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Unseen potential: photovoice methods in hazard and disaster science

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Abstract While still a nascent field, disaster science is surprisingly methodologically stagnant, often relying solely on traditional surveys, interviews, and focus groups to gather qualitative data. Social science disciplines that have long contributed to disaster research and the practice of emergency management, however, have begun to explore the value of alternative, participatory methodologies and their potential contributions to knowledge generation. In this paper, we discuss one such participatory method, photovoice, and its potential contribution to disaster research. We explore the epistemological roots of the method, lay out the steps involved in conducting a photovoice study, and briefly review previous applications of the method. We then enumerate what we see as topics ripe for exploration using photovoice in hazard and disaster contexts. We suggest that photovoice is an innovative method for capturing understandings of hazards and disasters and for providing rich theoretical insights related to extreme events, which are intrinsically geographical and place-based. Photovoice not only offers policymakers a valuable window into the public's understanding of issues related to extreme events, it also empowers individuals to consider their own capabilities to reduce risk in their communities and contribute to broader resilience building efforts.

Keywords Photovoice · Qualitative methods · Emergency management · Human geography · Capacity building

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Introduction

Photovoice is a qualitative, participatory action research method originally designed to harness the power of the visual image and participants' own viewpoints to advocate for local policy initiatives. Operationalized in the mid-1990s in public health, the technique aims to promote cooperative community reflection and critical discussion with policy makers (Wang and Burris 1997; Wang 1999). With its feminist theoretical roots, photovoice shifts power from the researcher to the participants. In the photovoice method, participants maneuver their daily lives, actively directing a camera lens and composing pictures to show things from their perspective, while the researcher acts only as a facilitator. Follow up discussions between the researcher and participants

then ensues with a variety of possible goals in mind, from program evaluation to grassroots organizing to theory development. The photovoice technique lends itself well to explorations where thick description, local knowledge, and situated perspectives are the objects of study. Photovoice has proliferated across social science disciplines in the last twenty years, with geographers, anthropologists, psychologists, and sociologists all having undertaken such studies.

Photovoice has yet to be incorporated widely in research on natural hazards and disasters. Recent shifts in emergency management policy and practice, however, may make photovoice more appropriate for use in this realm. Policy makers and practitioners in emergency management have emphasized the importance of active community stakeholder engagement in carrying out successful preparedness, response, recovery, and risk reduction efforts. The Sendai Framework, for example, calls for "a more people-centred preventive approach to disaster risk [… that engages] relevant stakeholders", and for "the use of traditional, indigenous and local knowledge and practices […] to complement scientific knowledge in […] the development and implementation of policies, strategies, plans and programmes" (United Nations 2015). The National Disaster Recovery Framework published by the United States' Federal Emergency Management Agency (FEMA) recommends "a whole community engagement strategy that builds local resilience and promotes joint ownership of the community's recovery by all stakeholders" (Federal Emergency Management Agency 2016). These guiding documents highlight a shift in the ethos of disaster management away from a response-centered, command and control model and toward a comprehensive and cooperative approach. As community informed, culturally appropriate, and inclusive approaches make inroads in disaster practice, the photovoice method holds great promise as a tool to inform best practices in disaster policy implementation.

We contend that photovoice has high potential value as a methodological tool in both disaster research and in the practice of emergency management across the four temporal phases of the disaster life cycle: preparedness, response, recovery, and mitigation. Preparedness activities occur before a disaster and involve getting ready for response (e.g., warning communication, evacuation, sheltering, drills and exercises). Response activities focus on life safety, property protection, and secondary hazard containment as the disaster unfolds (e.g., search and rescue, mass care, emergency sandbagging). Recovery activities entail restoring the affected areas and survivors to some state of normalcy after the disaster (e.g., debris removal, rebuilding homes and businesses, restoring daily routines). Finally, mitigation activities look ahead to future disasters and aim to make areas safer over the long-term (e.g., post-flood home buyouts, structural retrofits, public education campaigns). Despite varying goals and overlaps in the phases, an array of stakeholders are involved in any given emergency management activity. Diverse stakeholders including affected residents, policy makers, first responders, planning agency representatives, community-based groups, and relief workers each carry unique, situated perspectives on disaster-related activities, which may be of interest to scholars. These instances where stakeholders' subjective, place-based perceptions are the focus of inquiry stand to benefit most from the incorporation of photovoice.

As a qualitative data collection method, photovoice offers unique insights into lived experience that other qualitative methods alone cannot provide. While observations can generate rich data regarding a setting from an etic perspective, this method reveals little about the bonds individuals have with places or how individuals understand their physical environment. Interviews, which are traditionally used to gather this type of emic data, are limited in that participants are often removed from the physical environment in question and are required to reflect on place-based experiences from memory. Photovoice addresses these shortcomings by providing study participants with visual prompts that move them beyond describing a setting and into a discussion of meaning and feeling in an environment. The method also provides the researcher with a physical artifact they can use to facilitate discussions (Harper 2002). The process of self-authoring photographs not only aids in recall, but invites deeper reflection on a topic prior to an interview or focus group discussion, ultimately leading to better data. Additionally, photovoice provides researchers with another layer of data, the photographs themselves, to analyze. For these reasons, we suggest there is considerable value in exploring the merit of photovoice in both disaster research and in the practice of emergency management.

The goals of this paper are twofold. First, the paper provides a background to the photovoice technique, including its theoretical roots, implementation procedures, and methodological variants. Second, the paper demonstrates photovoice's suitability for use in research about the human dimensions of hazards and disasters. To accomplish these aims, we detail the technique's epistemological foundations in journalism, psychology, and anthropology, showing how these same epistemologies influence the development of two branches of human geography: cultural landscapes and hazards geography. Because the discipline of geography investigates interactions between humans and their natural and built environments—environments which are experienced and understood visually—this link is central to our argument that photovoice is well-suited to place-based disaster research. The paper next reviews previous applications of photovoice in the social sciences, then proceeds to photographic techniques that resemble photovoice within the hazards and disasters literatures. Limitations posed by the method itself and its use in disaster contexts are described. Finally, potential future applications for photovoice across the disaster life cycle are discussed at length, providing a path forward for future researchers and practitioners.

