

DISCURSIVE ARTICLE

A practical guide to using diary methods in qualitative research

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Abstract

The use of qualitative methods is growing in anatomical sciences education. While common qualitative methods such as interviews and focus groups can provide rich insights into participant experiences, there is a wide variety of other qualitative methods that are ideal for different research topics. Research topics that may be emotive or sensitive can be challenging for participants to discuss when face-to-face with a researcher, and thus, methods such as qualitative research diaries can be ideal in circumstances where focus groups and interviews may limit participant engagement and depth of data collection. As diaries are added to over time, they can also be used to understand change and learning. Accordingly, studies using diary methods have substantive potential for furthering anatomical sciences education research. To aid researchers interested in using diary methods, this discursive article provides a practical beginner's guide to qualitative diary studies. First, we review the background and benefits of qualitative diary studies with relevance to health professions and anatomical sciences education. This includes a description of different types of diaries, such as handwritten, typed, audio, and audio-visual diaries. We also discuss key quality indicators to ensure that diary studies are conducted with rigor and ultimately contribute important research findings to advance anatomical sciences education. Drawing on case examples from our own prior health professions education research, we provide practical guidance on how to design and undertake diary studies, including ethical considerations, participant support, and analytical considerations, as well as highlighting challenges that researchers may encounter.

KEYWORDS

anatomical sciences education, audio diaries, diaries, health professions education, qualitative research

INTRODUCTION

Diaries are repeated, first-person accounts of events, experiences, emotions, and reflections.¹ As entries are made over time, diaries can capture temporal change or continuity and allow diarists to engage in meaning-making.^{1,2} While personal diaries are typically

intended for the author's eyes only, diaries have been used for research purposes across various disciplines.¹

Biographers and historians analyze personal diaries to understand people and times past, and clinical and psychological researchers use diary-based approaches for participants to indicate the presence and severity of symptoms.^{1,2} Qualitative researchers

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themselves can keep diaries to document their research thoughts and processes, such as ideas for themes and decision-making during qualitative data analysis.³ Such researcher diaries are typically revisited across data analysis as a means of maintaining reflexivity (i.e., critically examining how one's beliefs and assumptions shape the research process).³

Relevant to this special issue, qualitative researchers may also ask participants to keep diaries as a method of data collection, aiming to understand individual perspectives on a research topic.^{1,2,4} These diaries, often known as *solicited diaries* to distinguish them from personal diaries, are gaining prominence in health professions education research (HPER) due to their distinct advantages over other qualitative methods.^{4-13,14} Unlike common qualitative data collection methods such as interviews and focus groups, solicited diaries are completed by participants without researchers or other participants present. These characteristics may aid participants in documenting personal and sensitive information, which can be particularly important when the research topic may evoke strong emotions or threaten social standing.^{2,15}

Diary methods have been successfully used in HPER to study topics that can be challenging for participants to discuss, including uncertainty tolerance,¹¹⁻¹³ professional identity formation,^{14,16} and preparation for practice.^{5-10,17} While diary methods are not yet widely used in anatomical sciences education, they may be useful in exploring research topics that are emotive or sensitive, such as experiences of ethical dilemmas when engaging with donor dissection,¹⁸ death and dying,¹⁹ experiences of underrepresented learner populations,²⁰ neurophobia,²¹ and learner wellbeing and burnout.²²

Other advantages of diaries relate to time, both in the timing of each diary entry and longitudinally across a diary study.²³ Participants can complete entries close to the occurrence of events, enhancing their ability to describe rich thoughts and emotions, and reducing the chance of details being forgotten, omitted, or changed, particularly compared to interviews, which may happen sometime after events occur.⁴ As multiple diary entries are documented across the duration of a study, they can also be used to track changes in perspectives, experiences, and learning, or conversely, aspects persisting over time.^{4,14} Given that diaries are typically completed with a degree of flexibility in relation to timing and location, they can also support data collection from participants in diverse locations, and for those who may struggle to attend scheduled interviews. This flexibility may also benefit the research team, as precious researcher time can be devoted to data analysis rather than, for example, scheduling and facilitating interviews. Furthermore, different ways of completing diaries (i.e., mediums) can also be considered to support the engagement of diverse participants.

Diary mediums

While handwritten diaries are a well-known diary medium, multiple other approaches are used in education research, including typed, audio, and audio-visual diaries.^{4,14,15,24} Each approach has nuances

that may make it particularly beneficial for different research contexts, topics, and participants. Practical considerations may also influence which approaches are used, such as funding (e.g., for recording devices, transcription, and hard copy diaries) and researchers' skills and interests.

