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ORIGINAL ARTICLE

"Here, I will stay until I die"—exploring the relationship between place attachment, risk perception, and coping behavior in two small Norwegian communities

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Abstract

This empirical study explores the interplay between place attachment, risk perception, and coping behavior, within two small Norwegian communities exposed to flash flooding. Through a mixed-methods narrative approach, we found that most of our respondents exhibited positive attachment to their communities, aligning with previous studies in rural settings. Using a conceptual model of place attachment (Raymond et al. 2010), the study identified five dimensions of attachment among the respondents: place identity, place dependency, family bonding, friend bonding, and nature bonding. The most dominant narratives centered around practical ties to the area through family and place dependency, combined with symbolic attachments in the form of nature and identity. Place attachment through generational ties, closeness to nature, and access to historical knowledge influenced residents' risk perception, here displayed as heightened awareness of flash flood-related risks. This risk awareness did however not translate directly into feeling at risk. Findings point to residents' underestimating risk close to home, which could partially be explained by strong place attachment. Coping behavior was mainly motivated by previous hazard experiences. Place dependency and family bonding contribute to explaining the resident's reluctancy to relocate as a coping strategy. We found that place attachment can act as both a mediator and a moderator between risk perception and coping behavior, and the relationship between place attachment, risk perception, and coping behavior is complex. While no clear causal relationship was established, understanding common elements in risk narratives can enhance community resilience and inform strategies to address community concerns.

Keywords Climate change · Natural hazard · Place attachment · Risk perception · Coping behavior

Introduction

Climate change is posing a threat to natural ecosystems as well as human society. Mounting evidence indicates that extreme weather events will increase in both frequency and intensity, with observable events already occurring across regions (van Aalst 2006; IPCC 2021, 2022). Altered weather and climate processes may also impact the conditions under which such events occur, with potential spatial and temporal challenges even for geographical locations lacking previous historical experience of such events (Lawrence and Hisdal 2011; IPCC 2021).

In Norway, the weather is expected to become warmer, wetter, and wilder. According to recent national climate projections, Norway has experienced a 20% increase in precipitation since 1900, a trend that is likely to continue (Hanssen-Bauer et al. 2017). With its varied topography and weather conditions, Norway is vulnerable to a variety of climate-induced hazards and cascading events, including flash floods and

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various types of slides. Due to national policies on decentralization by the Norwegian government, with a stated intention of ensuring vibrant local communities and growth across regions, Norway consists of many small communities scattered across the country (Meld. St. 5 2019–2020). Small communities can be particularly vulnerable to climate change impacts, due in part to challenging topography and limited access routes, an aging and/or declining population, limited access to resources or public services, and a long emergency response time. As such, they require more locally informed approaches to deal with climate-induced hazards (Amundsen 2015; Scherzer et al. 2019).

With the increasing impacts of climate change on local communities, there is a growing need for building resilience through improved adaptive capacity within small communities to enable them to withstand the current and future impact of climate change-induced hazards. Understanding why people decide to settle and stay in risk-prone areas, and how and in which ways their attachment to place shapes their risk perception and subsequent coping behaviors, is important knowledge for furthering local community resilience and adaptation strategies (Quinn et al. 2018; Amundsen and Dannevig 2021). Despite this, research on risk perception that includes the psychological notion of people's place attachment is still limited. The same goes for empirical studies of place attachment in relation to smaller-scale hazardous events of a recurring nature, which appear to have received less attention than hazards of a more disastrous nature (Bonaiuto et al. 2016).

The focus of this article is flash flood hazard, a specific type of flood hazard that is potentially becoming a major concern in several Norwegian communities that are characterized by settlements located in mountain valleys. Through this empirical study, we investigate how place attachment potentially influences how two small Norwegian communities understand and cope with the risk of flash floods and flood slides. The local concerns of small communities are at the center of the study. To this end, we aim to address the following research questions: What dimensions of place attachment can be found? How does place attachment shape people's risk perception? And how do people's place attachment and risk perception influence their coping behavior?

Place attachment framework

Why do people choose to live in hazard-prone areas? Studying place attachment can provide a useful lens when trying to examine this issue (van der Star and Hochstenbach 2022). While often used interchangeably within the literature, the concept of place attachment falls under the more overarching concept of sense of place, which generally tries to understand people's relationship to place (Stedman 2016). Place attachment then puts the main emphasis on a person's emotional or affective connection to a place created through social, natural, and functional bonds (Lewicka 2011b; Bonaiuto et al. 2016).

The scientific field of place attachment has grown substantially since the 1970s, with scholars redefining and refining the concept. Consequently, place attachment has been studied in a multitude of ways, focusing for instance on urban or rural settings, or highlighting individual or community dimensions of the term (Lewicka 2011b). To measure the strength of place attachment, a psychometric scale has traditionally been used, typically through the application of a variety of survey tools (Stedman 2016). However, it has been pointed out that this does not capture the different forms of place attachment that people can experience. Therefore, alternative methods of investigation have been put forward (Raymond et al. 2010; Lewicka 2011a). Raymond et al. (2010) have developed a conceptual model of place attachment distinguishing five different dimensions of the concept: (1) place identity, (2) place dependence, (3) family bonding, (4) friend bonding, and (5) nature bonding. These dimensions are further grouped into three different contexts: personal, community, and natural environment. It is recognized that some overlaps as well as interconnections exist between the five dimensions, but they still add analytical value for the purpose of empirical analysis (Fig. 1).