Origins of photovoice

The photovoice method was introduced in the mid-1990s by Caroline Wang and Mary Ann Burris (Wang and Burris 1997; Wang 1999). Emerging from the field of public health, the method has three major aims: (1) affording communities an opportunity to document their concerns, (2) promoting critical dialogue and local knowledge sharing, and (3) reaching a receptive policymaker audience. While earlier researchers had used photographs to spur political action or to serve as research data in and of themselves, Wang and Burris succeeded in naming, packaging, repurposing, and solidifying a procedure that has deeper roots within the fields of journalism, education, and the social sciences. Photovoice is traceable to three distinct lines of theoretical and methodological innovation: the expanding use of photographs as visual data, the growing legitimacy of interpretivist approaches in social science research, and the increasing popularity of empowerment education research. The following paragraphs briefly explore each of these three roots of photovoice, acknowledging that there is a large degree of entanglement among them.

During the last century, the nature of photographs as visual data has shifted from one of simple documentation by outsiders to one of reflexive photography by insiders. Anthropologists performing cultural inventory studies (e.g., Boas 1921; Bateson and Mead 1942) and social journalists (e.g., Evans and Agee 1941; Lange 1960; Siskind 1981; Evans 2004) adhered to a photo documentation approach in which they, as cultural outsiders, recorded what they judged to be the most salient conditions on the ground. While some documentary photographers espoused values of objectivity, others composed photos as emotional appeals to audiences. In the latter half of the Twentieth century, as point-and-shoot cameras, cheaper film, and quicker photo developing services made photography more accessible to the masses, researchers turned to photography for investigating participants' subjective perceptions. One technique, photo elicitation, used photographs as projective stimuli to elicit greater detail from research participants than interview questions alone (Collier and Collier 1986; Suchar 1988; Dempsey and Tucker 1991; Heisley and Levy 1991). In early photo elicitation studies, researchers either selected or took the photographs themselves (Collier and Collier 1986). Later, more sophisticated studies relied on reflexive photography where participants authored their own photographs and, afterward, reflected on the meanings of their own visual data (e.g., Worth and Adair 1972; Ziller and Lewis 1981; Douglas 1998; Ewald and Lightfoot 2001).

Reflexive photography has become the norm in most contemporary photo elicitation studies, including photovoice studies, partially because of the de-emphasis on positivism as the sole source of scientific knowledge and the growing legitimacy of interpretivism. The Civil Rights Movement in the 1960s spurred questions of positionality, ethics, and human experience that positivist quantitative inquiry alone could not address, and later waves of political movements reiterated the value of subjective research questions. Several schools of thought arose under the interpretivist umbrella. Phenomenology asserted that emotional and intuitive dimensions of everyday human experience must be holistically explored (Moustakas 1994; Seamon 2000). Symbolic interactionism focused on the ways in which human

interaction altered meaning and memories attached to things and places (Milligan 1998; Charron 2000; Kyle and Chick 2007). Feminism sought to upend patriarchal, outsider, and reputedly objective ways of knowing in favor of bottom-up knowledge gained through embodied experience (Crawford and Marecek 1989; Rose 1993; Sherif 1998). Shades of each of these epistemologies are represented in photovoice. Participants tell stories about their everyday lived experience in totality. Sometimes photographs are symbolic of observations, meanings, or memories either individually or collectively derived. The camera itself is also held, directed, and focused by a body. Thus, the camera (and ultimately the viewer of the photographs) goes where the photographer's body goes, experiencing the same vantage points and access rights (or denials) as the photographer, based on his/her height, gender, race, and social status.

The concept of empowerment education, epitomized by Paulo Friere's (2000) *Pedagogy of the Oppressed*, forms the third theoretical leg of photovoice. This approach asserts that education should result in learning that produces action; that critical thinking through group dialogue is a valid method for producing new knowledge; and that dialogues should center on objects that represent community realities. Friere's ideas are heavily influenced by Marx's theories on labor and power, but go further in suggesting a method whereby radical perspectives might be corroborated and enlisted to bring about political change. This newly minted brand of empowerment education found a home with community organizers and feminist scholars pushing for social change and contributed to a tradition in participatory action research seen across the social sciences. Photovoice's targeting of a policymaker audience from the outset, facilitating critical dialogue among locals, and the concluding meeting or exhibition with policymakers all exude Friere's radical and action-oriented philosophies for education.

Parallels to human geography

Each of the three epistemological roots of photovoice also influenced the development of human geography, a field primarily concerned with studying the interrelationships between earth and humankind. Early human geography sought to describe regions, differentiating them based on physical features and patterns of human activity (Buttimer 1971). These ideas evolved over time, gradually progressing to more complex assessments of the interdependence between the natural and human elements of place revealed through various landscapes (Ratzel 1895–1896; Schlüter 1899, 1906; Livingstone 1992). In the early Twentieth century the field underwent a significant shift away from patterns toward processes, with the President of the Association of American Geographers, Harlan Barrows, declaring that the central purpose of geography was the study of human ecology (Barrows 1923)—in other words, the dynamic interactions between humans and their environment, where one does not necessarily predetermine the other. Sauer, a contemporary of Barrows, further honed in on the morphology of landscape: how the natural landscape becomes a cultural landscape through manipulation by humans (e.g., Sauer 1925, 1944; Kniffen 1936; Lewis 1983). One can see parallels between Sauerian landscape geography and photo documentation, where the researcher assigns meaning to what he/she observes visually.