Handwritten diaries are where this research method originated. This traditional approach is still used today,¹¹ and may be particularly relevant in circumstances where researchers are using an art-based methodology,²⁵ where there is concern about generative artificial intelligence (AI) outputs being submitted by participants,²⁶ or indeed, where participants prefer to handwrite. While technology is not required to produce the diary, diaries can be digitally scanned or photographed for submission to researchers, particularly in situations where physically submitting diaries is not possible or challenging for participants. Handwritten diaries are typically transcribed for input into computer-assisted qualitative data analysis software (CAQDAS), so challenges may arise when participants' handwriting is illegible.

Typed diaries may be a more familiar medium, particularly for students who are used to typing notes and essays. The availability of technology and ease of typing also mean that this approach is more amenable to editing compared to handwritten diaries, either by the diarists themselves, or through the use of AI writing assistants (e.g., Grammarly). The capacity for such editing to influence the data collected may be particularly important if the research objectives include understanding not only what is written, but how participants make sense of their experiences, and how language is used (e.g., discourse analysis).

Audio diaries, also known as longitudinal audio diaries and solicited audio diaries, are growing in prominence in HPER.^{4,14} They may sometimes be used in combination with video, as for audio-visual diaries.²⁴ The availability of smartphones and a plethora of audio recording applications means audio diaries are now easily recorded and are an increasingly familiar medium for learners accustomed to audio and video recording for social media purposes. A distinct advantage of audio diaries over written formats is how they enable participants to "break the rules of writing",⁴⁽¹³⁴⁷⁾ which may encourage a more fluid approach to diary entries. This can facilitate participants to describe a "rolling stream of consciousness" of their experiences and meaning making,⁴⁽¹³⁴⁷⁾ with these diaries less likely to be edited after recording. Raw or unpolished prose in diaries, such as half sentences, backtracks and corrections, can indicate diarists' progress with meaning-making. Scripting and then reading or editing diaries polishes away such examples, thus potentially altering or misrepresenting important aspects of participants' experiences. Accordingly, researchers may need to reassure participants that rough, unscripted and unedited diary entries are acceptable, and indeed, preferred.

Audio diaries may also provide researchers with information about participants' pitch, tone, and volume of voice, which can help researchers to further understand participants and their stories.¹⁴ With readily available recording technology on smartphones, diary recording may also be more immediate and in the moment than

written forms. Audio diaries are typically transcribed by researchers, which can be challenging in the event of poor audio quality or background noise during audio recordings. Even relatively short audio recordings (e.g., a few minutes) can result in transcriptions hundreds of words long. This can quickly create large datasets, which researchers should bear in mind when planning researcher's time for transcription and analysis.

Some researchers select a single diary medium for their studies based on their different strengths and drawbacks. Others may incorporate multiple diary mediums, allowing participants the flexibility to choose a diary medium that aligns with their preferences, resources, and abilities, which may enhance engagement and inclusivity.^{11,16}

Beyond the choice of diary medium, there are a number of other considerations for researchers when designing diary studies. Carefully planning diary studies from the outset can help to ensure ethical participant involvement and data management, that rich insights are collected that facilitate answering the research question(s) and that meaningful contributions can be made to the literature. Drawing on our experiences with diary methods in HPER, the remainder of this discursive paper will overview key considerations for designing and using diary methods, with the goal of supporting rigorous diary-based research in future anatomical science education studies.

DESCRIPTION

To illustrate the process of designing and applying diary studies, we share three case studies from our own work that have used diary methods in Table 1. The case studies are referred to throughout this description to make visible our decision-making and research conduct.

Designing studies using diary methods

As with any qualitative research approach, it is important to start by considering whether diaries are suitable for the research topic. Diary methods align with research objectives that focus on exploring research participants' experiences and meaning making of the topic of interest over a period of time. For example, our studies were each interested in examining how experiences over time shaped the perceptions of participants across different contexts, such as preparedness for practice, transition to practice, and learning to manage uncertainty in health professions education.

Data collection using diary methods can be protracted, and the acceptability of this to the participant cohort and research team, as well as adequate funding and resources, are concerns that should be evaluated early in the study design. Carefully understanding the research problem and gap are thus imperative to establishing the need for participants to engage with longitudinal data collection. Alignment of the diary method with the underpinning philosophical

positioning of the research approach is also vital to demonstrate internal coherence: that is, consistency across the study's philosophy, methodology, and methods.²⁷ Diary methods are most often conducted from an interpretivist theoretical perspective, where the assumption is individual meaning-making through diary construction of subjective experiences and shared meaning-making through diary interpretation, as for case studies 1–3.