While there are many competing place attachment constructs with different typologies (cf., Cross 2015), Raymond et al.'s (2010) dimensional construct of place attachment has since been applied, for instance, to a Norwegian context by van der Star and Hochstenbach (2022), who underlined the usefulness of dividing the concept of place attachment into separate dimensions. Others have stressed that the dimensional typology will provide a more nuanced image of people's experiences, particularly regarding how and through which mechanisms the fact of being attached to a place impacts people's relationship to their surroundings (Quinn et al. 2018). The current article follows the same path and draws on Raymond et al.'s (2010) conceptual model.

Place attachment can have an influence on people's action (Amundsen 2015; Bonaiuto et al. 2016; Devine-Wright and Quinn 2020). Different degrees, types, and dynamics of place attachment can shape varying perceptions and behavior in the local context (e.g., Bailey et al. 2016). From the current point of view, the issue of place attachment becomes an interesting constitutive variable as it can affect how inhabitants interpret risk and deal with hazards and events in their communities. This notion is about the classical term risk perception, which emphasizes that risks and hazards are not a matter of objectivity, but that they interact with psychological, social, institutional, and cultural processes (e.g., Kasperson et al. 1988). In recent decades, the field of disaster recovery and place attachment has attracted growing attention, as illustrated in

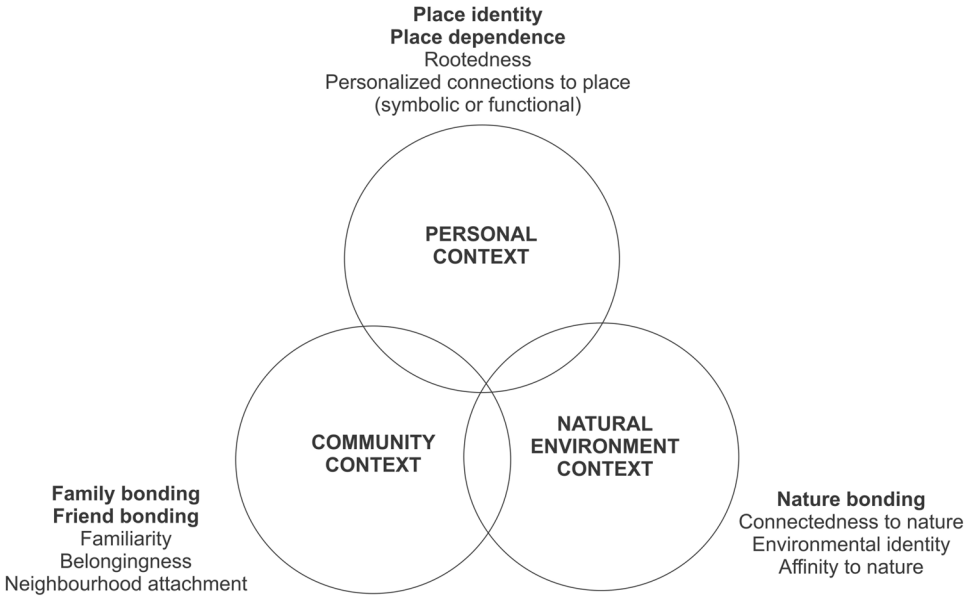

Fig. 1 Conceptual model of place attachment developed by Raymond et al. (2010) and modified by the authors to illustrate dimensions of place attachment and the different place contexts

previous studies of large-scale impact events such as Hurricane Katrina in the USA in 2005 and the Goderich tornado in Canada in 2011 (Chamlee-Wright and Storr 2009; Silver and Grek-Martin 2015). The impact of such events is often linked to people's place attachment to gain an understanding of why they remain in or return to such areas. Thus, place attachment can influence people's risk perception, leading to increased or decreased risk awareness. We use risk perception in a broad sense, covering different conceptualizations of how people recognize risk, including knowledge, awareness, and concern (Bonaiuto et al. 2016; Quinn et al. 2018).

In turn, place attachment and risk perception can influence people's coping behavior, motivating or discouraging them to adopt adaptive or mitigative strategies. In this paper, coping behavior covers adaptive measures taken in all phases of crisis management, from prevention, preparedness, response, and recovery, covering actions such as individual or collective preparedness efforts before the event, readiness for evacuation (e.g., Quinn et al. 2018), permanent relocation (e.g., Bonaiuto et al. 2016), post-hazard collective recovery action (e.g., Silver and Grek-Martin 2015), and so forth.

Flash floods threaten small communities

As a hazard modifier of meteorological and hydrological-driven events, climate change is expected to have an impact on the risk of flash floods, due to increasing temperatures and precipitation (IPCC 2021). This hydrological hazard is distinguished from other types of floods by its rapid onset (< 6 h) and short duration and is predominantly triggered by intense short-term rainfall (Peereboom et al. 2011; Associated Programme on Flood Management 2012; Kristensen et al. 2015; World Meteorological Organization 2016). Other triggers include rapid and intense snowmelt, a combination of rapid snowmelt and heavy precipitation, or the sudden release of water from lakes due to dam failure or bursting ice jams (Associated Programme on Flood Management 2012; Kristensen et al. 2015). Land that is already saturated or impervious can exacerbate the consequences of heavy precipitation in a concentrated area (Kristensen et al. 2015; World Meteorological Organization 2016). Flash floods can also cause cascading mass movement events such as avalanches, landslides, flood slides, and slush slides, posing a risk to human life, and causing economic loss, infrastructural damage as well as damage to the environment and cultural heritage (Peereboom et al. 2011; IPCC 2012; Hanssen-Bauer et al. 2017; NVE 2018a; NCCS 2021). With the expected climatic projections for the two case areas in the current study estimating a significant increase in episodes of heavy rainfall, more frequent and larger floods, and increased risk of flash floods, the hazard is highly relevant for these case areas (NCCS 2021).