At this point there is a bifurcation between hazards and cultural geographies. Hazards geographers following in the footsteps of Barrows and his student Gilbert White grounded themselves firmly in positivist methods proffered by the quantitative revolution in geography to study human–environment interactions. White himself examined how societal mechanisms such as land use policy, zoning, and development practices exacerbate environmental risks in already hazardous areas. He famously declared that, "floods are 'acts of God,' but flood losses are largely acts of man," (White 1942) advising that humans should undertake gradual adjustments in order to reduce societal risks. Modern-day hazards geographers still take cues from White in quantitatively and systematically measuring vulnerability to environmental hazards produced by biophysical and social conditions (Cutter 1996; Turner et al. 2003). Others continue to investigate the process of human adaptation to risks like climate change, which also have anthropogenic causes (O'Brien and Leichenko 2000; Adger 2006). Recently—and perhaps inspired by participatory action research taking root across the social sciences—hazards geography has been concerned with community capacity building as a means for reducing vulnerability to hazards and bolstering

resilience. No longer is vulnerability measurement dominated solely by quantitative indices. Instead, paralleling Friere's *Pedagogy of the Oppressed*, the ideal of empowerment education is incorporated within participatory methods used to map risks and assess localized capabilities for combatting the effects of natural hazards (e.g., Cadag and Gaillard 2012; Peters-Guarin et al. 2012; Chingombe et al. 2015).

In contrast to hazards scholars, cultural geographers following Sauer and his predecessor, Paul Vidal de la Blanche, became increasingly radical after the mid Twentieth century. These scholars turned to Marxist social theory and interpretivism to support their investigations into urban space and perceptual geography (Livingstone 1992). They examined how the ways in which we understand a space—through subjective judgments about its value, beauty, or memorableness—actively construct social meaning and form a distinctive place (Relph 1976; Tuan 1977; Lowenthal 1985). One can observe their insights in contemporary critical landscape studies within cultural geography, where particular attention is given to the eyes (Cosgrove 2008) and to the bodies (Rose 1993) that have codified how we look upon landscapes and come to know the world in which we live. Reflexive photography would appear well suited for investigating these questions that focus on participants' mental images and value judgments as they relate to place. Thus far, photovoice has been most widely applied within this domain of human geography (e.g., McIntyre 2003; Schumann 2015a). It is our argument, however, that these types of cognitive and affective queries would also be valuable to research in a disasters context.

Doing photovoice

In the previous sections, we have described the compelling parallels between the development of human geography as a field and the development of photovoice as a methodology. Both are intrinsically visual, people-centered, and place-based. Since human interactions with the built and natural environments lie at the heart of disaster contexts, photovoice represents an ideal method for exploring these situations. Here, we turn to the process of doing photovoice. The following subsections serve as a guide through the steps of a photovoice study. The standard photovoice procedure is explained first, followed by an exploration of typical photovoice studies. The third subsection details important methodological variations in three areas: data collection, overall purpose, and delivery of results.

Standard photovoice steps

The procedures of photovoice, codified by Wang and Burris (Wang and Burris 1997; Wang 1999), involve five steps: selecting the target audience, recruiting and training participants, participant photography, follow up discussion, and community engagement (Fig. 1). The first step, which involves identifying an audience for the study who possesses the authority to change policy, highlights the methodology's explicit goal of generating policy-based solutions. To be successful, the researcher must select a topic of mutual concern to both decision makers (i.e., politicians, advocates, philanthropists) and community members. The topic chosen should be one that is of interest to policymakers, *and* in which policymakers are open to receiving guidance from community members. The researcher should avoid issues on which decision makers and community members are too polarized, as that will stymie cooperation and mutual learning, and likely cause the research process to fail.

In the recruitment step, the researcher acts as a liaison by identifying both decision makers who are most receptive and locals who are most knowledgeable on the issue. Decision makers form a makeshift advisory panel and audience for the participants' eventual conclusions and recommendations. Purposive sampling of participants may be undertaken to target either one demographic group (e.g., Latina women, healthcare workers, elderly African Americans) or to widen the participant pool across demographic groups and represent the greatest variety of perspectives on the issue at hand. Another strategy is to post flyers in public places and recruit voluntarily by holding an open meeting. Wang (1999) suggests an ideal participant sample size is 7–12; however, other researchers have conducted photovoice studies with over 40 participants in multiple locations (e.g., Royce 2004; Nykiforuk et al. 2011).

Recruiting and training usually take place simultaneously at a general interest meeting. This session will include an informed consent process, an ethics discussion on camera usage, and the development or