Epistemological and methodological positioning should also be aligned. Our studies were situated within a subjectivist epistemology, which acknowledges the personal involvement of the researcher and the role of social contexts in shaping meaning; however, we each selected different methodologies. Longitudinal qualitative research was applied in case studies 1 and 2, with the addition of narrative inquiry in case study 2 to better understand participants' experiences through storytelling. Case study 3 employed a constructivist grounded theory methodology given the intention was to examine transition as a process. Understanding the philosophical positioning of the research team, as well as their experiences in qualitative research or diary methods specifically, is important to inform the assessment of internal coherence. Undertaking a research team reflexivity exercise is recommended to help researchers build an understanding of how their respective positioning and experiences shape the research process.²⁸

Determine study duration, entry frequency, entry timing, and diary medium

Once diary methods are identified as suitable for the research, the next step is to consider the temporal aspects of study design, including the study duration, diary entry frequency and timing, and diary medium. As diary methods are suited to understanding change over time,²³ it is useful to reflect on the time period that diary entries are needed to effectively explore the topic of interest, and whether this is achievable within funding constraints. This should include a thorough literature review to identify what is known about the topic, and whether prior research includes cross-sectional or longitudinal studies. Engaging with theoretical frameworks related to the topic may provide further insights into study duration. For example, in case study 1, participants recorded diary entries over an entire academic year as the researchers were interested in examining how uncertainty tolerance shifted over this time. This decision was made using prior cross-sectional literature that identified differences in the measured level of uncertainty tolerance across medical school year levels.²⁹ In contrast, for case study 2, participants recorded diary entries for 3 months following graduation to capture their early practice experiences upon entering the workforce as new practitioners.

In addition to study duration, the frequency of diary entries being recorded by participants also needs to be determined. This is informed by the topic of interest, the desire to observe change over time, and how quickly that change is expected to occur, as well as study duration, acknowledging that a minimum of two entries at two different time points is essential for a study to be

TABLE 1 Overview of case studies employing diary methods.

Case study	Research topic, participants, & questions	Philosophical underpinning & methodology	Diary format & timing	Practical considerations
1: Stephens et al. ¹¹⁻¹³	Uncertainty tolerance (UT) in medical students ($n=41$) Research questions: How do medical students, in their clinical years, experience uncertainty stimuli? What factors do medical students in their clinical years perceive as moderating their perceptions of, and responses to, uncertainty? How do medical students describe their responses to uncertainty? How (if at all) do described responses change over time? How do described responses contribute to understanding the UT construct?	Interpretivism, social constructionism and longitudinal qualitative research	Choice of audio, written or typed diaries, six submission time-points across an academic year. Semi-structured interviews occurred at study mid and end points	Diaries submitted to one researcher via email. Email reminders sent approximately 1 week before each diary entry submission and to follow up overdue submissions. The first author listened to or read all entries and replied to participants to acknowledge the receipt of diaries and ask clarifying questions as needed. Otter.ai used for transcription of audio diaries. Data analysis supported by NVivo
2: Ottrey et al., ⁶⁻⁸ Rees et al. ^{9,10}	Preparedness for practice amongst healthcare graduates ($n=35$) Research questions: How do final-year students conceptualize preparedness for practice and how do such conceptualizations change as they become new practitioners? To what extent do final-year students feel prepared for practice and how do their preparedness experiences shift as they become new practitioners? What multiple and multidimensional transitions are experienced moving from final-year student to new practitioner? What facilitates and hinders participants' preparedness across their transition? What are the emotional and psychosocial impacts of preparedness experiences across their transition?	Interpretivism, social constructionism, longitudinal qualitative research and narrative inquiry	Audio diaries, submitted weekly over a 3-month period upon entering the workforce. Audio diaries were bookended by semi-structured individual or group entrance interviews and exit interviews	Diaries recorded on participants' smartphones and submitted to one of three researchers via email. The researchers listened to audio recordings and asked follow-up questions (e.g., to probe or clarify diary content) via email. Email or SMS reminders sent each week and to follow up overdue submissions. Professional transcription service used for transcription of audio diaries. Data analysis supported by NVivo. Participants' responses to follow-up questions analyzed alongside audio diaries
3: Matthews et al. ⁵	Transition to practice in radiation therapy ($n=7$) Research questions: What is the transition to qualified practice experience of radiation therapist graduates? What is the perceived impact of the pandemic on preparedness for practice experiences? What are the factors influencing the process of transitioning to practice?	Interpretivism, social constructionism, constructivist grounded theory methodology	Audio diaries for a 6 month period. Frequency determined by participants. Period between 3 and 9 months after commencing work on graduation. Preceded by focus group; exit interview at 10 months	Diaries recorded on participants' smartphones and submitted to lead researcher via email. Email reminders sent approximately 4 weekly if no diaries had been received. Email acknowledgement on receipt of each diary entry: clarification of diary content not requested. Otter.ai used for transcription of all audio data. Data analysis facilitated using NVivo

considered longitudinal.²³ Equally, too many diary entries over a protracted period may be challenging for participants to sustain, therefore impacting their engagement in the research. It is helpful to consider the discussion points or prompts participants will use to complete their diary entries (see section below), influenced by the research question(s), as this may also inform diary entry frequency.

