; e.g., applications such as NVivo and ATLAS.ti, Karcher et al., 2021). Other authors proposed a refinement of the coding process and methodology to support transparency in and reproducibility of the research process. Examples include establishing the concepts and links between categories and themes in clear ways (Rainey et al., 2022), in-depth training of multiple coders (Hendren et al., 2023) and developing a detailed codebook that can be used by all coders (Becker et al., 2021; Noret et al., 2022). Some suggest that automation has the potential to make the process of documentation, coding and analysis more transparent and replicable. Automating these processes, for example through applying text mining to documenting workflows or natural language processing algorithms to coding textual data, could increase the production and analytic transparency, and reduce biases and errors by creating a more consistent approach to working with data documentation and coding, and therefore facilitate replicability (Abram et al., 2020) and generalizability (Chakrabarti & Frye, 2017).

In addition to coding and documentation, reflexivity has been indicated as an existing and already broadly used practice in qualitative methodologies that is essential for increasing transparency and trustworthiness of qualitative research. According to the literature, reflexivity practice is important for identifying assumptions made during the research process (Doyle et al., 2020), to consider researcher biases (Kawaguchi-Suzuki et al., 2023), and one's own a priori values (Bennett, 2021) and how they might influence the study outcomes. In other words, how the researcher as a person with their own 'subjectivity' affects the study (Hale et al., 2007; Kawaguchi-Suzuki et al., 2023; Thoresen & Öhlén, 2015). Some claim that in practicing reflexivity, qualitative researchers can make this subjective reality visible (Davies & Dodd, 2002) and manage the flexibility of process inherent in some approaches to qualitative research (Dubois & Gadde, 2014), which is in turn necessary for qualitative research rigor and trustworthiness (Davies & Dodd, 2002; Doyle et al., 2020; Hackett & Strickland, 2019; Mackieson et al., 2019; Steltenpohl et al., 2023) and makes the research process more transparent (Bennett, 2021; Doyle et al., 2020; Thoresen & Öhlén, 2015). Positionality statements are one method for including the practice of reflexivity in the research process (note, however, that although it gives opportunity for reflexivity practice, simply writing a positionality statement does not guarantee that one practices reflexivity throughout the research process). For example, Steltenpohl et al. (2023) argue that they give researchers an opportunity to discuss and justify decisions they made and their impact on the study. Field et al. (2021) suggest that reflexivity practices as described above, including positionality statements, are enablers of transparency and reproducibility of all research methodologies – not just those that are qualitative in nature.

Additionally, preregistration is framed as useful for reflexivity practice because, it is argued, it enables researchers to fully explore assumptions ahead of the research process (Chin et al., 2020), and through planning and considering many aspects of the study before it begins, potentially reduce the levels of subjectivity that shape the research process (Noret et al., 2022). Others state that preregistration enables clarity and transparency in the research process (Haven et al., 2020), including in the often-iterative process of theory development in qualitative research (Kern et al., 2020), and gives space for information that is usually not included in published papers (Branney et al., 2023).

Mackieson et al. (2019) suggest that reflexivity can be integrated through the recording of an audit trail for increased rigor and transparency. Audit trails were noted by several authors as a practice that contributes to increased trustworthiness (Hadi & Closs, 2016; Mackieson et al., 2019), transparency (Dolan et al., 2023; Hackett & Strickland, 2019; Hendren et al., 2023; Koch, 2006), reliability and validity (Tsai et al., 2016) of qualitative research. Some argue that such audit trails provide other researchers with information that aids in understanding how the primary researcher arrived at the final conclusions (Tsai et al., 2016) and can comprise, if possible, of data, including data reduction, analysis and synthesis, as well as elements typically included in documentation such as memos and notes (Dolan et al., 2023). Hackett and Strickland (2019) add that codes and visualizations can also function as an audit trail if they help explain how the data was interpreted.

4. Discussion and conclusion

4.1. Review aims and key findings

This review investigated how reproducibility and replicability are conceptualized and discussed in relation to qualitative research, and which factors and practices enable, and which are barriers to, the potential for either. While a large pool of literature now exists related to these topics, this literature is scattered across a variety of discipline-specific journals and to date no comprehensive review had been conducted to capture this literature and synthesize its themes and debates.

We found that conceptualizations of reproducibility and replicability that stem from positivist, quantitative standpoints are overwhelmingly framed as inappropriate practices and epistemic criteria for (most) qualitative research. When they are conceptualized in alternative ways that are adapted to the epistemic conditions, aims and practices of qualitative research, some believe they can be both applicable and appropriate. In other words, neither the form nor function of reproducibility and replicability are conceptualized in uniform or universal ways in the literature

we reviewed. Rather, both are often framed as dependent upon the underlying epistemology and aims of the research in question. Therefore, there is no one way that either are conceptualized or positioned in relation to qualitative research. Instead, there are various conceptualizations that align with or contradict the diverse array of epistemologies, ontologies, research methods and types of data that make up qualitative research.