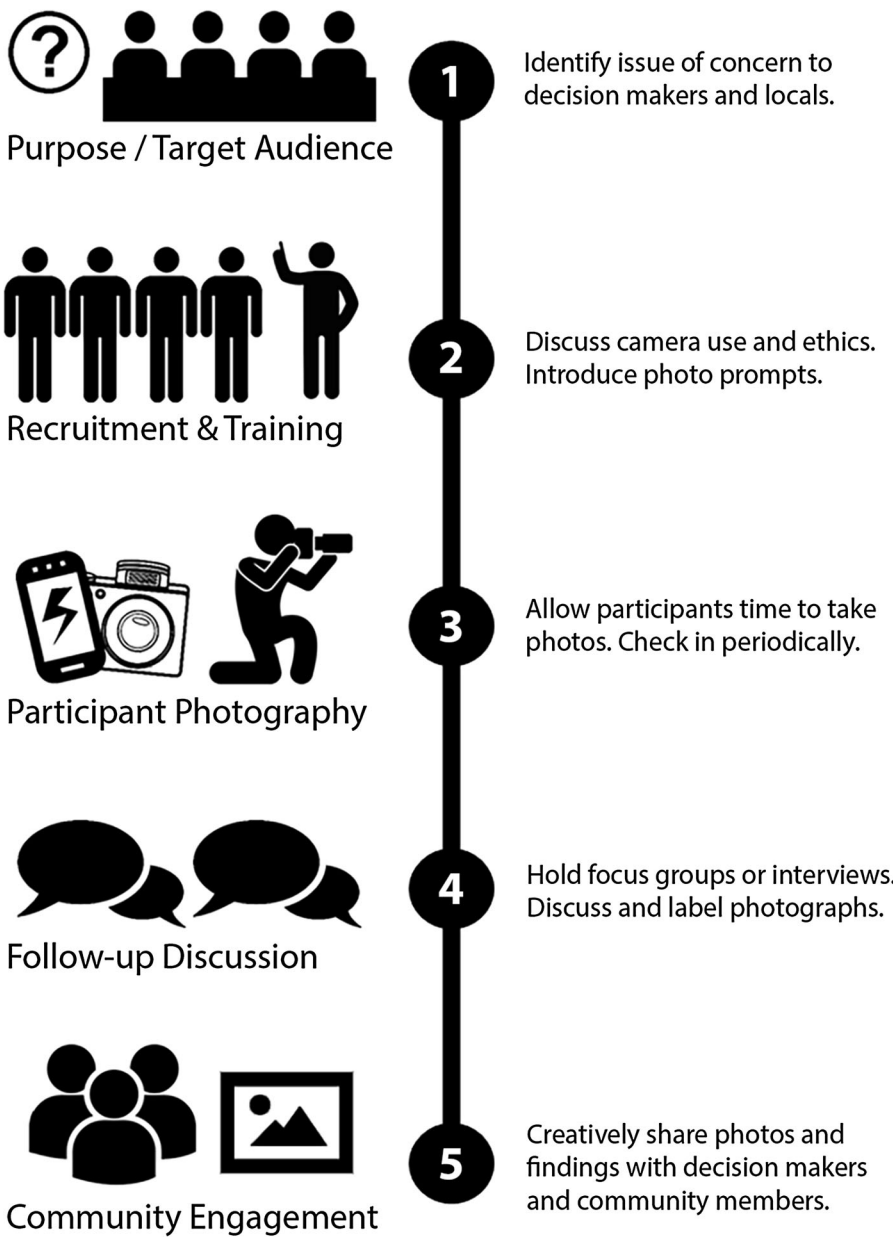

Fig. 1 Schematic depicting the five steps in the standard photovoice procedure

assignment of guiding prompts. Guiding prompts are questions or directives generated by the researcher that are designed to loosely guide participants as they take their photographs. For example, participants may be asked to answer a question such as *What places define your community?* by taking photos that reflect their perceptions and experiences. Along with the guiding prompts, the researcher also specifies an acceptable number of photos to be taken. Anywhere from ten to thirty photos is typical for each guiding prompt. If researchers distribute disposable cameras or smaller digital memory cards to participants, this automatically limits the number of pictures. There are two benefits to specifying a small number of photos. It produces less data, making management and subsequent analysis less cumbersome. It also generates better quality data because participants must intentionally plan out the purpose and composition of each

photograph in order to effectively communicate their stance through only a handful of photos.

Participants are allowed a period of time to self-author photographs in response to the guiding prompts. Depending on the schedules of both participants and the researcher, photovoice studies allow anywhere from one week (e.g., Nykiforuk et al. 2011) to six months (e.g., McIntyre 2003; Schumann 2015b) between distributing cameras and meeting to discuss photos. A balance must be struck between allowing the participants sufficient time to take pictures but not permitting so much time to pass that participants forget the purpose of the study and/or the meaning of their photographs. Asking participants to jot down their reasons for taking each photograph in a notebook can lessen this problem of forgetfulness. Checking in with participants after a few weeks or a month can also help, especially with longer research timelines. A check-in provides an opportunity for the researcher to clarify what is expected of the participant, answer any questions, set a tentative follow-up date, and potentially recruit new participants prior to the follow-up if the current participant must withdraw from the study. In light of the substantial time commitment involved and participants' often marginalized status, many researchers offer limited compensation in the form of money or gift cards to incentivize continued participation in the study.

Follow up meetings to discuss photographs are conducted either as focus groups or interviews, which typically take one to three hours. The purpose of this step is to explore commonalities in community members' photographs and to develop a shared understanding of desired policy outcomes. During these meetings, participants explain the meanings behind their photographs, generate their own themes, and write photo captions through a researcher-led dialogue. Wang presents the *SHOWeD* acronym as a guide for directing these sessions (Wang 1999), moving the conversation from what participants ***See*** and what is ***Happening*** in their photos to how it affects ***Our*** (their) lives. Participants then explore the social context behind ***Why*** the issues exist, and what we (they) can ***Do*** to empower themselves with the new knowledge. This step can help researchers reduce and prioritize certain emergent themes in the photographs by, for example, asking participants to select one or two photographs most or least representative of the issue or phenomenon under study. This tactic may be necessary with larger focus groups to curtail lengthy follow-up sessions. Photovoice studies can include one (e.g., Nowell et al. 2006; Nykiforuk et al. 2011) or multiple rounds of picture taking and follow-up meetings (e.g., Lopez et al. 2005; Hom 2010) until theme saturation is reached.

The final step in photovoice is to creatively share findings with community leaders, decision makers, and neighbors. Formats for these events go beyond public board meetings, traditional reports, and white papers to include coloring books (Wang and Burris 1994), empowerment conferences (Royce 2004), movie theater screenings (Wang 1999), portfolios (Hom 2010), and public art displays (Nykiforuk et al. 2011). Participants are often given sufficient latitude in directing the event. Finally, as a gesture of gratitude, participants receive a copy of their photos to keep.

Typical examples of photovoice

Since its inception, researchers have demonstrated the usefulness of this technique in realms extending from public health and youth advocacy, to diversity learning and ethnography. In this section, we briefly describe two studies that exemplify the standard photovoice methodology.

Nykiforuk and colleagues (2011) used photovoice to assess healthy lifestyle behaviors in communities surrounding Alberta, Canada. Their process closely followed the Wang and Burris method, with the minor exception of a round of preliminary interviews concurrent with participant training to add a longitudinal component to the study. The researchers began by identifying a target population, which included local health units, non-profit organizations, and other key decision-makers in the policy realm. They then organized these decision-makers into Community Working Groups that also included members of the general public. To identify their 35 participants, the researchers employed a variety of recruiting strategies including local newspaper ads, flyers, and emails distributed through the participating organizations' email distribution lists. During the training, participants were instructed on camera use and other study details, and were prompted to identify places or things that helped or hindered them from engaging in healthy behaviors. Follow-up meetings were held individually to allow the research team to focus on both individual

and community level issues, and findings were shared through activities designed by the Community Working Groups.

