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Research article

Awareness without learning: A preliminary study exploring the effects of beachgoer's experiences on risk taking behaviours

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ABSTRACT

Most drowning deaths on Australian beaches occur in locations not patrolled by lifeguards. At patrolled locations, where lifeguards supervise flagged areas in which beachgoers are encouraged to swim between, the incidence of drowning is reduced. To date, risk prevention practices on coasts focus on patrolled beaches, deploying warning signs at unpatrolled locations with the aim of raising public awareness of risk. What remains unexplored is the potential for learning and behaviour change that can transfer from patrolled to unpatrolled beaches through beachgoer's experiences and interactions with lifeguards. The aim of this preliminary study is to explore the risk perceptions of beachgoers at a patrolled beach to establish if and how their experiences of beach risk and interactions with lifeguards affect their behaviours. Data was collected in Gerroa, Australia by engaging 49 beachgoers using a mixed survey-interview methodology. Results show that beachgoers are aware that they should 'swim between the flags', but many did not know the basis for the positioning of safety flags. A key finding is that beachgoer's express a clear desire for a skills-based model of community engagement that enables learning with lifeguards. This demonstrates a reflective public that desires skill-development, which may transfer from patrolled to unpatrolled beaches to affect broader risk reduction on the Australian coast. Learning how to avoid site-specific rip hazards with lifeguards at the beach presents a promising, and previously unexplored model for beach drowning risk prevention that has the potential to affect behaviour at unpatrolled beaches, providing an empirically-supported alternative to prevailing deficit-based awareness raising methods.

1. Introduction

Globally, most coastal nations with recreational beaches attempt to prevent drownings through the provision of trained lifeguards who supervise flagged locations at popular beaches. In Australia (the location of this study), the United Kingdom, New Zealand, and South Africa, lifeguards patrol 'safer' swimming areas denoted by pair(s) of red and yellow flags between which beachgoers are encouraged to swim via public awareness campaigns (Brander and MacMahan, 2011; Tipton and Wooler, 2016). Despite reduced drowning incidence at patrolled beaches, this prevailing approach to drowning prevention may not support the learning of behaviours that beachgoers need to mitigate drowning risk at unpatrolled beaches, which is where the majority of beach drowning deaths in Australia occur (Surf Life Saving Australia, 2021). Raising public awareness of where safer flagged locations can be found does not, for example, support beachgoers learning how to choose a safe location to enter the water, nor how to avoid unintentionally entering a hazardous rip current while wading in the water. Rip currents are strong, narrow offshore flows of water (Castelle et al., 2016) that are associated with roughly 20 drowning deaths annually in Australia and represent the leading cause of surf rescues performed by lifeguards and volunteer surf lifesavers (Brighton et al., 2013; Cooper et al., 2021). Importantly, a primary responsibility of lifeguards and volunteer lifesavers is to position safety flags away from rip currents (Brander et al., 2022).

Notwithstanding the limitations of awareness raising for learning and behaviour change being unsupported empirically in risk research

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(Hargreaves, 2011; Kolb, 2014; Lejano et al., 2021; Shove, 2010), assuming that communicated information from experts will heighten public awareness and result in behaviour change remains endemic to risk management. This approach to community engagement is widely known as the 'knowledge deficit model' (Cook and Overpeck, 2018; Jasanoff et al., 1998; Wynne, 2006) and has long been criticized for assumptions: that a lack of awareness is the basis for inaccurate decision-making, that knowledge can be flawlessly transferred via education from experts to the public, and that education is an effective means of realizing expert-determined objectives (e.g., swim between the flags) (Cook and Melo Zurita, 2019). In the context of beach risk management, Brander and MacMahan (2011) found that the information being communicated when raising public awareness of rip currents is often inconsistent and, despite some notable standardized national campaigns in Australia that include 'swim between the flags' (Surf Life Saving Australia, 2021) and the 'Think Line' (Cooper et al., 2021), they remain context-dependent. Furthermore, rip researchers often assume publics lack awareness of rips (Cervantes et al., 2015) and prevailing rip current education strategies lack formal evaluation (Koon and Peden, 2021), meaning that their overall effectiveness is largely unknown. As there is little evidence to suggest that current deficit-based approaches to raising public awareness of beach risk is reducing drowning rates (Surf Life Saving Australia, 2021), government, researchers, and practitioners are seeking novel ways to mitigate drowning risk at all beaches as part of their efforts to reduce coastal drowning deaths (Australian Water Safety Council, 2021; Lawes et al., 2020). The aim of this preliminary study is to explore the risk perceptions of beachgoers at a patrolled beach to establish if and how their experiences of beach risk and interactions with lifeguards affect their behaviours.