Related to this, we found that much of the literature illuminates well-established ontological and epistemological barriers to reproducibility, replicability, and Open Science as they relate to qualitative research. There is a degree of consensus around the position that the epistemological approaches of qualitive research are at odds with mainstream definitions of reproducibility and replicability, and established ways of achieving these through Open Science practices that center on outputs. To that end, we found that identified barriers to Open Science are concentrated around practices of data sharing and reuse. Here, the variety of epistemic approaches and research methodologies within qualitative research, the role of the researcher in co-creating data and in interpreting it in subjective ways, the centrality of the research context, the difficult nature of fully and transparently documenting both, and ethical concerns about participant anonymity, risks, and informed consent emerge as key barriers to sharing and reusing qualitative data.

Yet, at the same time, we found many articulations of enablers of reproducible, replicable, and open qualitative research within the literature. We found, reflecting established beliefs about data sharing generally, that qualitative data sharing is framed as an enabler of transparency, reproducibility, and replication; and we found articulations of key enablers of data sharing (and reuse) that are intended to respond to the issues framed as barriers to varying degrees. Processes for carefully de-identifying qualitative data; thoughtful, interactive and iterative informed consent practices; infrastructures providing careful, ethical and managed access to data; and the provision of context documentation are framed as enablers of data sharing and reuse. Additionally, reflecting our finding that adapting conceptualizations of reproducibility and replication to suit the epistemic aims and methodologies of qualitative research, we found that adapting the expectations and norms *for Open Science practices* is framed as an enabler of open qualitative research. Alternative sharing practices, like sharing metadata or composite data instead of sensitive data, focusing on open research processes instead of outputs, and the provision of epistemically responsive and flexible infrastructures, research support services, and tools and templates are understood to enable transparency, openness, and some forms of redoing. Notably, we found that established qualitative research practices, like setting and process documentation, and engaging in reflexivity and interrogations of researcher positionality are thought to enable open, and in some cases reproducible or replicable, qualitative research.

4.2. Interpretation of key findings

Reflecting broader trends within metascience and science policy, many of the papers included in our review demonstrate complex and diverse relationships between reproducibility, replicability, and Open Science. This suggests that the development of reproducibility and Open Science policies, and Open Science mandates, have impacted the qualitative research community. In particular, we see the emphasis on data sharing and reuse within our sample (more than half of all papers have this in focus) as evidence that open data policies and mandates can clash with the realities of qualitative research, but they have also prompted valuable discussions and debates about the underlying ontologies and epistemologies of qualitative research, of the quality criteria and research ethics, and the relationships between socio-technical systems and structures and research values, practices, norms and expectations. The steep growth in papers published since 2010 and included in our review signals the same.

The articulation of barriers to reproducibility, replicability and Open Science within our sample are evidence of a shared sense of imposition regarding science policies developed for positivist and quantitative research, and concern for their implications among the authors included in our review. One could argue, as do some included in this review, that epistemic exclusion within science reform movements generally and within Open Science specifically is a driver of universalist policies, practices, and expectations that are a poor fit for (much) qualitative research.

Not only is a sense of exclusion present within the reviewed literature but also concern for the negative implications that might follow it. For example, when data sharing is mandated, concerns about these risks, both among participants and researchers, may have a "chilling effect" on certain research topics or with certain communities (Branney et al., 2023; Hall, 2016; Monroe, 2018). Both members of vulnerable groups (Parry & Mauthner, 2004; VandeVusse et al., 2021) and the elite (Tsai et al., 2016) may be less willing to participate considering such risks (Reeves et al., 2023; Tsai et al., 2016) or may participate but not fully disclose (Mozersky et al., 2021). Pownall et al. (2021), citing Siegel and LaMarre (2019), expressed concerns for potential negative career ramifications for early career researchers whose research does not align with established Open Science practices. And, as was noted in section 3.2, it appears that Open Science policies and the science reform movement that drives them have historically had a blind spot for open processes while focusing mainly on open outputs.

It makes sense, then, that epistemic flexibility is framed as an enabler of reproducibility, replicability and open research by many authors included in our review. We see this theme both in terms of how these terms are conceptualized (adapting definitions to make them relevant to and feasible for the underlying epistemologies and methods of qualitative research), and in terms

of how openness is practiced and accepted. This manifests in discussions of how data sharing or output sharing might look different for some qualitative research, depending on epistemology and ethical concerns, and is reflected in the community of practice that has grown around and fostered open qualitative research, which includes the focused work being done by researchers, repositories, libraries, and reproducibility networks to enable open qualitative research. It also manifests in the emphasis within the literature on enabling open research *processes*, both to support the reusability of open qualitative data and the potential reproducibility/replicability of qualitative research, but also as a valuable and acceptable way of practicing open research when data sharing isn't feasible, and reproducibility or replicability are not relevant. As some authors included in our review point out, there are established practices within qualitative research methods that are meant to provide transparency of research design, data collection, interpretation and analysis, including the role of the researcher in shaping the full process. These practices, broadly described as documentation, reflexivity, and considering positionality, presented in the literature as enabling open methods and open analysis, precede Open Science. Although they have received far less attention within the mainstream science reform movement than have open data and Open Access publishing (see Chtena et al., 2023), we note that they could be incorporated as part of a more epistemically inclusive version of Open Science.

