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A review of technical and quality assessment considerations of audio-visual and web-conferencing focus groups in qualitative health research

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The transition from the conventional approach to an online setting in conducting focus groups (FGs) for qualitative research is an increasingly adopted approach in health-related research. The purpose of this narrative review aims to provide an overview of the quality of FGs in health-related research that are conducted using various audio-visual (AV)-enabled and web-conferencing approaches. Online databases searched were Medline/PubMed, ProQuest, Web of Science, and Google Scholar. Four key concepts (qualitative health-related research, online platforms, platform analysis, and quality measures) were used. A consensus group method, and a review of user guides of three of the currently used online platforms (i.e., “WebEx”, “Zoom”, and “Microsoft Teams”) were employed to develop a set of specific core quality criteria for appraising online qualitative research studies. While various synchronous and asynchronous online FG approaches were utilized in health-related research, audio-visual (AV)-enabled, and web-conferencing approaches were comparable to conventional FGs. These platforms are associated with several advantages, such as spontaneity in responses through real-time interactions among researchers and participants. The developed quality assessment tool for online FGs included criteria such as maintaining the privacy of participants and confidentiality of data collected, appraising the potential selection bias due to technological and logistical requirements, and ensuring the presence of features for recording video and audio within the software. The validated quality criteria that are used to evaluate face-to-face qualitative studies can be applicable in online contexts. However, additional criteria targeting the new features of the online platforms should be considered as well. This review helps health-related researchers and research academic institutions to select the online platform that best addresses their research and institutional needs while maintaining good quality, time-efficient, and cost-effectiveness.

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Introduction and background

Qualitative research is a crucial component in the health-care field, which seeks to produce rich evidence that cannot be obtained and examined while conducting quantitative research (Holloway, 2005). Focus groups (FGs) are a well-established, valuable data collection technique for qualitative health-related research (Kitzinger, 1994; McLafferty, 2004; Morgan, 1997). A focus group is an organized discussion about a research topic with a group of participants to gain their joint perspectives. FGs are particularly useful when participants are similar in their background and experience and cooperate with each other, which yields a complex discussion (Creswell and Poth, 2016). This approach is originally supposed to be carried out in a face-to-face modality to facilitate the interaction between participants and researchers, which contributes to yielding a large amount of qualitative data about individuals' knowledge and perceptions that affect their behaviors (Guest et al., 2013; Kitzinger, 1994; Krueger, 2014). Despite being considered a robust approach for collecting data in qualitative research, FGs continue to lag behind due to substantial logistical challenges that restrict effective participation, such as date, time, and location (Rolls et al., 2016). High costs associated with transcript and participant compensation are resource challenges associated with conducting FGs in qualitative health-related research (Nicholas et al., 2010).

The COVID-19 pandemic, and similar crisis situations, increased the challenges associated with conducting face-to-face FGs because of quarantines and social distancing requirements. These challenges necessitate the suspension or postponement of face-to-face FGs, or a transition from the conventional approach to an online setting (Remesh, 2020). Notably, there has been global leverage of technological resources to conduct FGs in a time-efficient and cost-effective manner (Weiner et al., 2020). These technological advancements include the availability of high-speed internet; the development of advanced video-conferencing platforms, the proliferation of portable smartphones, tablets, and laptops with built-in cameras, the availability of cloud storage services for sharing documents, images, and other multimedia files; and the enhancement of security and privacy measures such as participant authentication, secure data transmission, and encryption. Hence, the transition from conventional face-to-face FGs to an online modality is facilitated (Fox et al., 2007; Mann and Stewart, 2000).

Conducting online FGs becomes an increasingly popular method for collecting qualitative data in several research fields since the advancement of technology and the popularity of internet use (Schneider et al., 2002; Stewart and Williams, 2005; Synnot et al., 2014; Wilkerson et al., 2014). Online FGs are generally computer-mediated "communication events" in which a group of individuals virtually assemble to discuss a specific topic mimicking a face-to-face approach (Clapper and Massey, 1996; Morgan and Morgan, 1993; Sweet, 2001). Online FGs interactions can be conducted in the form of text, voice, video, or a combination of these, and can be held either synchronously or asynchronously (Stewart and Williams, 2005; Sweet, 2001). An asynchronous internet environment is a non-concurrent interactive communication that occurs through closed email discussions, discussion boards, weblogs (blogs), newsgroups, or LISTSERV mailing lists (Lobe, 2017; Mann and Stewart, 2000; Tuttas, 2015a, 2015b). Asynchronous text-based online FGs have been employed in various health-related research in several different forms (Acocella, 2012; Bringsvor et al., 2014; Hatten et al., 2014; Moltu et al., 2012; Murray, 1997; Rolls et al., 2008; Salmon, 2013; Whitehead, 2007). They offer a means to facilitate participant recruitment and involvement, especially for geographically dispersed participants (Murray, 1997; Williams et al., 2012).