Cases: two small communities with a collective hazard memory

The current study's case areas of Barstadvik and Vartdal are two small communities located in the municipality of Ørsta, within the county of Møre og Romsdal (Fig. 2). Both communities are situated in the northern part of the Ørsta peninsula, about 20 to 32 km from the administrative municipal center. The topography of both communities is characterized by a deep valley surrounded by steep

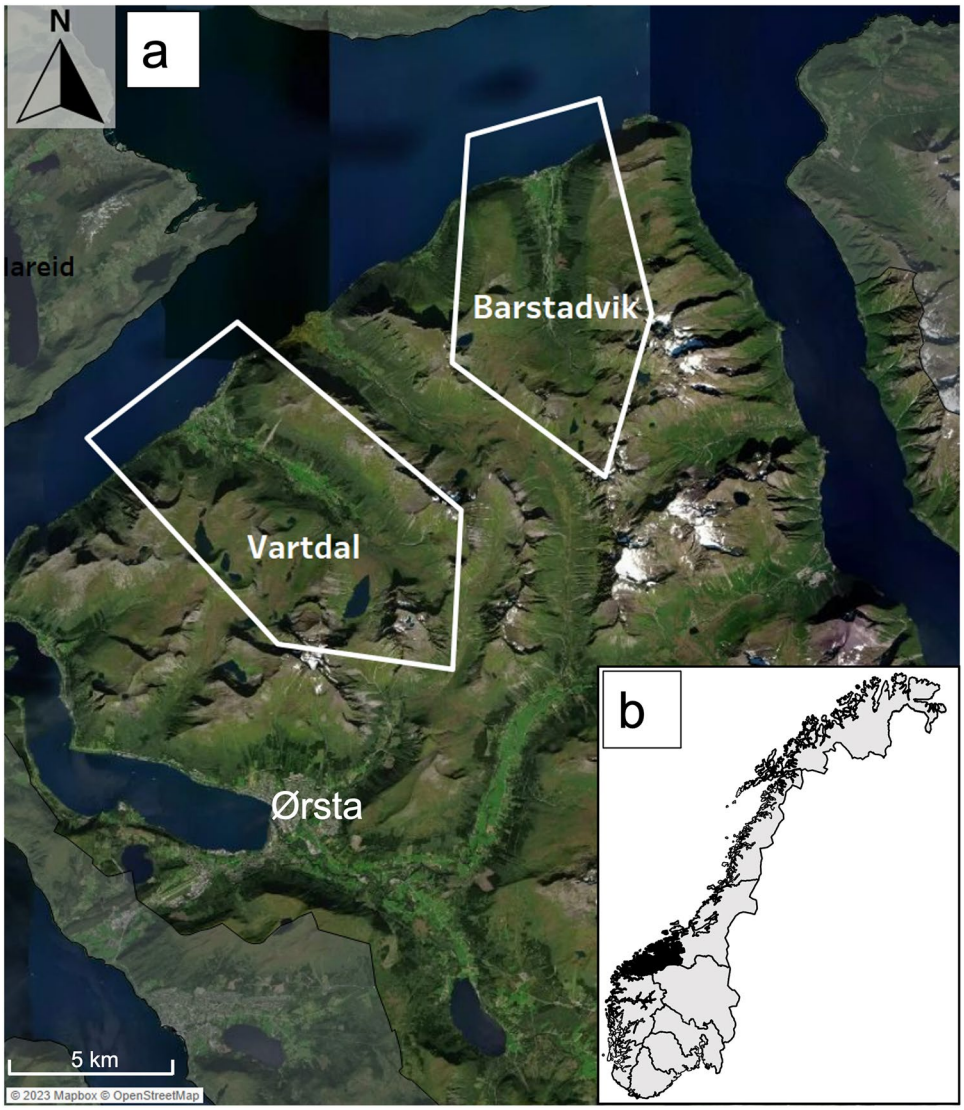

Fig. 2 **a** Topographical map showing the two case areas, Barstadvik and Vartdal (highlighted by white polygons), and the nearest administrative center Ørsta. **b** Inset map of Norway with the location of Møre og Romsdal county, highlighted in black (Kartverket, ©Norgeskart.no)

mountains and a main river running from the mountainous areas in the inner valley toward the fjord. The mountain region draws tourists in summer as well as winter, with several opportunities for hiking, climbing, and skiing. With populations of 567 and 271, respectively, most of the residents in the communities are concentrated around the estuary of the main river, near the main access road. Infrastructure and housing are found on both sides of the river, including several farms with cultivated land and livestock (Statistisk sentralbyrå 2022; Thorsnæs 2022). Agriculture is an important source of income for many of the residents. Other work affordances include local industry and short commuting distances to the administrative centers of Ørsta and Ålesund (Thorsnæs 2022).