2. Literature review

In Australia, approximately 95% of beaches are unpatrolled by lifeguards, meaning it is unrealistic to expect beachgoers to always 'swim between the flags' (Uebelhoer et al., 2022). During winter months, many beaches have either no patrols or the hours of patrolling are reduced (Surf Life Saving Australia, 2021). Growing concern surrounding drowning deaths on unpatrolled beaches is evidenced in the 99 coastal drowning deaths between July 2020–June 2021 that occurred more than 1 km away from a patrolled location or outside of patrol hours (Surf Life Saving Australia, 2021). Further, an untold number of drowning deaths are prevented each year at unpatrolled beaches by surfers (Attard and Shaw, 2015; Berg et al., 2021) and other bystanders (Brander et al., 2019; Lawes et al., 2020). While risk prevention practices on Australian beaches focus on patrolled locations through supervising flagged locations and the 'Nippers' program that provides coastal water safety skills to children aged 5–14 years (Calverley et al., 2021), awareness raising via warning signs remains the most common form of community engagement at unpatrolled beaches (Uebelhoer et al., 2022). This is despite the known limitations that beach warning signs have on behaviour change (Brannstrom et al., 2015; Houser et al., 2017; Matthews et al., 2014; Sotés et al., 2020). This highlights the need to extend the impacts of community engagements at patrolled beaches towards risk mitigation strategies that prioritize learning and capacity building (i.e., skill) instead of continuing to assume that raising public awareness of risk will result in lasting behaviour change.

Skill is understood as here implicit knowledge that develops over time and is highly dependent on an individuals lived experiences (Ingold, 2000a). In the social sciences, learning skills often occurs in what Lave and Wenger (1991) define as a 'community of practice' or contexts where people with more experience mentor beginners (Lave and Wenger, 1991). Consequently, learning skills that are expressed through behavioural change are intimately linked to who people are learning from, what is being learned, and how this learning is being reinforced (Sharpe, 2016). Similar to coastal rock fishers developing the skilfully ability anticipate overtopping wave hazards (Kamstra et al., 2019), we hypothesize that beachgoers can learn how to more skilfully scan the surf zone to identify rip hazards (i.e., what is being learned) with lifeguards (i.e., who learning is shared with on the beach (i.e., how this learning is being is reinforced) which, theoretically, is more likely to influence behaviours than deficit-based warnings or awareness raising practices.

To date, most of what is known about beachgoer's risk perceptions and behaviours internationally is based on quantitative surveys that characterize beach drowning incidents (Koon and Peden, 2021; Segura et al., 2022; Silva-Cavalcanti et al., 2018) or that describe beachgoer demographics, safety knowledge, and behaviours (Clifford et al., 2018; Fallon et al., 2018; Hamilton et al., 2016; Sotés et al., 2018; Williamson et al., 2012) in relation to lifeguards, positioning of beach safety flags, and rip current hazards (Brannstrom et al., 2014; Caldwell et al., 2013; Locknick and Houser, 2021; Ménard et al., 2018; Pitman et al., 2021; Sherker et al., 2010; Woodward et al., 2015).

Other psychological research focuses specifically on behaviours relative to beach safety flags, attempting to understand why people swim at unpatrolled beaches (Ménard et al., 2018; Uebelhoer et al., 2022; White and Hyde, 2010). Few studies explore how beachgoer's experiences of risk and interactions with lifeguards affect their behaviours over time. The aim of this study is to contribute to the growing interest in rip current research from both geomorphologists and social scientists by responding to Shaw et al. (2014) call for expanded social scientific research approaches in rip current science. This is accomplished by engaging beachgoers using a mixed quantitative survey and qualitative interview methodology to explore the effects of lived experiences of beach risk on behaviour change.