Participation in asynchronous online FGs also offers the advantage of maintaining anonymity which facilitates free-flowing and more open discussions especially when related to sensitive topics in contrast to face-to-face FG (Campbell et al., 2001; Nicholas et al., 2010; Turney and Pocknee, 2005).

Other forms of text-based online FGs which have demonstrated success fit in the category of real-time interaction, facilitated by synchronous computer-mediated messaging applications, such as Audium, MSN messenger, AIM, Google Hangouts, Gaim, Trillian, Kadu, Pidgin, and web messaging facilities like Facebook Live Messenger, etc. However, researchers argue that asynchronous text-based techniques are inadequate for monitoring fundamental components of FGs, such as moderators' role, nonverbal behaviors, and the group atmosphere and dynamics (Galloway, 2011; Greenbaum, 2002). Moreover, synchronous text-based applications have the challenges of skill-related limitations, such as participants' typing speeds, which may affect the spontaneity of interactions (Fox et al., 2007).

The current technological advancement facilitates real-time communications among participants where they can be seen and heard through the evolution of synchronous (AV)-enabled applications (e.g., Skype, AnyMeeting, Google Hangouts, Facebook Video Chat, etc.) and web-conferencing platforms (e.g., Zoom, Cisco WebEx, Meetings.io, etc.) (Lobe, 2017). These approaches have been utilized in health-related research fields in providing consultation services (Hasan, 2012), improving the quality of care (Wakefield et al., 2004), developing health behavior change interventions (Thrul et al., 2017), and collecting qualitative data for research projects (Sedgwick and Spiers, 2009; Tuttas, 2015a, 2015b). The quality of data produced by online FGs in the field of health-related research using AV-enabled, and web-conferencing platforms remains relatively inadequately examined. Furthermore, the availability of technical guidance reports about the features of the currently used synchronous AV-enabled and web-conferencing platforms that best suit health-related research requirements, and their optimal use of them are also lacking. The main focus of this review is to investigate the quality and technical aspects of FGs conducted in health-related research, specifically examining the utilization of different AV-enabled and web-conferencing approaches. Therefore, this paper aims to (1) review the pros and cons challenges of using AV-enabled and web-conferencing platforms in conducting online FGs for qualitative health-related research; (2) propose quality assessment criteria for online FGs in qualitative health-related research; and (3) provide a technical guide and a comparison between the currently used synchronous AV-enabled and web-conferencing platforms (i.e., WebEx, Zoom, and MS Teams).

Methods

Overall literature review methodology. A narrative literature review of findings related to the objectives was conducted in December 2020. Findings were retrieved from the most common medical/health and science online databases, which included: Medline/PubMed, ProQuest, Web of Science, as well as Google Scholar. Four key concepts (qualitative health-related research, online platforms, platform analysis, and quality measures) were used in this review. Keywords used to search for qualitative health-related research included: "health research", "qualitative", and "focus group(s)". Keywords used for online platforms concept search included: "online", "virtual", "WebEx", "Zoom", "MS Teams", and "Microsoft Teams". Keywords used for platforms analysis included: "pros", "advantage(s)", "cons", "disadvantage(s)", and "guidance". Keywords used to search for the quality measure concept included: "quality measures", "trustworthiness", "credibility", "conformability", "transferability", and

“dependability”. Boolean search strategy (AND, OR) was used to combine concepts and keywords. The review included journal articles that are human-based (i.e., not animal or in vitro research-based articles), book chapters, and reviews (e.g., literature or systematic). Only English-written articles were included, and there was no restriction on geographical location or publishing date. Articles that mentioned the use of any online platform to conduct qualitative research only without reflecting on the use of this online platform were excluded as they do not provide answers to the current paper objectives. Google Scholar and ProQuest searches resulted in a variety of article types that were not relevant to this review, such as media releases, letters, commentaries, pre-print/in-process, or conference papers.

Quality measures development for conducting online FGs in health-related research. A search of the literature (applying the above strategy) was conducted in an effort to determine if there are existing set of specific quality criteria that are developed and validated for use in the context of conducting qualitative studies using web-conferencing platforms. Search findings revealed scant information in terms of quality criteria used in this context. Therefore, a consensus group method was employed by the research team to develop a set of specific core quality criteria for appraising online qualitative research studies, as well as to determine if traditional tools used in face-to-face FGs are suitable in the context of qualitative studies conducted using AV-enabled and web-conferencing platforms. The consensus group (i.e., the current research team) composed of six experts from academia (faculty members in medical and health education, and qualitative researchers), and from the Information Technology Department (ITD) at Qatar University (QU), met online in the period December 2020 to February 2021 to propose and evaluate a set of assessment criteria. Members of this group have experience in conducting face-to-face and online FGs, and individual interviews. Throughout meetings, the consensus group members reviewed the available literature in this context, evaluated the quality of evidence that suggested specific criteria, and proposed new measures that were deemed significant and relevant based on their expertise in conducting both online and face-to-face FGs.