The communities of Barstadvik and Vartdal have a long history of flood events as well as rain-induced flood slides and landslides. Several historical events have been documented by the local communities themselves, describing events dating back as far as the seventeenth century (Buset 1964; Grøvik 1982). These hazards have become part of the collective memory of the local inhabitants. In 1873, Barstadvik experienced a large flood caused by a combination of several factors—the area was hit by heavy rain after a dry period had left the land area impervious, and a flood slide consisting of rock and soil had flowed into a lake in the inner valley, causing a rapid flood downstream that resulted in severe destruction to the community. The locals refer to this event as "Kviefonnene" (Buset 1964; Grøvik 1982).

Similar events of a more recent nature include a large flood slide in Vartdal in 2013 and a flood event in Barstadvik in 2016. On November 15, 2013, several flood slides and landslides occurred in different locations in Vartdal. The largest of the slides caused damage to buildings, roads, and cultivated land and left a massive scar on the mountainside. Several residents had to be evacuated (Buset 1964; NVE 2018b). A detailed description of the major flood slide was

documented through the collection of testimonies from impacted residents, captured by a local resident within the community (Buset, 2014, unpublished material). The largest recent flooding event in Barstadvik occurred on 9 August 2016. During the flood, the river transported a large amount of debris downstream, causing damage to bridges, existing riverbank enforcement measures, and cultivated land. The flood also altered the riverbed, jeopardizing infrastructure and cultivated land nearby (NVE 2020; NORCE 2022). These two recent events, together with historical events, form the foundation for the conversations with residents within the two case study communities.

Method: a narrative approach

Following a mainstream qualitative sociological approach (e.g., Hellevik 2002), the study was designed as an intensive small-N narrative approach to allow for a more in-depth investigation of the relationships between place attachment, risk perception, and coping behavior. A narrative approach (e.g., Paschen and Ison 2014; Butina 2015) constitutes an inquiry wherein the stories of the informants become the raw data. The informants are storytellers who consciously or unconsciously reveal insights into how they, in this case, perceive their communities, make sense of past events as well as current and future risks, and the impact of climate change through their narratives. In the narrative approach, the sample size is ambiguous as it depends on the answers sought, the theoretical framework, the type of data collected, resources, time, and so forth (Butina 2015, p. 192).

To enable mixed sources and information environments, the essential place attachment-related narratives of the residents were collected during field research. In the period between 18 and 22 September 2022, field observations, informal conversations ($N=7$), a focus group interview ($N=7$), and semi-structured interviews ($N=8$) were conducted in the two communities of Barstadvik and Vartdal. Some of the interviewees participated in more than one activity, making the total individual sample size $N=18$. The focus group interview was held as a joint session with participants from both communities. The respondents were mainly landowners permanently residing within the communities, several of whom had a direct relation to local agriculture. Two-thirds of the respondents were male, and the dominant age group was that of 50 years or older.

Information about the research project and a call for participants was made available in advance through social media platforms, local media outlets, and the municipality's website. Informants were recruited during public information meetings and through a snowball sampling technique and were formally apprised of the purpose of the research. Participation was voluntary and informed, with participants (taking part in semi-structured interviews and the focus group interview) providing a signed consent form agreeing to the use of anonymized information as part of the qualitative data collected. An interview guide was utilized to support the interviews, organized around three main topics: (1) place attachment, (2) risk perception, and (3) coping behavior. Two recent natural hazard events in the communities formed a natural starting point for conversation with the residents.

The recorded interviews were anonymized and transcribed verbatim. Quotes presented in this paper were provided in Norwegian and translated into English by the authors. Analysis of the data was performed through coding the transcripts using the qualitative data analysis software NVivo (QSR International Pty Ltd. 2022) to identify relevant themes. The initial screening of the transcripts identified the following themes related to the concept of place attachment: nature, family, history, community, and work. A second screening was conducted using Raymond et al.'s (2010) conceptual model of place attachment by coding the transcripts according to the following codes: place identity, place dependence, family bonding, friend bonding, and nature bonding. As part of the data processing, the transcripts were also reviewed and coded to capture elements relating to risk perception and coping behavior. Statements relating to previous experience with natural hazards, general risk awareness, or attitude toward natural hazard risks were coded under risk perception and further screened into subcategories. Coping behavior was coded based on statements illustrating precautions and measures taken or considered, or lack thereof, as well as any identified needs for capacity-building in the community. Our findings are presented as quotes in narrative form, aiming to achieve an enhanced understanding of the presence of place attachment and its impact on people's risk perception and coping behavior in the two small Norwegian communities.

Results: narratives

Narratives of place attachment

As a theoretical construct, place attachment can appear too abstract and wide a concept to apply to empirical studies without further operationalization. For our purposes, Raymond et al.'s (2010) conceptual model has been adopted. In the following section, we explore whether, and to what extent, dimensions of place attachment (place identity, place dependency, family bonding, friend bonding, and nature bonding) can be found in the two communities.

Place identity

In Raymond et al. (2010, p. 426), place identity is defined as "Those dimensions of self, such as the mixture of feelings about specific physical settings and symbolic connections to place, that define who we are." Place identity is a highly personalized connection to place that is symbolic in character and falls under the "personal" context of place attachment.