Some diary studies ask participants to record a diary entry at timed intervals (e.g., daily, weekly, and monthly), whereas others ask for entries contingent on events experienced.¹⁵ For example, case study 1 asked participants to complete their diaries at six scheduled time points during the year of the study, which corresponded to periods of clinical placement. This decision considered workload for participants (i.e., the work of completing diaries in addition to their usual learning commitments), and that experiences may change with each placement. Case study 2 asked participants to complete weekly diaries over the 3-month study period; however, participants could choose when this happened. For example, they could complete their entry at the end of the week following reflection on their whole week or complete their entry during the week when an event occurred. Case study 3 offered even greater flexibility, where the frequency of diary entries was determined by participants, dependent on their transitional events and experiences during the six-month period of recording their entries. This was an intentional choice in line with the research question and methodological approach.

Along with diary frequency is the consideration of how, and how frequently, researchers should prompt participants to complete their diary entries. Participants may need reminders to complete their diary entries at scheduled time points or be regularly reminded to submit their recorded diary entries if the frequency of recording is more flexible. Reminders can be sent in different ways, such as by email or text message, depending on the process approved by ethics, participant preference, and the relationship between participants and researchers. It is also important to frame reminders in a way that is not perceived by participants as pressuring.

As described in the introduction above, diary entries can be recorded via different mediums: by hand or typing, or audio or video recordings. The selected format may depend on the overall research approach. For example, researchers using an arts-based methodology may use handwritten diaries to incorporate visual components, and those using a narrative methodology may prefer audio diaries to allow impromptu stories to be shared. Research practicalities can also inform selection. For example, while typed diaries may still need anonymization, they do not need to be transcribed prior to data analysis. Audio diaries do need transcription, and this can be difficult if the sound quality is poor. It is also worth considering the participant cohort and their comfort in using technology to record diaries and engage fully in the research. For example, the ability of participants to record audio diaries on their smartphones anywhere and at any time was a factor influencing the choice of diary format for case studies 2 and 3. Researchers may also provide participants with a number of options to self-select a format that aligns with their

preferences,¹ as in case study 1, which may enhance participant engagement and reflection on their experiences.³⁰

Develop prompts or questions to guide participants

Beyond the diary medium, researchers also need to provide participants with instructions on what to document in their diaries. The extent of these instructions can vary considerably in depth and breadth depending on the research question(s). Relatively unstructured approaches may be used in some studies, such as where there is very limited prior research, and the focus is on naturalistic and lived experiences. Most diary studies in HPER use a semi-structured approach where a degree of guidance is provided about the diary content, balanced with flexibility or breadth for participants to document their experiences without being unnecessarily constrained.^{15,14}

Instructions for participants are typically in the form of prompts or guiding questions, which are brief statements or questions for participants to reflect on and respond to in their diary entries. Participants should be given direction on whether to address any or all of the prompts in each diary recorded. Prompts may be relevant and applicable for each diary entry, or they might shift across the course of the study depending on the research context and question, as well as any preliminary analysis of diary entries. For example, case study 1 asked participants to: "Describe and reflect on a scenario from your experience as a medical student in which you felt: (1) Certain; and (2) Uncertain". Analysis of the first round of diary entries identified that many participants focused on describing events without reflection, so the prompts were adjusted to add a brief reflective framework, which included details about emotions and the significance of experiences.^{11,31} In contrast, participants in case study 2 were given a printed instruction sheet that encouraged them to share memorable experiences, both positive and negative, of preparedness and unpreparedness. Prompts were provided to elicit further detail about these experiences, such as: when and where did the events occur, who else was present, what happened, what did you do, what was the reasoning behind what you did, and what were you thinking and feeling at the time? As a different approach again, case study 3 prompted participants to record any thought, feeling, experience or reflection that they felt was significant to their transition to practice experience. Although this flexibility enabled participants to select moments to narrate that they felt were important, contributing to a rich and reflective dataset, the diversity of the raw data did add to the analytic workload of the researchers.