Technical guide development for the use and selection of AV-enabled and web-conferencing platforms. The literature was searched (applying the above strategy) to identify the existing technical guides for the currently used AV-enabled and web-conferencing platforms in academic institutions and research centers (i.e., Cisco WebEx, Microsoft Teams, and Zoom). Additionally, the user guides for the three platforms were reviewed and summarized by an expert in network and telecommunications (a member of the team), and the features were critically analyzed for their appropriateness in health research use by the other team members who had expertise in health and qualitative research.

Results and discussion

Pros and challenges of online FGs

Pros of conducting FGs through AV-enabled and web-conferencing platforms. Synchronous online FGs through AV-enabled and web-conferencing platforms have been employed in qualitative health-related research in a way that closely resembles conventional face-to-face FGs. This technology provides real-time interaction among researchers and participants across a wider range of geographical locations where Internet service is accessible (Tuttas, 2015a, 2015b). The opportunity for participants and moderators to concurrently see and listen to each other allowed for immediacy and spontaneity in responses which facilitate the active role of moderators, and support the interaction,

engagement, and nonverbal activity among participants (Tuttas, 2015a, 2015b). Hence, this technology enables researchers to examine the quality of the discussions, and to gain better insights and deeper perspectives about the communications (Tuttas, 2015a, 2015b). This technology was also employed in carrying out FGs as a cost-saving technique because it eliminates travel costs for both researchers and participants (Lobe, 2017).

Challenges of conducting FGs through AV-enabled and web-conferencing platforms. Online FGs are more suitable for individuals who are substantially more likely to utilize social media or be heavy internet users (Williams et al., 2020). These platforms also necessitate the availability and accessibility of internet connection by all potential participants, in addition to functioning AV equipment, especially for desktop computers (Lobe et al., 2020). In some cases, the quality of the internet connection and the AV tools matter, especially if capturing nonverbal reactions from participants is important to researchers (Lobe et al., 2020). Also, having an adequate level of knowledge and skills in using a computer is required for both researchers and participants (Davies et al., 2020; Lobe, 2017). Likewise, an appropriate surrounding environment, where no interruptions and distractions are experienced, should be assured for optimal FGs discussions (Lobe et al., 2020; Morgan and Lobe, 2011). These all are beside the unanticipated technical issues that may arise when conducting FGs with a large number of participants (Lobe, 2017; Lobe et al., 2020; Morgan and Lobe, 2011).

Conducting FGs through online AV-enabled or web-conferencing platforms. The use of online AV-enabled or web-conferencing platforms in conducting FGs is growing in the health-related research literature. Several studies in the literature have discussed the experience of researchers and participants with online FGs in different contexts. For example, Matthews et al. (2018) focused on the national implementation of advanced practitioner radiation therapy in Australia (Matthews et al., 2018), Tuttas (2015a, 2015b) examined the impact of onboarding experiences on travel nurses' job performance (Tuttas, 2015a, 2015b), and Smith (2014) investigated the experience of low-vision therapists and occupational therapy students using WebEx technology for refining the Low Vision Independence Measure (LVIM) (Smith, 2014). These studies collectively demonstrate the benefits of video-enabled online FGs. First, they allow for the effective participation of dispersed participants. Participants from different geographical locations can come together in a virtual setting, enabling a wider range of perspectives and enriching the data collected. Second, video-enabled platforms offer the immediacy of response and high levels of group interaction and engagement, mimicking the dynamics of traditional face-to-face FGs. This fosters a conducive environment for open discussions and idea exchange among participants. In addition, online FGs can be cost-effective, as they eliminate the need for travel and accommodation expenses associated with in-person meetings.

However, these studies also highlight some challenges associated with video-enabled online FGs. Technical issues, such as unstable internet connections or software glitches, can disrupt the sessions and cause participant reassignment or data loss. To enhance the benefits and overcome challenges, several strategies are recommended. Researchers should establish clear protocols and guidelines for conducting online FGs, including pre-session software testing to ensure accessibility, stability, and recording capability. Moreover, researchers must have a comprehensive understanding of the technology being used to ensure optimal data collection. In addition, clear instructions and guidance should be provided to participants to mitigate any potential usability challenges they may encounter. Furthermore, adequate training and support should be

provided to both researchers and participants to ensure smooth and effective engagement during the sessions. When it is feasible, sending research assistants to participant sites to provide hands-on assistance might also be helpful.