Several of the respondents in the current study indicated some notions of place identity, with a strong sense of connection and affectionate feelings toward the place where they lived. For some, it had a symbolic connection through fond memories of growing up in the area and the way in which the specific physical and social settings provided a safe environment for bringing up children. For others, it represented a sense of rootedness that was particularly realized when traveling or while living away for certain periods in their lives.

> You will find everything here. I mean when we're talking about why one lives here. Well, I'm a migrant in that I've moved here because of family, but I can feel it, for my own part, that when I'm on holiday and out travelling to places with less nature, I'm always missing home, back to the mountains and the fjord.

One respondent, who originated outside of the area, had resided most of his life in one of the case areas and strongly identified as belonging to the place where he lived.

> It's my village, yes, without a doubt.

Place dependence

Following Raymond et al. (2010, p. 426), place dependence, together with place identity, also belongs to the "personal" context of place attachment. Whereas place identity is mainly symbolic in nature, place dependence is a highly personalized functional connection to place, defined as a: "Functional connection based specifically on the individual physical connection to a setting; for example, it reflects the degree to which the physical setting provides conditions to support an intended use."

In the current study, place dependence was particularly visible in terms of connectivity to family farming, an individualized attachment to place through generational farm activity. It was accompanied by a sense of functional connection to the settings through the ability to engage in activities that respondents found meaningful, such as hiking, hunting, fishing, and picking berries. Several respondents highlighted that such outdoor activities connected them to the place.

> I live here, I live near the river, I grew up near the river, I have my farm here, I've lived here almost my whole life.

One respondent humorously summed up the benefits of living in a small, remote community, seen here as a form of functional connection that allows for a certain level of freedom.

> One can live wherever one wants, he only has two demands: that he can walk around the corner of his house and take a piss without his neighbors watching, and that he can walk up to his farm and shoot a deer. Those were the two things he set as requirements. You know, it's about freedom.

Family bonding

This dimension of place attachment belongs to the "community" context in Raymond et al.'s (2010, p. 426) model, together with that of friend bonding: "Feelings of belongingness or membership to a group of people, such as friends and family, as well as the emotional connections based on shared history, interests or concerns." Here, family bonding provides a sense of belonging to a place through familial ties, in that they feel attached to the place through their relationship with relatives and family members that also reside in the area.

Family bonding was highly represented among the respondents, most of whom had relational ties to the area. Some of the interviewees even shared a surname with a small geographical location within the community. During field visits, it was observed that several farms had family names painted on the barns, such as Andersgarden, Pettergarden, or Olagarden. These names have been used for generations and are also referred to in *Vartdalssoga*, a series of books documenting historical events in the two communities (Buset 1964; Grøvik 1982).

Three interviewees who grew up in the area had later moved away from the community for various reasons. At a later stage in life, they had returned to the area to assume full or part of the operation of the family farm. This also illustrates an interconnection between the dimensions of family bonding and place dependence, as one of the respondents indicated that he might not have moved back to the area had it not been for family bonding and responsibilities toward the family farm.

> This was a decision we made together, me and my wife. So, my father wanted to sort of withdraw, or he didn't want to be responsible for running the farm was more how it was, and then, yes, taking over the family farm it is as much about the place, that the children could grow up here, and yeah, that sort of thing. It's

> probably a slightly rosy image of one's own upbringing, so you think that it's not so hazardous. So, there were several reasons, of course also the fact that I could take over the farm and live off it. So, there are several reasons for ending up here, and I was lucky that she (his wife) wanted to come with.

Friend bonding

As part of Raymond et al.'s (2010, p. 426) "community" context, we also find friend bonding. This dimension represents a connection to place, a form of belongingness based on friendship and other forms of emotional connections outside of the family, such as shared concerns or interests within the community.

One respondent showed a pronounced attachment to place through the social context in the form of friend bonding, as illustrated in his response to a question about what the best part of this place was for him.

> That's the relationship with our neighbors. They're very nice. We can visit them whenever we want and have a chat. If we need help, we just call them. And when they are out travelling, we help feeding the cat.

Some other respondents indirectly indicated some belongingness through neighborhood attachment or social bonding in the form of community belonging. One example of a form of community bonding was brought up during the focus group interview, where one participant mentioned that people from the community gather at the local beach and go for a swim once a week.

One respondent, having experienced several natural hazard events, showed concern for other members of the community and felt that the natural response was to see if anyone needed help, indicating a form of attachment to neighbors and the larger community.

> But what I'm thinking is that it's completely natural in a way to see if anyone needs help. You can't just sit back down and drink your coffee. That's not possible.

A few of the focus group participants pointed out that Barstadvik has a strong community organization with a bottom-up approach, and the community, in cooperation with the municipality, has developed several hiking and walking paths in the area, evincing an observed pride in what they had accomplished together.

One respondent indicated a lack of attachment to the place he was now residing in, explaining that he did not feel very connected to the local community, and that it almost felt lonely in a sense. Reflecting on this, he pointed out that it might perhaps also be a bit too soon for him to have developed an emotional connection to the place.

Nature bonding

Finally, Raymond et al. (2010, p. 426) introduce nature bonding, defined as an "Implicit or explicit connection to some part of the non-human natural environment, based on history, emotional response or cognitive representation (e.g., knowledge generation)." All interviewees displayed some degree of place attachment in the form of nature bonding, many of whom displayed an emotional affinity to the surrounding mountains and the picturesque view. One respondent, with family ties to the place, mentioned nature bonding as a strong reason for returning to live in the community after several years away.