In another example, Nowell and colleagues (2006) applied photovoice methodology to better understand the meanings residents in distressed urban neighborhoods ascribed to the physical characteristics of their neighborhood. This study also applied the Wang and Burris method, except in their adaptation of the *SHOWeD* probes to guide participants in self-selecting a subset of their photos prior to the group follow-up discussion. In this study, the primary target audience was a major funder interested in implementing a community change initiative in the study area. Participants consisted of 31 youth and adults recruited through community newsletters and flyers distributed throughout the target neighborhoods. Participants attended an initial orientation session, followed by a training conducted during two evening sessions. Participants were trained in the goals of the study and basic photography. After completing their training, participants were given cameras and asked to take one roll of photos each week for five weeks. Prompts included questions about what participants saw as good about their lives and what they thought needed to change. Group follow-up meetings were conducted weekly, rather than at the end of the photography period. Findings were shared with the funding agency as part of a larger formative evaluation process.

Variations on photovoice

As noted earlier, the term photovoice refers to a specific and narrowly defined protocol designed by Wang and Burris. Many variants of photovoice do exist across the social sciences, however, and not all variants retain the photovoice moniker. Subtle changes in the method's name, such as photo novella, photo-sharing, photo interviewing, photo journal, and photo elicitation, often signal significant departures from the Wang and Burris method either in terms of data collection procedures, overarching research purpose and target audience involvement, or in the mode of delivery for findings. Here, we explore these three common areas of variation.

Several studies have modified the data collection procedures outlined in photovoice. For example, Beilin (2005) had farm families group photographs by theme, sort them by importance, and draw mudmaps (makeshift maps in the mud) to show the locations and viewsheds (the angle and extent of viewable area) of their photos. She then accompanied participants on four- to six-hour transect walks of the sites depicted to draw out additional information about the images' contents. Latham (2003), in his study of social politics of public urban spaces, used photographic diaries constructed in tandem with participant interviews to provide yet another means of data collection. Loebach and Gilliland (2010) demonstrate a novel variant on data collection in their urban planning and community psychology study, designed to acquaint urban planners in London (Canada) with children's perspectives of their neighborhood environment as part of World Town Planning Day. Recruiting 16 third grade children to participate, they grouped pairs of child participants with one researcher and one planner. Each team then followed a walking route designed by the children. Child participants were equipped with cameras, while adults carried a mobile GPS unit and recording devices (audio and paper) to document the route. This supervised method of data collection kept children focused on the task at hand, captured ephemeral in situ observations while photographs were being taken, and provided a geospatial dataset that could be used directly by city planners.

A second area of variation is in the overall aim of the research. While standard photovoice aims to effect policy change, others have used photovoice with alternative purposes, including activism (Moletsane et al. 2007; Wilson et al. 2016), ethnography (Delgado 2015), program evaluation (Wang et al. 1996; Raber et al. 2011), community-based knowledge generation (Beilin 2005), and theory development (Freedman et al. 2014; Sims 2014; Schumann 2015a). For instance, Beilin (2005) aimed to understand the competing roles of the farming family as commercial producer and environmental steward. While she acknowledges these insights could be valuable to government and NGO leaders in the land management arena, providing these agencies with data and involving them during the research design as a target audience were not the primary goals of her study. In another example, Schumann (2015a) employed photo documentation, photo elicitation, and go-along tours to pilot test methods for a proof of concept in heritage tourism. His proposed conceptual model of cooperative animation—the process by which tour guide, landscape, and visitor co-produce meanings on

restored Southern plantation sites—necessitated visual methods of inquiry. Once again, while the findings of a larger study might be useful to museum managers, there was no direct decisionmaker audience involved in the pilot study. Both Beilin's and Schumann's studies, however, do still preserve elements of education through research inherent in photovoice.

A third area where variations in photvoice methods occur is in the final step of community engagement. The final deliverable (i.e., product, performance, or meeting) can vary considerably depending on the research purpose and context. Lopez and colleagues (2005), for example, use successive group photo-sharing sessions as a means for simultaneously generating discussion, engaging the community, and validating themes for analysis that emerged in earlier sessions. The end result of this photovoice study was to create a participatory, grounded theoretical model of coping behaviors among female, African American cancer survivors in rural North Carolina that could be tested and further refined in other settings. Other variations in the final step of photovoice vary the deliverable, but preserve the applied aspect of the research. Royce (2004) provides a good illustration. Addressing the singular topic of tobacco use among youth, he organized teams of participant-researchers across South Carolina to reenvision and photograph a tobacco-free life. Photographs and interview data from the photovoice procedure were used to design workbooks and other educational literature for a portable youth empowerment mini-conference.

These studies present examples of how the photovoice method has been modified to better reflect specific research aims or contexts. While they do not strictly follow the five-step process outlined by Wang and Burris (Fig. 1), they maintain the core emphasis on generating participant authored and analyzed visual data. We now turn to a discussion of the previous and potential uses of photographic methods in disaster contexts.

Looking back: previous applications of photovoice in disaster research

Historically, disaster researchers have relied on photo documentation methods to assess risk, post-disaster reconstruction, or response behaviors, although the nature and degree of local participation in the photography has varied widely. In some cases, outside researchers collected visual data in collaboration with locals (e.g., Curtis et al. 2010) while in other cases, locals had no role in guiding photography (e.g., Burton et al. 2011). Photos have also been used merely to exemplify statements from participant interviews (e.g., Peters-Guarin et al. 2012; Chingombe et al. 2015). In addition to photo documentation, other creative and visual participatory research methods, including citizen journalism (Watson 2013), art therapy (Mohr 2014), and graphic elicitation (Kuehne 2013), have been applied in disaster contexts. Until recently, however, implementation of the more interactive photovoice method in disaster contexts was limited. Here, we review the relatively small number of disaster studies that have applied this method.