In a series of studies, researchers examined different modalities for conducting focus groups (FGs) and interviews: Namey et al. (2020) compared in-person, online video-based, online chat-based, and online email/message board-based modalities (Namey et al., 2020); Rupert et al. (2017) compared video-based and live chat-based synchronous online FGs with face-to-face FGs (Rupert et al., 2017); and Kite and Phongsavan (2017) compared face-to-face FGs with web-conferencing service (Blackboard Collaborate) FGs (Kite and Phongsavan, 2017). Together, these studies suggest that employing various modalities for FGs and interviews offers several advantages. Firstly, audio-visual modalities (in-person and online video) tend to generate substantially more data compared to text-based modalities. This suggests that the visual and auditory cues present in audio-visual modalities enhance the richness and depth of data collected. In addition, online modalities offer the advantage of cost savings in terms of travel expenses, especially when compared to in-person FGs. Online modalities also provide flexibility in terms of scheduling and enable the participation of geographically dispersed populations, allowing for a more diverse sample. Furthermore, the quality of data and level of discussion in online modalities were found to be comparable to face-to-face approaches, making them a viable alternative, particularly for remote or rural populations. Nevertheless, these modalities come with their own set of challenges. Online data collection is typically more expensive per event than in-person interviews or FGs, primarily due to platform fees, transcription requirements, and longer scheduling periods. Participants in video-based FGs may experience reduced rapport and personal ease, while text-based FGs may lead to a higher likelihood of opposing views among participants. Technical issues can also arise in online modalities, potentially impacting the quality and reliability of the data collected. Therefore, it is crucial that researchers consider the research objectives and target population in selecting the appropriate modality and choose a modality that aligns with their research goals and caters to the needs and preferences of participants.

Gratton and O'Donnell (2011) have examined the preferences of First Nations people living in remote communities in Canada regarding online health information through the conduction of focus groups via a multi-site videoconference (Gratton and O'Donnell, 2011). The authors remarked on the success and the quality of data collected using the video-conferencing approach through active participation, and the ability to observe facial expressions and body language which aims to minimize the likelihood that responses will be misunderstood (Gratton and O'Donnell, 2011). Moreover, the adoption of this strategy in conducting FGs revealed enormous cost and time savings (Gratton and O'Donnell, 2011). Nevertheless, the authors reported some limits to the use of video-conferencing strategy such as the difficulties in coordinating the session (Gratton and O'Donnell, 2011).

In an attempt to overcome the challenges of face-to-face FGs (e.g., recruitment challenges of healthcare professionals, geographical issues, and limited research budget), Flynn et al. (2018) used a video-conferencing technology (Alberta Health Services "Telehealth") to conduct FGs with healthcare professionals on process evaluation of two research programs in Canada (Flynn et al., 2018). It was shown that the use of video-conferencing technology accommodated the needs of the participants by increasing scheduling flexibility and offering a high-quality service that was reliable and maintained participants' confidentiality (Flynn et al., 2018). Collectively, the video-conferencing technology was more efficient and economical than face-to-face FGs (Flynn et al., 2018).

Quality measures in conducting online FGs for health-related research. The quality of qualitative research has been widely discussed in the published literature (Amin et al., 2020; Hadi and José Closs, 2016; Hammersley, 2007; Mays and Pope, 2000; Mukhalalati and Awaisu, 2019; Rolfe, 2006). Qualitative research validation involves ensuring the rigor of the data collection, management, and analysis methods. In qualitative health-related research, the use of reliability, validity, and generalizability to ensure quality should be used carefully because of differences in the research paradigm, the nature of knowledge produced by conducting qualitative research, and the utilized tools to produce that knowledge (Amin et al., 2020; Mukhalalati and Awaisu, 2019; Santiago-Delefosse et al., 2016).