3. Methods

After receiving human ethics approval by the University of Melbourne (ID, 2021-22989-23252-3), beachgoers were approached to participate in a survey-interview on a patrolled beach in Gerroa, Australia from January 16 - January 30, 2022, allowing us to recruit participants on weekdays and on a popular weekend during the peak summer holiday season. Gerroa is a coastal town in the Municipality of Kiama, in the Illawarra region of the state New South Wales (NSW) located approximately 100 km south of Australia's most populated city, Sydney (Australian Bureau of Statistics, 2016). Gerroa was selected as a case study due to its moderate hazardous rating (5/10), owing to a usual lack of rips, with the exception of rip currents running out to sea during falling tides at the mouth of the creek shown in Figure 1 (Surf Life Saving Australia, 2022). This means that our case study site has rip currents, but the risk of distracting on-duty lifeguards or beachgoers from supervising high-risk coastal areas is relatively low during the survey-interview engagements. Before recruitment began, we engaged Kiama Council members, Surf Life Saving NSW representatives, and council lifeguards about the suitability of our methodology and to request their permission and support to engage with beachgoers.

To recruit participants, the research team (PK and BC) approached beachgoers either sitting or walking on the beach within 200 m either side of, and between, safety flags. The aim of this sampling strategy was to engage beachgoers who chose to recreate between the flags and just outside of the flagged locations (i.e., 200 m), but still within view of lifeguards and not within the more hazardous areas near the creek mouth (Figure 1). This sampling strategy also addresses our aim of developing a baseline understanding of how people recreating at a patrolled beach (i.e., between or 200 m from flags) experiences of risk and interactions with lifeguards affect their behaviours. Before survey-interviews began, informed consent was obtained from all participants.

All beachgoers of diverse gender and ethnicity over the age of 18 were invited to participate in a 10–15 min audio recorded survey-interview for which they received a $10 (AUD) voucher to a local beachside café. If a participant was accompanied by a family member or friend, we typically