Several studies have used photovoice as a participatory method for vulnerability assessments. After Hurricane Katrina, Scheib and Lykes (2013) engaged women of color who were serving as community health workers to document health disparities in the disaster response and recovery process. Participants in this study documented class-based structural inequalities that affected access to health care and health services in their communities, developing recommendations for improving health practice in future disasters. Other studies have taken a similar approach, using photovoice to inform targeted post-disaster interventions. In the Philippines, residents of hazard-prone communities documented local vulnerabilities and core capacities that they then translated into targeted interventions to increase hazards resilience (Cai 2015). In a small community in Hawai'i, researchers used photovoice to develop a tsunami preparedness plan that was grounded in local practices and experience (Crabtree and Braun 2015), while residents of Goderich, Ontario, engaged in a photovoice project designed to capture local perceptions and experiences of a tornado event, and to leverage those experiences to plan for climate change (Hissa 2016).

Photovoice has also been used to examine the process of disaster recovery, particularly to explore the experiences of special populations and to more actively engage them in recovery activities. In 2005, a train derailment in Graniteville, South Carolina, resulted in a chlorine spill that directly impacted the town. Researchers used a suite of participatory methods, including photovoice, to engage the

community in the process of recovery after the spill. Participants identified specific health and environmental concerns, documenting the ways in which the disaster had impacted their quality of life. Results of this study were used to target health interventions in Graniteville and, more broadly, they provided insight into community recovery priorities after technological disasters (Abara et al. 2014; Annang et al. 2016). Another study of four disaster-affected communities across the US and Canada integrated photovoice and photo elicitation within a suite of participatory methods aimed at understanding recovery, specifically from the perspective of youth (Peek et al. 2016). Results from this study illuminated ways in which youth are willing and active participants in community recovery. In another case, photovoice was used with participatory mapping to explore residents' perceptions of long-term recovery nearly a decade after Hurricane Katrina in coastal Mississippi. This study not only identified common recovery understandings among immigrant, native-born, and racial/ethnic minority groups, it also demonstrated the inadequacy of quantitative recovery metrics to capture the full range of meanings residents used to judge the success of their own community's recovery (Schumann 2015b). Finally, Madsen and O'Mullan (2016) applied photovoice methodology to examine the relationship between social capital and community resilience. This study, which took place in a flood-affected community in rural Australia, identified elements of social capital (i.e., social connectedness, optimistic acceptance, learning tolerance and patience, and learning from the past for the future) as key elements of community resilience that should be the focus of recovery planning initiatives.

Looking out for pitfalls: limitations to implementing photovoice

Previous applications of photovoice in disaster research and other contexts have demonstrated that the method is not without its shortcomings. In considering possible applications in disaster research going forward, we must first carefully consider these limitations and their potential impacts. In this section, we examine several general limitations inherent to the method before turning to the unique set of limitations posed by disaster contexts. We then offer suggestions on how to minimize and surmount each of these issues.

General limitations

There are several limitations to the photovoice method. First, photo prompt development is difficult and delicate, largely due to translation and reduction issues. Photo prompts, which guide participants as they take their photos, must be crafted to be clear enough to answer the research questions, broad enough so as not to unduly lead or bias the participants, yet specific enough to be translatable into a useful result for either policy formation or practice. Additionally, researchers must distill the spirit of the research questions into only one or two photo prompts for participants. Exceeding this number of prompts may confuse participants or prove too much to fulfill in the time allotted for data collection. The inherent challenge is that the use of a small number of prompts may limit the researcher's ability to address complex, detailed, or multiscalar research questions.

Second, photovoice is a time-consuming and labor-intensive method as it requires a participant to carry a camera for weeks or months in order to document daily activities. Participants may find it difficult to remember their camera or may not have the time to take the photos that they envision to fulfill the prompts set forth by researchers. This can result in participant attrition. Participants who find themselves unable to complete the requirements of a photovoice study and simply drop out may unintentionally upset the balance of perspectives in a purposive participant sample (e.g., too few males, too many elderly people, imbalance between two comparison groups, etc.). Alternatively, participants may feel remorse over not being able to follow through and pass their camera off to someone else. In addition to upsetting the sample, this introduces difficulties in adhering to IRB protocols. For example, the fill-in participant could be a minor child of the original participant or he/she may not have been briefed on ethical camera practices and proper informed consent procedures for subjects photographed.

Third, data analysis techniques are underreported among current researchers using the technique, such that analysis is virtually a black box. Authors who may go to great lengths explaining data collection

techniques often omit details of their coding schemes and analysis techniques. This leads social scientists who are not thoroughly steeped in qualitative methodologies to wonder what should be done with the photographic data. Options abound, of course: reductive content analysis of photographic subjects, thematic coding of interview transcripts alone (which are based on the photos), discourse analysis on key concepts unearthed through dialogue, or policy analysis cross-referencing legal documentation about features contained in the photos. Then there is the issue of using photographs in conjunction with other types of data. How would one incorporate GIS features, sound bits, archival materials, or sketch maps with the photographs and transcripts produced by photovoice? Unfortunately, the literature offers few suggestions. This may prove reason enough for an unseasoned researcher to avoid photovoice altogether, discounting it as less than rigorous or too difficult to integrate into a cohesive research design.