Therefore, it might be best to use qualitative approaches and terms to ensure the quality of qualitative research, such as the trustworthiness criteria (Lincoln and Guba, 1985), including credibility, conformability, transferability, and dependability (Amin et al., 2020; Mukhalalati and Awaisu, 2019). Existing quality assessment tools are conceptualized and operationalized while taking the context (e.g., the nature of interaction) into consideration (Fàbregues and Molina-Azorín, 2017; O'Brien et al., 2014; Tong et al., 2007). Challenges to the determination of quality criteria include the plurality of views among researchers, particularly regarding how quality should be conceptualized and appraised (Fàbregues and Molina-Azorín, 2017; Hadi and José Closs, 2016; Hammersley, 2007; Rolfe, 2006), and the perception that qualitative research quality is highly context-dependent. Collins et al. (2012) argue that two scholars from different disciplines or intellectual communities may differ in their opinion of what quality is or how it should be measured (Collins et al., 2012). Some commonly used tools to assess the quality of qualitative research include the 21-item SRQR (Standards for Reporting Qualitative Research) (O'Brien et al., 2014) and the 32-item COREQ (Consolidated Criteria for Reporting Qualitative Research) (Tong et al., 2007). The ultimate aim of quality assessment is to promote well-designed and properly implemented qualitative research studies (Hadi and José Closs, 2016; Mays and Pope, 2000; Rolfe, 2006). In this regard, Salmons (2012) suggested that qualitative research purposes should be aligned with research design to produce quality data (Salmons, 2012). Moreover, Merriam (1998) contended that the validity of FG discoveries should be seen in the consistency between information disclosed during the interview meeting and the plan of the subsequent theory (Merriam, 1998).

Despite the large body of evidence about the experiences of researchers and participants with online FGs, only a few studies have assessed the quality of data generated through AV-enabled and web-conferencing platforms and their comparability to traditional face-to-face FGs. In addition, there is an apparent lack of guidelines for researchers on assurance and assessment of quality for FGs conducted online. Whether researchers should rely on traditional quality assessment processes and tools, or they should incorporate additional criteria is not well-elucidated in the literature. The validity of traditional FGs can be monitored by parameters such as the clarity of research questions and objectives, the appropriateness of participants' recruitment, the moderators' role, and the data analysis (Bers, 1989). Since AV-assisted online FGs resemble the traditional face-to-face FGs to a large extent (i.e., similar methodological, practical, and ethical considerations), Daniels et al. (2019) encouraged the utilization of these parameters in evaluating the validity of online FGs in health-related researches (Daniels et al., 2019). On the other hand, Pocock et al. (2021) argued that the mechanisms and framework created by Salmons (2011) on designing and conducting online interview research are crucial in ensuring the yield of quality data and could be extended to AV-enabled and web-conferencing FGs (Pocock et al., 2021; Salmons, 2011). These mechanisms include (1) considering the reason why the researcher wants to conduct online interviews or FGs, (2) sampling and recruiting participants, (3)

acknowledging the researcher's position, (4) deciding on an interview style, (5) choosing the virtual communication technology, (6) running the online interviews or FGs, and (7) dealing with ethical concerns (Salmons, 2011).

Qualitative research studies conducted online platforms have other unique features with respect to ethical and methodological considerations (Franzke et al., 2020; Lobe et al., 2020; Roberts, 2015; Tuttas, 2015a, 2015b) and as such, should be appraised according to a specified set of quality criteria. Addressing threats to quality in these new approaches can be more challenging than in conventional methods, due to the increasing methodological, logistical, and ethical complexity of these online interviewing platforms (Daniels et al., 2019). Addressing quality in the context of web-based qualitative methods such as online FGs is important because investigators and readers need criteria to ensure that the study under investigation is rigorous, transparent, and trustworthy (Hadi and José Closs, 2016; Hammersley, 2007; Lobe et al., 2020; Rolfe, 2006). This is especially relevant in this evolving approach, as certain fundamental principles are still unfamiliar to many researchers. Furthermore, quality criteria are useful to avoid the shortcomings that may be associated with the design and implementation of the new online approaches. Identification of criteria to assess the quality and formalizing them in a tool is highly warranted.

The authors of the current review believe that the validated quality criteria and tools that are conventionally used to evaluate qualitative studies conducted face-to-face such as SRQR and COREQ can be applicable in the context of socially-distant data collection methods. Therefore, a researcher can choose and apply any of the validated tools that are appropriate to their context. On the other hand, quality assessment is incomplete if additional criteria targeting the new features of the online platforms are not taken into account. Davies et al. (2020) claimed that the technology and facilitator skills are what determine the quality of data gathered during online interviews and focus groups (Davies et al., 2020).

Tuttas (2015a, 2015b) suggested some measures to be considered in choosing an online platform that is reasonable for AV-enabled or web-conferencing FGs (Tuttas, 2015a, 2015b). The importance of choosing an application that supports meetings with a maximum of ten participants was emphasized by the investigator. Tuttas (2015a, 2015b) highlighted the need for adequate security measures that restrict access to the FG meeting only to the invitees, as well as the ability to record and playback the recorded AV content. The authors of the current review believe that the chosen online application ought to offer researchers the option to apply recording restrictions to study researchers only to protect data during its collection, and to customize notifications when recording is initiated. Lobe et al. (2022) claimed that in-person data collection sessions are relatively safer because the researcher can prevent unauthorized recording, but in online data collection sessions, technologically proficient participants can secretly record without the researchers' knowledge, even with typical recording restrictions in video-conferencing software (Lobe et al., 2022). Tuttas (2015a, 2015b) also proposed that the platform should be simple for use by FGs participants and does not need to be purchased or installed on their computers. Therefore, these measures should be considered while making quality evaluation guidance for online FGs. The section that follows attempts to provide some guidance on quality measures to researchers intending to use online FGs.