Ethical considerations of diary studies

Once a research proposal is developed to include elements such as the study duration, diary medium, and prompts to which participants will be asked to respond, researchers will need to gain ethical approval through an institutional review board or ethics committee as relevant to their research context. Ethical considerations of

particular relevance to diary studies include participant consent, researcher-participant communication and power dynamics, and managing actual or potential participant harm.²³

Informed consent should be obtained in writing before study commencement. To ensure participants understand what they will be asked to do during the study, they should be provided with a detailed explanatory statement and an opportunity to ask questions of the researchers before a consent form is signed. Because diary studies are longitudinal, this adds some complexity to consent processes compared to cross-sectional studies. It may be helpful for researchers to consider consent in dynamic terms, that is, participants may change their mind about participation and withdraw their consent, or conversely, signal ongoing consent by continuing to engage in diary entries. Accordingly, researchers should provide participants with a clear directive for how to withdraw from the study should they wish to, and the implications for any diary entries already submitted (e.g., whether they will be included or excluded from analysis).

Providing clarity on the communication that will occur between researchers and participants is another important aspect to include in consent for diary studies. For instance, how will the researchers contact participants about the study and how often; whom can the participant contact if they have questions or want to withdraw from the study; and whether the researchers will contact participants to clarify what was said in diary entries? In case study 1, consent forms included contact preferences for study reminders (email and text messaging). The explanatory statement detailed that participants would be contacted to remind them about diary entry submission due dates, up to two further reminders for overdue diaries, and to confirm that diary entries had been received by the researchers. In the confirmation email, researchers could ask participants questions to clarify diary content as required (e.g., where words were inaudible or illegible). For case studies 2 and 3, these aspects of communication were discussed in the initial study briefing (see section below). Participants were encouraged to raise any concerns about communication or their participation in the study with the researcher receiving their diary entries.

When seeking ethical approval, researchers need to clarify the nature of relationships and power dynamics between researchers and participants. This is particularly relevant in HPER because researchers often hold other roles (e.g., educators and clinical supervisors), which may result in power imbalances and impact participants' psychological safety and openness about their experiences. While anonymity is an approach often used in research to mitigate power imbalances, this is not always achievable in diary studies, particularly when diary entries are being submitted directly to researchers via email or where recognition of individual participants is more apparent in video or audio diaries. The small size of some healthcare programs and professions may also inadvertently allow researchers to deduce participants' identities from deidentified transcripts. For instance, for a study examining healthcare student experiences, details such as participant gender, clinical placement location, and date may be sufficient to identify a participant. Thus, researchers will need to carefully consider whether it is appropriate to include team

members with known relationships to participants (e.g., teachers, assessors), and if so, how their specific research tasks and data access need to be limited to protect participants (e.g., avoiding data collection, only analyzing deidentified transcripts). Unlike research in scientific or post-positivist paradigms, interpretivist research embraces researcher involvement and subjectivity, so carefully considering the relationship between researchers and participants can powerfully influence participants' trust and engagement in the study.

In case study 1, the research team consisted of a doctoral student and two supervisors. The doctoral student knew the identities of participants, but she deidentified participants' diaries before they were reviewed by other research team members. While the doctoral student was known to many participants in her role as a former anatomy tutor, during the study she only had a research role. For case study 2, while the research team included academics with unit/course coordination and teaching roles, the three researchers responsible for participant recruitment and data collection had no pre-existing relationships with participants. They were, however, of the same profession as some participants (dietetics, pharmacy), helping them to bring a greater level of understanding and insight in relation to participants' experiences at university and in the workplace. Similarly, case study 3 included a research team where some members were employers of graduates. As a result, the lead researcher, who was from the same profession but with no influence on graduate career pathways, managed all diary submissions and the deidentification of transcripts prior to team analysis.

A further element that may shift power dynamics in diary studies is whether diaries are used purely for research purposes or are concomitantly used as educational or assessment activities (e.g., as part of reflective learning portfolios). An abundance of caution is recommended in such circumstances, as using diaries for assessments may influence participants' openness, particularly for sensitive topics or where diary content may have academic or professional implications. For instance, grading diary entries that ask participants to describe and reflect on professional dilemmas, critical incidents, and clinical errors may result in participants selecting or altering scenarios to minimize repercussions for themselves or others.³⁰

Additionally, the very nature of recording diaries can build rapport between participants and researchers, specifically those acting as data collectors, beyond that of other qualitative approaches. In case studies 1–3, several participants routinely opened their diary recordings with a personal greeting for the researcher responsible for data collection and ended with a personal farewell. Additionally, in case study 3, some participants disclosed an experience of personal challenge within their diaries, not aligned with the intention of the research. As a result, the researcher consistently listened to the recordings before sending an email to confirm receipt to allow for a personalized and sensitive response, with a reminder of available support services if required.