Contextual limitations

Aspects of the disaster context pose additional limitations to a photovoice researcher. Conflicting priorities between researchers and disaster survivors represent one such issue. While the quality and consistency of participant photography is of the utmost concern to the researcher, participants will have many competing priorities during a time of disaster. If the project takes place shortly before the onset of a hazard event, the participant may lose valuable time to prepare their household, protect their property, or stage an evacuation. Participants are unlikely to take photos for research purposes if doing so might put themselves, their family, or their home at risk. In the short-term recovery period following a disaster, competing concerns might include weatherproofing and securing one's damaged home or business, making minor repairs in order to return to that structure, removing debris, remediating mold, obtaining supplies or volunteer assistance, applying for financial aid, locating a reliable contractor, filing claims with insurance companies, and traveling farther distances beyond the disaster zone to complete routine household tasks. An ethical researcher would not wish to distract a survivor from these important tasks aimed at reducing losses and preserving well-being. Researchers who implement photovoice to study long-term recovery three to ten years after a disaster might also encounter roadblocks in the form of research fatigue. Community leaders and residents may feel over-researched by outside academics or that their contributions would not be valued since they may not see visible results within their community. On the other hand, possible participants may express consternation at being asked to recall traumatic events they have recently overcome and would rather forget. Hence, photovoice carries with it certain drawbacks depending on the activities individuals are undertaking within a given emergency management phase.

Technical skill, access, and the digital divide may prove challenging as well. Level of technical skill when using a digital camera or smartphone camera is a concern in non-disaster photovoice applications, especially when participants may be elderly, poor, or may not have regular practice with this equipment. Immediately post-disaster, however, electrical power to charge such equipment may be scarce. Disposable cameras—an alternative to digital devices—broaden photovoice participation among low socioeconomic groups and technical novices and in areas without electricity. Still, it may be difficult for the researcher to find photo processing facilities (i.e., wet labs) within the disaster zone that can process the film quickly for follow up interviews or focus groups. Allowing each participant to use the most accessible photographic device may make data collection run more smoothly, but it could complicate analysis or endanger internal consistency (e.g., digital photographers are able to take many more photos than those using disposable cameras). Furthermore, differences in the quality and usability of participant photos for a culminating event could result in certain participants' viewpoints being privileged over others.

Looking forward: possibilities for photovoice in disaster research and practice

As a method of participatory action research, photovoice is poised to make substantive, democratic, and locally contextual contributions to disaster management. In the concluding paragraphs, we identify an array of potential disaster research topics where photovoice would serve as an ideal method to advance

both theory and practice. These topics are summarized in Table 1, which also notates the phase(s) of the disaster cycle most applicable for each item. Recognizing that many of these research topics cut across phases, we group them for discussion according to three inherently geographical facets, which photovoice can readily tap. The first group includes topics where place-based knowledge, perceptions, and culture are essential, as is the case with ethnographic studies, grounded theory development, and grassroots community organizing activities. The second group, locally tailored policy implementation, suggests topics

Table 1 Potential disaster research topics and corresponding disaster cycle phases where photovoice would be an appropriate method

Disaster research topic	Mitigation	Preparedness	Response	Recovery
Place-based knowledge and perceptions				
Documenting local knowledge or social memory of a discrete, chronic, or recurrent hazard	X	X	X	X
Understanding citizen concerns about technological risks and dangers	X	X		
Monitoring environmental quality, ecological change, or community health through citizen science	X	X		
Unpacking protective action decision-making processes that involve environmental cues (i.e., evacuation, sheltering, warning response, property protection)	X	X	X	
Documenting culturally-grounded perceptions of disasters and post-disaster interventions	X		X	X
Documenting locations of cultural, ecological, or historical significance for preservation and commemoration	X			X
Incorporating vulnerable, special needs, or underrepresented groups into emergency planning and long-range community visioning processes	X	X	X	X
Examining trade-offs between resilience building strategies at the community and household levels	X			X
Locally-tailored policy implementation				
Acquainting outsiders with social norms, routines, and traditions of indigenous groups prior to interventions	X	X		
Identifying discrepancies in perceptions and expectations across stakeholder groups (government agencies, community members, aid workers, etc.)	X	X	X	X
Evaluating risk awareness and identifying acceptable risk reduction strategies for slow onset disasters	X	X		
Assisting community organizations in monitoring recovery and reconstruction progress				X
Evaluating local policy implementation related to recovery or mitigation	X			X
Identifying externalities or unintended consequences of past post-disaster interventions	X		X	X
Geographical contributions to hazards and disaster theory				
Exploring intersecting factors contributing to social vulnerability	X	X	X	X
Studying mobility as a barrier and facilitator of successful disaster outcomes	X	X	X	X
Exploring complex social and spatial interactions like place attachment and social capital and how they change over the course of a community-wide disaster	X			X
Explicating the role of culture in the interpretation of disaster events, response processes, and recovery outcomes	X	X	X	X
Testing theories and assumptions for face validity with locals	X	X	X	X

where negotiation and alignment of insider community perspectives with outsider agency perspectives is essential to achieving programmatic goals. The third group contains research topics, some established and others emergent, that speak to broader geographical contributions to hazards and disaster theory.

While these topics span all four phases of the disaster life cycle, we suggest that place-based issues central to recovery and mitigation may better lend themselves to the photovoice method than issues in other phases. Practically, they offer the opportunity to leverage proactive post-disaster efforts to reduce future hazard impacts, and the lengthy time frames of these phases make photovoice easier to implement. In comparison, collecting valid, in situ data may be problematic during the preparedness and response phases, given the time compression present in response and the action-oriented operations (often with fewer visual referents) that dominate preparedness. Still, in cases where photovoice is appropriate to preparedness and response, the potential for new knowledge generation is significant, as evidenced by the following examples.