Daniels et al. (2019) suggested important factors that should be considered to overcome the methodological challenges, enable authentic interactions, and ensure data are collected robustly and in adherence to ethical considerations while conducting

synchronized FG using AV-enabled technology in a healthcare research context (Daniels et al., 2019). These factors are related to (1) stability of group numbers (e.g., late/early arrival of participants), (2) technology (e.g., participants joining with audio only, and the availability of technical support for participants), (3) environment from which participants take part (e.g., distractions within the participant's environment), (4) evaluation (i.e., limited evidence of the effect on data), and (5) recruitment (e.g., participant alienation) (Daniels et al., 2019). The quality of the internet, which tends to be poorer in remote and under-resourced areas, impacts several factors that are proposed by Daniels et al. (2019) (Lucendo-Monedero et al., 2019; Robinson et al., 2015). This poses significant challenges for equitable participation in health-related research, which places a strong emphasis on addressing issues of fairness and inclusivity (Carter et al., 2021; Kaihlanen et al., 2022). As an expansion for the mechanisms suggested by Salmons (2011), Pocock et al. (2021) recommended over-recruiting participants due to high attrition rates, conducting practice sessions to ensure that all facilitators are familiar with the AV features, and assessing the technological capability of participants (Pocock et al., 2021).

A notable difference between online and face-to-face FGs is the complexity of the facilitators' role (Matthews et al., 2018; Morrison et al., 2020; Pocock et al., 2021). The researchers claimed that in virtual environments, the facilitators should possess knowledge of the technology and be prepared to address any technical issues that may arise. In addition, they should pay attention to the unique characteristics of the online platform, such as managing conversations involving multiple participants in a single space, managing participant movement between main spaces and smaller breakout rooms, managing simultaneous verbal and chat function responses, and being aware of participants' nonverbal cues and pauses. Lobe et al. (2022) claimed that moderators have access to a wider array of nonverbal cues in face-to-face group interviews, enabling them to effectively manage participants who are either less talkative or more dominant (Lobe et al., 2022). Examples of such cues include directing more eye contact toward participants who contribute less to the conversation and deliberately shifting attention away from those who tend to dominate the discussion (Lobe et al., 2022). Online modes, in contrast, enable moderators to use private chat messages to involve less active participants, effectively managing overly talkative participants, which is a common technique in focus groups (Lobe et al., 2022; Morgan, 2018). With regards to the interview question types that are well-suited for online FGs, Lobe et al. (2022) challenged the notion that traditional questioning methods and interviewer guides are satisfactory, considering the relatively inflexible dynamics observed among participants in online focus groups, especially in less-structured groups (Lobe et al., 2022). As a result, it is crucial to conduct additional experimentation using a range of question strategies (Morgan, 2018) in order to identify the most effective approaches for fostering dynamic and engaging online group discussions (Lobe et al., 2022).

Various researchers have suggested taking extra caution with adhering to ethical principles. For example, different privacy and data protection laws are advised to be followed when involving participants from diverse geographical contexts in online research (Eynon et al., 2017; Salmons, 2016; Stewart et al., 2017). Preserving privacy holds significance when considering various ideals and principles. Some fundamental values such as human dignity, upholding individual autonomy, promoting the freedom to engage and interact with others without constant surveillance, and encouraging freedom of thought and innovation (Eynon et al., 2017). An example of privacy and data protection laws is the General Data Protection Regulation (GDPR) is a comprehensive

Table 1 Additional quality assessment criteria for conducting online FGs in qualitative research studies.