Researchers should also consider how to manage actual or potential participant harm as part of their submission for ethical approval. Completing diaries typically requires participants to detail personal experiences, including their emotions, and may result in

disclosures of harm even if these are not requested as part of the diary prompts. Mental health concerns are one area of potential harm that was disclosed by participants in case study 1. Participants were provided with details of institutional counseling services at the study outset, and working with the ethics committee for advice, participants were sent a reminder partway through the study about support services and their right to withdraw from the study. Rarely, more serious concerns about harm (to self or others) may require researchers to break confidentiality. This situation should be flagged in the study explanatory statement.

Supporting participants throughout the study

Diary studies, by their nature, require commitment from participants over time. Consideration for how to support participants throughout the study may help minimize drop out and aid in the collection of quality data. Mechanisms to support participants in diary studies include initial study briefings, respectful communication approaches by researchers, and incentives. The amount of support provided to participants can vary considerably, depending on the research topic and resources available to researchers.²³

For most diary studies, an initial study briefing can help to inform participants about the study and research topic, and clarify any expectations about engaging with diary methods. It provides the opportunity for participants to ask questions of the researchers and, if necessary, practice the process of recording and submitting audio or video recordings. Briefing may also include the dissemination of instructions and prompts for completing diary entries, and an explanation of support available to participants during the study. Importantly, briefing provides the opportunity for the researcher receiving the diaries to make a personal connection with the participant, which may help them feel more open to sharing their thoughts and feelings in their diary entries. The timing of the briefing may vary; however, depending on the study schedule. For instance, in case study 1, the lead researcher explained diary methods and the importance of studying uncertainty during in-person and Zoom meetings with prospective participants. In contrast, in case studies 2 and 3, participants were recruited to the study knowing that there were multiple phases to the research, including diaries. However, the researchers leading the diary phase provided a detailed explanation of the diaries and their expectations in person, after participants had consented, following the initial individual or group interview that preceded the diary phase.

Ongoing and respectful communication between researchers and participants is key to supporting participants across the duration of a study. Respectful participant relationships are particularly important in diary studies, as this helps ensure that participants sufficiently trust researchers to authentically convey their experiences over time.¹⁴ Across all three case studies, researchers built trust by having a single researcher who communicated with a given participant across the study to receive entries and ask follow-up questions (discussed in more detail below). For case study 2, this responsibility

was split across the research team, whereby each researcher had a group of assigned participants.

Communication should occur in the way and at the frequency approved by the ethics committee and as discussed with participants at the study outset, so participants do not feel overwhelmed or bombarded with information, questions and requests. Communication may include research practicalities (e.g., reminders about diary entry submission, changes to prompts and acknowledgement of diaries received), as well as reassurance to participants that their entries are helpful to the researchers and guidance on what to include in future entries. For example, in all three case studies, the researchers would read or listen to each diary entry as quickly as possible after receipt, then respond to participants via email (within 24 h wherever possible) to acknowledge the diary received. As relevant, and tailored for each entry, the researchers would thank the participant for their contribution, provide a brief comment on the content (e.g., "it was interesting to hear about X", "this seems to be a common experience for new graduates"), ask follow-up questions for clarification (e.g., "what did you do when X?", "what is the date of this recording?"), and provide encouragement for their next entry (e.g., "looking forward to hearing how this resolves next week"). Additionally, in case study 2, if a participant had not submitted a recent diary entry, or their entries were infrequent, the researchers would also check in with the participant to determine their willingness to continue in the study and explore alternate options if required, such as fortnightly diary entries instead of weekly, or typed diaries instead of audio. In our experience, participants may include notes or ask queries of the researchers in their diary entries or when returning their entries (e.g., in the body of their email). Attending to these notes or queries can help participants feel valued and alleviate concerns about their continued participation in the study.

Participant incentives or payments are used by many researchers to acknowledge the significant time commitment typically required by participants in diary studies. For case study 1, participants who completed all stages of the study were provided with a \$100 gift card to thank them for their participation and commitment to the study. By contrast, participants in case study 2 were given a \$10 gift card for each study phase they participated in. Participants did not have to complete all 3 months of audio diaries to receive a gift card; any contribution to this study phase was recognized. Additionally, audio diary transcripts were returned to participants for them to use as evidence of their reflective practice. Although participants in case study 3 were not offered incentives, the five participants that undertook an exit interview shared that they had enjoyed the reflective triggers prompted by recording diaries. Certificates of participation from institutions are another small way to acknowledge participants' contributions.