Place-based knowledge and perceptions

Many of the critical questions facing disaster researchers, practitioners, and policy makers are intrinsically place-based. The ability to view these problems through the eyes of locals embedded within a hazardous environment can reveal appropriate place-based solutions which may not be obvious to outside decision makers removed from the setting. Disaster interventions, for example, could be informed by photovoice studies that elicit local knowledge of discrete, chronic, or recurrent hazards, or that document the collective social memory of past hazard events. Perceived risk of future hazards could also be examined. Whether the threat under study is natural (e.g., shifting drought patterns, rising tides, increasing erosion), human-induced (e.g., nuclear waste transport, hydraulic fracking operations, new flood control structures), purposive (e.g., bioterrorist attacks, cybersecurity threats), or a combination of these, visual data collected through reflexive photography could elucidate residents' concerns and assist in developing a viable risk management strategy. Other methods like participatory GIS and participatory rural appraisal, equally grounded as photovoice in empowerment education, have already been widely used in these contexts (Smith et al. 2000; Tran et al. 2009; Chingombe et al. 2015). Participant photography could assist in unpacking decision-making processes where visual cues play a vital role, such as recognizing and sheltering for severe weather (Klockow et al. 2014; Dewitt et al. 2015; Schumann et al. 2017) or evacuating in advance of a hurricane (Burnside et al. 2007). Documenting culturally grounded perceptions of response strategies and post-disaster interventions could improve emergency operations plans for future events. Similarly, photovoice could be used after an event to identify surviving landmarks of cultural, historical, and ecological value for preservation (Kienberger 2014), or to develop an inclusive, culturally sensitive community recovery plan. The high level of researcher facilitation but minimal degree of expertise required of photovoice participants is well suited to integrating vulnerable populations such as women of color (e.g., Scheib and Lykes 2013), immigrants with limited English proficiency (e.g., Schumann 2015b), and children and youth (e.g., Loebach and Gilliland 2010; Peek et al. 2016) in good risk governance (Federal Emergency Management Agency 2007; Tierney 2014; United Nations 2015). These studies could be broadened to include often-overlooked vulnerable groups, such as people with functional or access needs, service animal owners, and individuals who are homeless or housing insecure. As post-disaster dialogue shifts to building community resilience, photovoice could also help identify unforeseen consequences for households that might result from large-scale plans to harden infrastructure, reconfigure neighborhood housing, or streamline social services.

Locally-tailored policy implementation

While understudied, the importance of fit between disaster policy and programming and the local context cannot be overstated. Previous studies have highlighted the importance of community engagement in disaster planning (Oliver-Smith 1991; Berke and Campanella 2006; Smith 2011) and disaster recovery (Knobloch 2005; Fraser et al. 2006; Binder and Greer 2016), though operationalizing this approach has proved challenging. Photovoice can bridge this gap by actively involving at-risk individuals in crafting and implementing their own policies, providing

policymakers timely feedback on the lived experiences of residents, and increasing stakeholder buy-in. To begin, acquainting outside policy makers with local social norms and traditions is important in any intervention, but it is paramount in situations where indigenous groups or cultures are involved (Carlson 2005). Photovoice can facilitate this process in a way that allows members of the affected community to determine which facets of their culture and social norms are most salient in a disaster setting. Relatedly, this method could be used to identify discrepancies in perceptions and expectations across stakeholder groups, thereby reducing the potential for misunderstandings among all involved. Photovoice could also be employed in actively engaging community members in policy-related efforts that directly impact them. This could include gauging risk awareness, brainstorming risk reduction strategies, or vetting proposals. Photovoice could also be used to engage the community in monitoring the progress of reconstruction and recovery efforts or in evaluating the implementation of a specific policy. A charrette or workshop at the end of the photovoice procedure could provide a necessary venue for illuminating externalities of past interventions so that they are minimized in future mitigation efforts.

Geographical contributions to hazards and disaster theory

Photovoice can contribute to hazards and disaster theory by advancing our understanding of place-based constructs and processes, particularly in exploratory studies. The potential applications here are broad and numerous, but include vulnerability, mobility, place attachment, and place-based social capital. In researching these topics, turning cameras over to participants could further nuance researcher assertions, challenge existing theoretical assumptions, provide a compelling picture for political leaders, and inspire grassroots organizing. Photographing lived experiences of hazard manageability or socio-spatial marginality might represent a novel approach to understanding the intersecting social, environmental, and cultural factors that produce vulnerability on a local scale (Peters-Guarin et al. 2012; Gorman-Murray et al. 2017). Mobility is another frontier of disaster research that photovoice could explore (Schumann 2015b). This topic spans areas such as personal mobility, mode of transport, community access and security, barriers to circulation, and the role of regional transportation lines in influencing the experiences of disaster survivors. Place attachment and social capital are complex concepts where memory and identity intertwine with collective agency and efficacy in unique ways dependent on the location. Scholars have pointed to the essential roles that social capital and place attachment play in post-disaster recovery, reconstruction, and relocation (Aldrich 2012; Ritchie and Gill 2007; Brown and Perkins 1992; Binder et al. 2015). Few studies, however, investigate connections between the two concepts. Photovoice may be the most apt technique to address the fusion of the social and spatial elements present in this research context. Broadly, photovoice is a valuable tool for explicating the role of culture in the disaster experience and for testing theories and assumptions for face validity with locals.

Conclusions

Disaster science is a relatively new field, with a number of exploratory inquiries left unaddressed. At the same time, the field is in a methodological rut; most studies rely on traditional data collection techniques, ignoring innovative methods that could provide more valid, contextualized results. Even given the limitations inherent in the method, photovoice offers an opportunity to develop significant theoretical insights related to place-based understandings of extreme events not accessible via conventional methods. While not an exhaustive list, the nineteen topics detailed in Table 1 represent a variety of promising avenues where the photovoice method could grow both practical and theoretical knowledge across the transdisciplinary disaster science field. Although the inherently geographical facets of these research contexts have been emphasized, it is essential to note that these contexts are not exclusively geographic—they span multiple fields of social science inquiry including community psychology, sociology, anthropology, and others.

The value of photovoice lies in its unique ability to authentically depict the everyday place-based lifeworlds through which people visually and tangibly experience both the effects of previous disasters and the inherent risks of future hazards. In terms of practice, the method offers decision-makers a visual

illustration of hard-to-understand concepts through the eyes of citizens, and it empowers individuals to better understand the bridge between their daily lives and capacities to deal with extreme events. If emergency managers, local decision makers, and disaster researchers truly value an inclusive, people-centered, place-based approach to disaster management as championed across guiding policy documents, incorporating photovoice into the disaster science methodological toolkit is an important step to that end.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflicts of interest.

Informed consent/human subjects Since this is a methodological and prescriptive piece, no human subjects data were collected as part of this research.

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