Item/criterion	Description of criterion
Description of the online meeting platform	Description of the web-conferencing platform, including name, whether it is for-free or subscription-based, context of use (e.g., academic vs. business)
Features for recording of video and audio within the software	Presence or absence of features that allows recording of video and audio within the software
Security applications and maintenance of confidentiality	Elaborate if access to the online meeting space and recordings is password-protected to ensure confidential information is safeguarded
Informed consent and adequacy of information provided to participants	Explanation of how informed consent is obtained for the online data collection as well as providing adequate information to participants regarding the software functionality and potential security risk involved (e.g., breach of confidentiality)
Permission to record audio and/or video	Permission to record audio and/or video and an option is provided if a participant declines to be recorded Provide information on measures taken to ensure that the AV recording is limited to the study researchers
Privacy of participants and confidentiality of data collected	Provide information on the privacy, confidentiality, and data collection policies of the online platform used
Recruitment and potential selection bias due to technological and logistical requirements	Explain how participants were recruited to account for the high attrition rates in online FGs Explain potential selection bias due to the need to meet certain technological and logistical requirements by potential participants (i.e., explain who is potentially excluded [e.g., individuals who have no/minimal access to stable internet connection or the required AV equipment, prefer not to enable the camera for nonverbal reactions, lack adequate competence in computer and/or online technology, or have ability issues] Explain how justice was ensured in the selection of subjects such that it is free of bias that may be imposed by the use of online technology Explain how selection bias affected the quality of research findings
Moderation, facilitation and technical support	Explain whether the moderator is familiar with conducting online FG, including familiarity with the AV features and other technological capabilities Provide information regarding the presence of a facilitator, observer, and technical support person during the FG session, along with a comprehensive explanation of their respective roles and how their presence will be visible to participants Provide information on whether practice FG sessions were conducted prior to the actual session to ensure that all members are confident and competent with conducting FG sessions through the selected online platform Explain how different anticipated technical issues will be encountered
Interaction and communication	Explain how the multiple modes of interaction/communication (e.g., chat, whiteboard, sharing screens, polling, reactions, hand raising, or breakout rooms) enabled by the used platform are managed to maintain the quality of the FG session Explain how data generated from the different modes of interaction/communication are recorded and analyzed
Data analysis	Provide information on how the data analysis process has taken into consideration the online and interactive nature of the data collection
Follow-up with participants	Provide information on how post-FG session summary and study findings will be shared with participants for member checking to allow participants to review the interpretations and provide feedback, enhancing the validity and credibility of the analysis Provide information on how thank you gifts or reimbursements, if any, will be shared with participants

data protection law that applies to the USA and all EU member states. It imposes strict regulations on the collection, processing, and transfer of personal data and provides individuals with rights regarding their data (Council, 2022). Marhefka et al., (2020) also suggested providing procedures for the research team that outline expectations for maintaining privacy and confidentiality (e.g., using headphones and remaining alone in a room), professionalism (e.g., dressing appropriately and being conscious of what is shown on camera), and how to handle difficulties (e.g., develop a technical support guide) (Marhefka et al., 2020). Moreover, Pocock et al. (2021) raised emphasis on the uncertainty of ensuring participants' full understanding of the research purposes and process which necessitates an additional need for adequate engagement in the informed consent process (Pocock et al., 2021). Participants should be aware of their rights, which include the freedom to participate and the right to leave the FG at any moment without consequence. It is interesting that withdrawal is easier while doing online FG as opposed to conventional face-to-face FG because it only requires

electronically cutting the connection (Neville et al., 2016). Informed consent can be received as a verbal statement at the beginning of the FG session (Salmons, 2016; Stewart et al., 2017), or word processor capabilities or tools like Adobe Sign might be used to show their agreement on the relevant documents and to be sent through email to the researchers (Pocock et al., 2021). Moreover, with regard to data security and storage, Lobe et al. (2020) recommended that AV content has to be promptly removed from the device and the online platform used for the data collection (Lobe et al., 2020; Lobe et al., 2022).

Pocock et al. (2021) provided recommendations for analyzing and interpreting virtual qualitative data, utilizing traditional methods of qualitative research design and data management as a basis (Pocock et al., 2021). Researchers should establish what characteristics to observe (such as participant situations, behaviors, verbal and nonverbal signals), how to interpret visual observations, and whether their study design permits audio-visual recording of online FGs, which have implications

Table 2 A technical guide representing different features for AV-web-conferencing platforms.