Analyzing diary data

Like other types of qualitative data (e.g., interviews, open-ended survey responses, field notes), there is no prescribed approach to

analyzing diary data. Suitable analytical approaches for diary data include those commonly used in qualitative research, such as framework analysis (case studies 1 and 2), constructivist grounded theory (case study 3) and reflexive thematic analysis.³ Due to the longitudinal nature of diary studies, however, researchers should consider how the analysis approach will explore findings regarding change or continuity over time.²³

Approaches to analyzing qualitative data typically involve an initial immersion or familiarization phase.^{3,32} For diary studies where data are collected throughout the study, analysis can commence once the first diary entry is received. Analysis of early portions of the dataset can allow researchers to start documenting their insights and allow them to identify problems with data collection they had not anticipated, like in case study 1, where the researchers realized that participants were typically describing scenarios without reflection or meaning making.

Importantly, there are multiple ways in which researchers can journey through a dataset during their analysis. For instance, analyzing a set of diary entries from one participant in the same analysis session may allow researchers to better appreciate change in that participant's perspectives and experiences over time. Conversely, looking across participants at one particular time point may enable researchers to build up a broader picture of diverse participant experiences in the same stage of a study. Oscillating between these cross-sectional and longitudinal approaches may enable researchers to better understand nuances in the data that either approach alone may overlook.

When managing data during the analysis, commonly using CAQDAS, we recommend including a way for coding time (e.g., codes for time-points or date of diary entries) to help make comparisons over or through time in thematic coding. For instance, case study 1 had codes for six study time-points, which enabled the researchers to identify some changes in participants' responses to uncertainty over time. Similarly, case study 2 had codes for each study week to enable the tracking of change through time, with data also grouped according to the primary time-points of interest: before and after participants had started work as healthcare professionals. By contrast, case study 3 viewed time as a continuum in line with the philosophy underpinning a constructivist grounded theory approach. To capture the concept of time during analysis, the researchers examined how time was reflected during the evolving categories, and described time within category properties. Category names also reflected time where relevant. For example, 'becoming the radiation therapist' was the key finding that reflected shifting identity during the transitional time period.

Depending on the research topic, theoretical or conceptual frameworks can also aid researchers in making sense of data and linking findings to existing literature. For instance, case study 1 utilized the integrative uncertainty tolerance model³³ as a conceptual framework for understanding participants' experiences of uncertainty. Researchers oscillated between inductive and deductive approaches that respectively identified components of the integrative uncertainty tolerance model and built a theory of uncertainty tolerance specific to the research context and participants. In case study

2, Multiple and Multi-dimensional Transitions (MMT) theory^{34,35} was applied to inform data collection, analysis, and interpretation. Through the analysis of participants' transition stories, extensions to MMT theory were proposed relating to the temporal and emotional aspects of transitions.

Some diary studies may include other sources of data, in addition to diaries, that researchers will need to consider in their analyses. Case studies 1–3 used individual or group interviews at specific points in time to further understand participants' experiences. Such approaches are commonly termed diary-interview studies.¹⁵ For example, in case study 1, participants completed an individual or group semi-structured interview halfway and at the conclusion of the diary portion of the study. The individual interviews allowed the researcher to question participants about experiences raised in their diaries, and group interviews also allowed for sharing experiences and collective meaning-making. In case studies 2 and 3, audio diaries were bookended by individual or group semi-structured entrance and exit interviews. For case study 2, this study design enabled the researchers to explore participants' perspectives and experiences before, during, and after they entered the workforce as new graduates. Other sources of data may include participant responses to follow-up questions from researchers seeking clarification (as used in case studies 1 and 2) or researcher field notes in observational or ethnographic studies. Different data sources may be separated or combined for data analysis depending on the research question(s). Decision-making either way is typically included in study methods, and data sources may be added to illustrative quotes in study results to demonstrate to readers where these were drawn from.

As well as analyzing participant diaries, researchers themselves should keep a diary or reflexive journal that documents their impressions, ideas, and decision-making across the process of analysis.³ This can include electronic notes and memos in CAQDAS. These can then be used to guide team discussions during analysis, helping researchers to maintain reflexivity and challenge each other's assumptions about the developing study findings.