> I'm very fond of nature. I love plants, animals, insects, all living things. And that's in addition to the mountains, right? I enjoy being able to walk out in the morning and see this and that type of bird. Do you understand? It's the experience of nature.

> I can share a little story that also highlights living in this district. You've probably heard of him, Claus Helberg, who accompanied the Queen of Norway on all her hiking trips. He was 75 years old in the 90s, and we were in a gathering with him, and I greeted him from Sunnmøre, I was active in the tourist association at that time, and then he pulled me aside and said: 'I can't tell anyone, but everyone asks me what's the most beautiful mountain I've ever hiked up. But since you're from Sunnmøre, I can tell you that Sunnmørsalpane is by far the best. But I can't publicly say that,' said Helberg. And that's also partly why we enjoy ourselves here!

Nature bonding appears to share some overlaps with both place identity and place dependence, as the surroundings provide the residents with both symbolic and functional meaning in addition to their general connectedness to nature and the way they perceive the mountains in the area as part of their environmental identity.

Narratives of risk perception

The dominant narrative among the interviewed residents in both communities displayed strong collective and self-experienced hazard memory and awareness of risk in the area. Several of those interviewed had noticed changes in the climate and weather, such as seasonal shifts impacting the timing of crop harvesting. One of the farmers expressed concern about decision-making under uncertainty, highlighting that it was challenging to prepare for both dry periods and heavy rains as these pose two very different challenges to farming activities. All but one respondent had prior experience of natural hazard events in the area. In Vartdal, most had experienced different types of mass movement events (like landslides and avalanches), while in Barstadvik, flooding

events were the most prominent. Both in the focus group as well as in two personal interviews, it was noted that flooding events are most likely to occur in the month of August (as is also testified in more structural and scientific observations, see Lawrence and Hisdal 2011). Illustrating the collective local memory, several of the respondents frequently referred to historical events, such as Kviefonnene in 1873, and how this event occurred in the month of August after long periods of drought followed by heavy precipitation.

Most of the respondents generally took an interest in natural hazards in their area and had either previously been worried about natural hazard events or were still concerned to some extent. Some of the respondents demonstrated heightened risk awareness by actively seeking information to determine whether they were located within a risk zone and if their properties could be affected by flooding or mass movement. Participants in the focus group unanimously responded "yes" when asked if they had sought this type of information. One respondent pointed to experience of previous events as a reason for seeking more information about the hazard zones.

> You probably become a bit concerned about it, and if we hadn't experienced it, then I'm not sure whether I would have looked at these avalanche maps for the Ørsta municipality.

Many respondents demonstrated knowledge about different weather signs that they used to determine risk, such as awareness of different wind directions that bring heavy precipitation and bouldering sounds from the river, indicating increased water flow and the potential for flooding. After the implementation of flood protection measures, the fear of flooding events appeared to have subsided, although most maintained their awareness of risk and continued to look out for weather signals.

> Listening out for the river rolling rocks – I often do that. In recent years, I've basically not bothered about it because I know she won't do any damage, but I did probably lie awake at night for thirty years.

Several of the participants mentioned historical signs in the landscape such as glacial deposits and indications of old riverbeds in the soil. One respondent believed that historical river paths could indicate the river's potential to resume its old riverbed paths in the future, meaning that there was a risk that the river could enter his cultivated land area.

While the respondents did indicate strong awareness of the risks, they expressed that they felt safe in their own homes. However, at the same time, several respondents stated that they had concerns about the safety of other community members living in what they themselves perceived as more risk-prone areas. Most of the respondents expressed their feeling of safety by refuting any intention of relocating.

> Quite impossible! Here, I will stay until I die.

Three respondents provided a counternarrative by stating that they rarely thought about natural hazard risks in the area and did not worry too much. One of which was a newcomer who had not experienced a large natural hazard event in the area. Two respondents, who had lived in the area for most of their lives, pointed out that the risk of mass movement was never talked about prior to the large flood slide in 2013. As such, they had not really thought about the risk before experiencing a flood slide near their own property. They were still aware of historical event impacts and the respective mitigating measures implemented following the events. Despite both their historical knowledge and their experience of the recent event, both participants indicated that they were not concerned about the risk and that they felt safe where they lived.

> We have a very relaxed attitude toward it. As I said, I grew up here and, at that time, there was never any talk of a flood slide.

Narratives of coping behavior

The analysis of the interviews revealed a dominant narrative in which most of the participants exhibited some form of coping behavior. Several of the respondents had taken their own precautions prior to, during, or after an event, or had thought about possible additional measures that could be taken to ensure their resilience to the occurrence of natural hazards. Two respondents expressed counternarrative behavior through lack of coping behavior strategies. These respondents demonstrated limited risk awareness despite having experienced a flood slide close to home, as they were not overly concerned about future events, and rarely thought about the risk of natural hazards in the area. It was emphasized in this context that a flood slide can happen when you least expect it and that it is a natural part of living on the west coast of Norway. The counternarrative can be summed up in one phrase:

> We can't do much about the forces of nature.

Most of the respondents did exhibit coping behavior, however, and appeared to pay attention to weather-related indicators in order to prepare for or take action during potential hazards.