The considerable evidence presented in this review that demonstrates how qualitative research practices can enable openness suggests that the science reform movement and mainstream Open Science can be diversified and strengthened by incorporating the expertise of the qualitative research community. We echo the call to bring researcher reflexivity into quantitative research made by Field & Derksen (2020), Jamieseon et al. (2023), and Lammer (2023), in support of increased transparency, openness and research quality. In addition, we believe that the findings of this review make a case for developing standards and guidance for open methods and open analysis that center the longstanding practices of qualitative research that enable them. At the same time, we take caution from our findings and recognize the critical voices who assert that not all (qualitative) research is meant to be, nor can it be, reproducible, replicable, nor open. We agree with Leonelli (2018) that reproducibility cannot be a universally accepted criterion for research quality, and with Penders' (2019) similar critique of universality of replication (see also Guttinger, 2020; Ulpts & Schneider, 2023). There is far too much evidence to the contrary.

4.3. Limitations

Having identified key themes in the included literature gives us confidence that our findings are valid and meaningful, however, as with any review study, we recognize that there are limitations to both the study design and our findings. Our review lacks language diversity and primarily includes literature that is indexed in established academic databases. While we did conduct a

snowball search, included preprints and searched for relevant grey literature, we recognize that the included studies reflect varying degrees of academic privilege that likely impact their content. Including sources in other languages or acquiring them through other search methods might have changed the key findings and conclusions we are able to draw from them. Further, we recognize that the focus in the included literature on text-based data and the methods that generate them likely also influenced the themes we were able to identify. While we made every effort to rigorously co-create a code system and process that could be carried out systematically by various members of our study team, we acknowledge that this was not a perfect process and that some inconsistencies in our coding likely exist. And, while we attempted to achieve "radical reproducibility" (Ross-Hellauer et al., 2022) throughout our research process, by documenting our methodological choices, analytic debates and decisions, providing an extensive methods section and supplements, and sharing the maximum amount of data, materials and code possible, we suspect that others would still be unable to recreate exactly our process and/or findings, given our roles as researchers in the processes of data extraction, coding, analysis, and reporting, and the iterative nature of the coding and analytic process.

4.4. Implications for future research and policy

Our findings signal a critical need for consensus building within the science reform movement around the meanings and functions of reproducibility and replicability, which echoes the findings of Ulpts & Schneider (2024) from their more broad-based review of conceptualizations of these terms. This work must center epistemic diversity if it is to be broadly relevant and legitimate, and it must acknowledge that what these terms mean is always, already ontologically and epistemologically dependent. Our call is therefore not for singular definitions of these terms, but for a recognition of a set of definitions and functions that are understood to be relevant in certain ontological and epistemological contexts. Here, specifying different types of reproducibility and replicability is critical. Our constant struggle with terminology through writing this paper, often feeling that the words we have available to use – reproducibility and replicability – do not adequately capture the diversity of meanings and practices that we aimed to describe, is evidence of this.

They also signal, reflecting Leonelli's (2022) assessment, a critical need for the development of epistemically inclusive Open Science practices, education, training, guidance, services, tools and templates. Epistemic diversity must be centered within the Open Science movement and its implementation if it is to succeed in its mission of making research (and scholarship) more open and accessible, generally speaking. But beyond this, our findings demonstrate the need for qualitative-specific versions of all the above, given the well-articulated epistemic mismatch between existing Open Science practices, services and infrastructure, and most qualitative

research. Our experience in conducting this review has also surfaced the need for FAIR resources to support those who wish to practice open qualitative research. The literature suggests that resources are scattered around the web, with many embedded in or attached to published papers, and that they are not yet integrated into institutional guidance and trainings on Open Science. Gathering resources together and systematizing training around open practices for qualitative research would be of great benefit to the qualitative research community specifically and the scientific community more broadly.

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Data availability

The data associated with this study are published on Open Science Framework (Kormann et al., 2024) and available here: https://osf.io/javz2/. The code used to compute descriptive statistics and create figures is also available on the Open Science Framework here: https://osf.io/asgvc/ (Kormann, 2024).

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Competing interests

The authors declare that we hold no competing interests.

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