Features	QU Cisco WebEx	QU microsoft teams	Zoom
Cloud/on premise	Both	Both	Both
Accessibility (browser, desktop & mobile app)	✓	✓	✓
Audio/video call	✓	✓	✓
Sharing content	✓	✓	✓
Sharing HD motion & video	✓	✓	✓
Chat (individual, everyone, private)	✓	✓	✓
Notes and Q&A	✓	✓	✓
Raised hand	✓	✓	✓
Polling	✓	✓	✓
Host authentication using QU credentials	✓	✓	✗
Personal room/fixed URL	✓	✗	✓
Meeting lock/unlock	✓	✗	✓
Ability to assign alternate hosts	✓	✗	✓
Allow non-QU to host online course/event	✓	✗	✗
Video layout per page (grid view)	5 × 5	8 × 6	7 × 7
Breakout sessions	✓	✓	✓
Simultaneous male & female meeting (with attendees separation)	✓	✗	✓
Ability to draw on top of shared content	✓	✗	✓
Local recording to workstation	✓	✗	✓
Customize URL site	✓	✗	✓
Security & end to end encryption	✓	✓	✗
Native live social media/external streaming (Facebook, YouTube Live)	✓	✗	✓
Attendance report—during meeting	✗	✓	✗
Attendance report—after meeting	✓	✗	✓
Transcript subtitle (in English)	✓	✓	✓
Transcript subtitle (in Arabic)	✗	✓	✗
Unlimited recording—desktop	✓	✗	✓
Unlimited recording—cloud	✓	✓	✓ (paid)
Participants	1000	3000	100 (free)
Recording transcription	✓	✓	✓
Notifications when recording is initiated	✓	✓	✓
Noise cancelation algorithm	✓	✓	✓
Desktop application sharing	✓	✓	✓
File sharing/transfer	✓	✓	✗
Remote desktop control	✓	✓	✓
Virtual background	✓	✓	✓
Artificial intelligence	✓	✓	✓
White boarding	✓	✓	✓
Financial Cost to QU faculty & staff	Free	Free	Paid by the user for unlimited meeting durations

for informed consent and data storage (Merriam and Tisdell, 2016; Pocock et al., 2021). Moreover, Pocock et al. (2021) suggested that researchers should be mindful of the research context and decide how much of it to incorporate in their reflections, analyses, and interpretations (Pocock et al., 2021). Due to the fact that researchers can only see what is in the camera field or is reported in writing, virtual research is intrinsically less contextualized than traditional field studies (Weller, 2017). However, using virtual research techniques allows one to consider how information is co-constructed, when participants' interaction is facilitated or inhibited, and overall spontaneity and nonverbal cues (Pocock et al., 2021; Weller, 2017). Hence, the influence of the virtual mode and data collection methods on analysis and interpretation should be considered. According to Matthews et al. (2018), nonverbal responses from audio-visual recordings might be included in transcripts to supplement the analysis (Matthews et al., 2018). Lehoux et al. (2006) argued that it could be difficult to analyze social interactions from in-person FGs (Lehoux et al., 2006), and Pocock et al. (2021) claimed that online FGs add complexity since users can choose to turn off their video cameras, which alters the audio-visual data that is accessible and might

have an effect on other users' behavior (Pocock et al., 2021). Therefore, in combination with the research design, decisions concerning data collection and analysis for social interactions should be taken early.

Based on the existing quality assessment tools and considering the setting of online platforms, a set of additional core quality criteria that may be used in this context is proposed and illustrated in Table 1. Despite proposing a set of core quality criteria for appraising qualitative research employing online approaches, future work should focus on consolidating the criteria and undertaking a more stringent validation process.

Technical guide for selecting and using AV-enabled and web-conferencing platforms in conducting online FGs. Academic institutions commonly subscribe to Cisco WebEx Microsoft Teams, and Zoom platforms based on the technical features of these AV-enabled and web-conferencing platforms. Table 2 illustrates the different features of AV-enabled and web-conferencing platforms, which helps qualitative researchers to select the most suitable AV-enabled and web-conferencing

platforms for their research. Zoom platform features are almost similar to Cisco WebEx; however, Zoom users experienced a “Zoom Boom” security breach, which caused major disruption in the services (Lobe et al., 2020).

Conclusions

A shift from the traditional method of conducting in-person FGs in qualitative health research to an online platform has been observed. While various synchronous and asynchronous online FG approaches were utilized in health-related research, AV-enabled and web-conferencing approaches were comparable to face-to-face FGs. The use of AV-enabled and web-conferencing platforms for online FGs offers advantages such as real-time interactions and cost efficiency. However, there are challenges related to technology and environmental interruptions. Ensuring research quality in online FGs can be more complex due to methodological, logistical, and ethical factors. In this article, a set of core quality criteria were proposed, and a consensus about them was reached by a group of researchers and IT experts. The quality criteria include a description of the online meeting platform, features of AV recording, security applications and maintenance of confidentiality, informed consent and adequacy of information provided to participants, and potential selection bias. Importantly, the technical and security measures should be carefully considered when appraising the quality of online FG research. Future work should focus on consolidating the quality criteria for appraising online FGs and undertaking a more stringent validation process. This work provided a technical guide about different platforms to help qualitative researchers to select AV-enabled and web-conferencing platforms to conduct their online FGs based on their research needs.

Data availability

The original contributions presented in the study are included in the article; further inquiries can be directed to the corresponding authors.

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Additional information

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