> It's so odd that when you've lived here your whole life and know which [wind] directions to pay attention to – the directions when the weather is bad, then you know... I mean, it doesn't necessarily mean that something will happen, but at least you have in mind what your next move would be, so to speak.

One respondent had gone as far as to self-evacuate their children out of the area several years earlier during a large flooding event, while another respondent mentioned evacuation as a relevant alternative in case of hazard events. One respondent, having experienced flood damage to her own property, had since taken different precautionary measures to prepare her property for future events.

> I had to lift things up so that they wouldn't get wet, and afterwards I had to have a different structure in the basement so that I could withstand water coming in.

Four respondents pointed out what they saw as an evident need for self-preparedness when living in remote areas. They had taken precautions to that end either prior to or following an event, such as purchasing relevant equipment to ensure that they could handle severe events in the area. One of the interviewees related this coping behavior to their occupation and responsibility as farmers.

> I think many people in the village think about their own preparedness because they have livestock.

Equipment owned by local farmers was utilized during and after the flood slide event in Vartdal in 2013 to clear the roads and the surrounding land of debris. The respondents also provided other examples of coping behavior at the community level, such as residents offering assistance and private accommodation for those being evacuated following the flood slide in 2013, as well as arranging a small gathering for the community. Following the 2016 flood event in Barstadvik, the community got together to ensure a clean-up of the flood-damaged areas and to re-establish some of the riverbanks. On the other hand, two of the participants in the current study, who did not have historical roots in the area, agreed that the locals do act and provide support, but felt that the concern and sense of community was only manifest during or after an event, rather than prior to it. The respondents were also rather unsure about how the community perceived newcomers and to what extent the community cared and would show up for those with no historical or familial bonds to the area.

The perceived need for assistance or capacity-building from outside the community varied greatly. Few respondents had expectations of outside help, and many indicated a strong sense of self-preparedness rather than relying on outside assistance.

> I haven't asked for any support.

However, when asked directly about the potential need for capacity-building to ensure a resilient community in the face of natural hazards, some residents highlighted the importance of ensuring information-sharing, electricity and cell phone coverage, coordination of mitigating measures, and road access/alternative escape routes. One respondent strongly expressed a need for overall leadership and joint situational awareness to ensure coordinated measures and actions. This was supported by other residents during informal conversations in the field, as well as indicated in interviews with other respondents. One respondent expressed some concerns in that she feared that those closest to the flood slide were in a sense left to fend for themselves following the event. Some respondents suggested that the community should ensure that the citizens would stand together as a community when such adverse events occurred.

Discussion: the influence of place attachment on people's risk perception and coping behavior

This study has examined the relationship between place attachment, risk perception, and coping behavior, pursuing a narrative-based investigation of two rural and remote communities in Norway. Using the lens of place attachment, our findings show that most of our respondents expressed an overall positive attachment to their communities. These findings are in line with other studies investigating people's place attachment in rural settings, such as those conducted by Raymond et al. (2010), Anton and Lawrence (2014), and van der Star and Hochstenbach (2022). Investigating place attachment further, we applied the conceptual model developed by Raymond et al. (2010) and were able to find evidence of all five dimensions of place attachment to some extent among the respondents. While not measurable, this typology can be useful in terms of operationalizing the concept of place attachment by providing a more nuanced image of people's relationship to their physical and social environment.

The dominant narratives in terms of place attachment among the respondents were centered around the dimensions of place identity, place dependency, family bonding, and nature bonding, with some evident overlaps between the different dimensions. Place identity and nature bonding in our cases were to some extent intersecting, as the residents found their symbolic connection to the place partially through their affinity or connectedness to the local mountains and natural surroundings, while place dependency and family bonding in many cases revolved around the connection to and responsibility related to farm succession. Nature, combined with a sense of familiarity and belongingness rooted in their familial ties and farming activities, were emphasized as reasons for residing in these communities. A counter-narrative was found among those respondents without familial ties and with a shorter duration of stay in the community, where place attachment had not yet formed.

Some traditions interpret risk as inherently subjective, as illustrated by Slovic and Weber (2002, p. 4): "*risk* is

seen as a concept that human beings have invented to help them understand and cope with the dangers and uncertainties of life." An increased understanding of the different dimensions of place attachment within communities provides us with a better understanding of why people continue to live in risk-prone areas. This in turn can provide a gateway to investigating how people perceive risk, and what actions they choose to take in terms of dealing with risk.

The dominant narratives on risk perception within the two communities generally pointed to the presence of a strong awareness of flash flood-related risk in the area. Prior collective and individual experience with flash flood-related events appeared to have a strong impact on this risk awareness. Similar findings have been put forward in a body of literature on the link between experience and risk perception, maintaining that having previously experienced a greater number of negative life events of any type is associated with greater risk perceptions in the future (e.g., Blum et al. 2014). Having a previous flood experience, according to some studies (e.g., Lawrence et al. 2014), contributes to increased preparedness of households, but also a stronger preference for central government and communities having flood risk responsibilities, in addition to local government. Those who lack experience are likely to be more optimistic about flood consequences. Our study confirms the enforcement of local and individual risk awareness due to prior experience but is not able to arrive at any clear-cut conclusion about the preferred risk governance model, except to say that prior collective risk experiences enforce communality and solidarity in the face of future risks and during them.