DISCUSSION

Diary studies have the potential to enhance qualitative research in anatomical sciences education by elucidating rich individual experiences and changes over time. Through the description section of this article, we drew on case studies to help illustrate the practical and theoretical considerations researchers need to conduct quality diary studies. Key quality indicators, also known as ways in which researchers convey rigor or trustworthiness, need to align with the philosophical underpinnings of the research.²⁷ Like many diary studies, all three case studies were underpinned by an interpretivist worldview. Indicators of quality in interpretivist qualitative research are overviewed by Dueñas et al.³⁶ and typically require a detailed methods section with information such as how reflexivity and respect for participants are maintained throughout the research process.³⁷ A further aspect of quality with relevance to diary studies is



the consideration of how time shapes and influences the research process and outcomes.²³

While all three case studies are now published, there are potential challenges and limitations that should be considered when embarking on a diary study. At the outset of diary studies, a major challenge may include sourcing sufficient funding to support the desired study duration and sample size. Insufficient funding that curtails data collection may potentially impact the ability to answer the research question(s), and therefore, researchers will need to carefully consider whether to proceed with a smaller study or source further funds. Based on our experiences, common challenges during diary studies include participant attrition, variable diary depth, and unanticipated time demands.

Like all longitudinal qualitative research, diary studies are likely to include some participant attrition.^{4,23} For instance, 35 of 41 participants completed all study phases in case study 1, 22 of 35 participants completed all study phases in case study 2, and 5 of 7 participants completed all phases of case study 3. While participant attrition can be minimized by careful study planning and considering participant support, we recommend that sample sizes are planned with a degree of attrition in mind. To help plan sample sizes, we recommend using the concept of information power.^{38,39} While originally developed for qualitative interview studies, this concept is now more widely applied and recommended across qualitative research.^{6,7,11-13,39,40} It considers five factors that influence the richness of data: the breadth of the aim of the study, specificity of the sample, use of theory, dialogue quality, and analysis strategy (case or cross-case). The greater the information power of a study (e.g., narrow aim, use of theory, participants with in-depth lived experience of the phenomenon being studied, etc.), the fewer participants that will be required. While the component regarding the quality of dialogue is of greater relevance to interview studies, researchers who are using diary studies without interviews could consider the quality of diary monologues (e.g., are participants recording detailed diaries, or more superficial descriptions of their experiences?). To help understand how the concept is applied, we recommend referring to prior literature.^{6,7,11-13}

The lack of direct researcher involvement during diary creation means that it can be particularly challenging to determine the depth and breadth of diary content, even when guidance has been provided through study briefings and guiding questions. In case study 1, individual diary entries varied in length from a short paragraph to multiple pages. While some participants focused on describing what happened in their experiences, others were deeply reflective, detailing their emotions and how their experiences were informing their understanding of what it means to manage uncertainty as a medical professional. Similarly, in case studies 2 and 3, diary content ranged from somewhat superficial descriptions of tasks that participants had completed that week to detailed accounts of one event, including the emotional, psychological, and social impacts of their experiences. While diaries have advantages over interviews in relation to detailing experiences close to the occurrence of events, participants were not always able to do this, citing challenges with

educational and professional commitments, potentially further limiting the depth of some diaries. Variation in the depth of data from each participant should also be considered when planning the study sample size and whether to use additional data collection methods, such as interviews or observation.

While it can be hard to predict how a planned diary study will unfold, it is likely to take considerably more time (for both participants and researchers) than novice researchers anticipate. For instance, the volume of data generated and time required for analysis may be much larger than predicted. We recommend using this discursive paper to develop a research plan that can help keep researchers on track. Applying principles of project management, we recommend that research teams take time at the beginning to document the individual project tasks that need to occur at each research stage, and who will be responsible for these.⁴¹ Overlooking seemingly small tasks, such as sending reminders to participants, acknowledging receipt of diaries, and clarifying diary details, can all take considerable time, but are essential for successful diary studies. By setting clear responsibilities at the study outset, research team members have the best chance of ensuring the research project progresses.

CONCLUSIONS

Diary studies offer a powerful means of exploring individual experiences and change over time. Handwritten, typed, audio, or audiovisual diaries may suit different contexts, research topics, and participants. Semi-structured approaches use guiding prompts to focus participants' reflections while retaining flexibility for them to document their unique experiences. Although researchers are not present during diary creation, careful consideration of researcher-participant communication and power dynamics is essential to support psychological safety and ensure that diaries reflect authentic experiences. Time is a key factor in the design of diary studies, including decisions about study duration, entry frequency, and timing, and how change is examined during analysis. When designed with attention to key quality indicators, diary studies hold significant potential for advancing qualitative research in anatomical sciences education, particularly for research topics where participants may find it difficult to share experiences in the presence of researchers or other participants.

AUTHOR CONTRIBUTIONS

Georgina C. Stephens: Conceptualization; methodology; project administration; writing – original draft; writing – review and editing. **Ella Ottrey:** Conceptualization; writing – original draft; writing – review and editing; project administration; methodology. **Kristie Matthews:** Conceptualization; methodology; writing – original draft; writing – review and editing; project administration.

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CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to declare.

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