An interesting finding of our study is that the two communities' risk perception was not only influenced by self-experienced events, but also through access to historical knowledge developed over time and passed down through generations. This finding suggests that people's place attachment, particularly through family bonding, could have an influence on their risk perception, as generational ties to an area form a type of knowledge and awareness that is more accessible than it would be for a newcomer to the area, for example. As this form of knowledge develops over time, it supports the notion that experience and time spent in an area can influence people's risk perception (Lewicka 2011a). Place attachment in the form of place dependence, exemplified here through farming activities, provides access to knowledge about changes in the landscape. Respondents with a shorter duration of residency in the area and with connections to the place other than place dependency may not have access to this knowledge and may be less inclined to notice changes that indicate natural hazard risks. Our paper reinforces arguments put forward by authors such as Bonaiuto et al. (2016), Groulx et al. (2014), and De Dominicis et al. (2015), who suggest that the presence of place attachment influences risk perception as individuals with a strong attachment to place often have heightened risk awareness.

Despite finding strong risk awareness in both communities, increased risk perception does not necessarily translate into a sense of feeling exposed (Bonaiuto et al. 2016). As De Dominicis et al. (2015) show, place attachment can actually work as a "mental" shield against place-related threat and, as such, strong place attachment can cause people to dismiss or ignore risks (Bonaiuto et al. 2016). As seen in our case study, while most respondents had strong awareness of risk, they also stated that they felt safe in their own homes. These findings could illustrate a negative relationship between risk perception and place attachment, despite the evident familiarity with risks among most of the respondents. Similar findings have been pointed out in Bonaiuto et al.'s (2016) studies, where it was suggested that strong place attachment in the form of place identity, where residents attach strong symbolic value to place, may cause those residents to downplay the risk or underestimate it. This aligns well with the concept of insideness, whereby a feeling of being "inside" a place can contribute to individuals feeling less at risk (Relph 1976 in; Bonaiuto et al. 2016).

Interpreting people's connection to place and their perception of prevailing risk contributes to a better understanding of people's behavior in dealing with hazards and events. Despite respondents averred feeling of safety in their communities, the dominant narratives indicated a willingness to adapt and implement a variety of coping strategies that would enable them to continue living in the area. As most of the respondents had previous experience of natural hazard events occurring within their communities, this could be interpreted as a motivator for their coping behavior. Relocation was not considered a feasible coping strategy by most of the respondents. This could be linked to the dimensions of place dependency, where many of the respondents were dependent on local farming activities for their livelihood. Family bonding could also contribute to strengthening ties to the area and diminish the willingness to relocate.

Some studies suggest that affect-based cues, such as place attachment, diminish environmental risk-coping intentions and actions when associated with high-risk perception (De Dominicis et al. 2015). Thus, place attachment can act as a moderator (cf. Venables et al. 2012; Schultz et al. 2014) when it comes to local-level risk management. However, other studies argue that place attachment can be a motivator for adaptation or coping behavior (Devine-Wright 2013; Amundsen 2015). Still others have found somewhat fatalistic attitudes among people, not particularly connected to any place attachment, namely, that one cannot do much about the forces of nature (e.g., Paton et al. 2008). Furthermore, research (e.g., Lujala et al. 2015) emphasizes the impact of experience. Individuals who have not personally experienced

the effects of hazards, even if they reside in high-risk areas, are less inclined to implement coping behavior strategies. In sum, we maintain the argument that the relationship between place attachment and coping behavior is complex, and place attachment can act as both a mediator and a moderator between risk perception and coping behavior (Bonaiuto et al. 2016). While some studies suggest a strong influence between place attachment and coping behavior, it is important to consider that no clear causal relationship can be drawn. However, an increased understanding of common elements among people's risk narratives provides insights into community concerns and can help identify opportunities to increase community resilience.

Conclusions: the promises and limitations of place attachment

Insights into the dominant narratives of risk perception and coping behavior can accommodate a better understanding of the concerns and priorities within a community, and how they interpret and deal with the presence of risk and natural hazard events. Nature bonding and generational ties to the area have provided residents with access to knowledge such as weather signs or landscape and climatic changes indicating heightened risk, as well as increased awareness of previous events and their consequences. The dominant narrative of risk perception illustrated a strong collective and individual hazard memory and awareness of risk in the area, although this risk awareness did not always translate into a sense of feeling at risk. A strong sense of symbolic identity tied to the area could have inhibited the residents' sense of urgency and fear tied to the embedded risk of natural hazard events in the community. This was expressed as a strong reluctance to relocate. Some adaptive measures had been taken at individual and community levels to ensure continued residency and activity in the area, which could have been influenced by place identity and place dependence. Even though the relationship between place attachment, risk perception, and coping behavior is complex, we argue that it does yield valuable insights into the issue of why people reside in hazardous areas. The concept of place attachment also highlights new perspectives for increasing community resilience.

This form of knowledge, as presented in the current study, can provide a basis for more locally informed adaptive strategies aimed at climate-induced natural hazards, for instance through actions that enable small communities to thrive despite the presence of risk, rather than relocation as the sole option. An interesting area for further research could be to investigate from a local governance perspective how this form of knowledge can be gained, how it is interpreted, and how local concerns and capacities are implemented in local governance strategies and actions.

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Data Availability The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Conflict of interest The authors declare no competing interests.

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