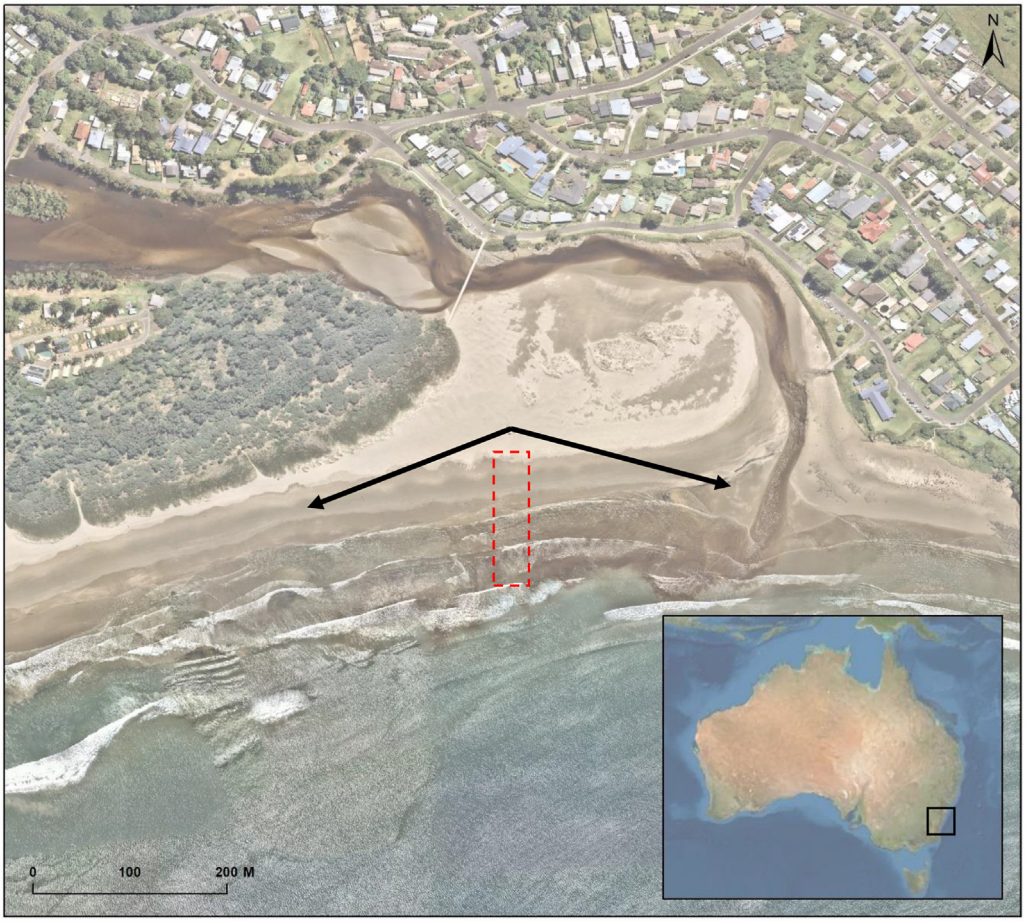

Figure 1. Gerroa Beach, NSW, Australia (inset) and location of where beachgoers were engaged (black lines) relative to the position of flags the red and yellow flagged area patrolled by lifeguards (red dashed lines).

conducted multiple, separate survey-interviews. Due to the public nature of the survey-interview engagements, there was sometimes discussion amongst participants, with joking common to the relaxed and informal model of engagement. Survey data was collected using Qualtrics, which is a bespoke web-application that allows survey questions to be answered directly via a secure website, while responses to paired semi-structured interview questions were simultaneously audio recorded and transcribed using the transcription service Otter. AI on a mobile phone. For a full list of survey-interviews questions, please see Appendix 1.

Survey-interviews and the range of possible answers were viewed on a digital tablet by participants and/or read aloud to participants at their request. Survey-interviews began by asking participants how far they had travelled to visit Gerroa, how often they visit an Australian beach in a typical year, and if they thought they were knowledgeable about the beach conditions at Gerroa. These questions established the level of experience that participants had with the study site and with Australian beaches more generally. This was followed by a sub-set of questions concerning participants' risk-taking appetite (Aven, 2013) and risk perceptions, including if they had ever experienced a hazardous situation on an Australian beach, how life-threatening that situation was, and whether their lived experience of risk had a lasting effect on their behaviours. Next, we asked if participants had interacted with a lifeguard, what type of interaction they had had (e.g., speaking to a lifeguard or being rescued), and whether their interaction(s) with a lifeguard had a lasting effect on their behaviours. This was followed by asking beachgoers what lifeguards and the public might do differently to make beachgoing safer. Lastly, demographic questions were asked to aid analysis and to contextualize the results.

Interwoven with the quantitative survey, paired semi-structured interview questions asked participants to 'describe' the hazardous situation that they had experienced and 'how' that experience had since affected their behaviour. Where relevant, we asked participants to rate, for example, 'how life-threatening a hazardous situation was', using a 10-point Likert scale ranging from, for example, 0 being 'not hazardous at all' to 10 being a 'near death' experience. Likert scales are common psychometric tools that allow for quantitative comparison between responses (Joshi et al., 2015), while the paired qualitative responses provided context for 'why' they chose that rating, which added breadth and rigor to the use of Likert scale analyses common to beach risk research. After completing 49 survey-interviews, we stopped recruiting new participants as we reached a point of 'saturation', where we had collected enough data to replicate the study (O'reilly & Parker, 2013) and now new information was being attained (Guest et al., 2006). Reaching this point of saturation after only 49 survey-interviews meant that our sample was too small for any meaningful statistical analysis to occur, which is an acknowledged limitation of this study (see section 5.4. On the other hand, reaching a point of saturation meant that we achieved greater validity and transferability of the qualitative findings (Fusch and Ness, 2015), which is why the qualitative findings in this preliminary study are emphasised in the results section instead of statistical analysis of the quantitative data. Before any analysis began however, transcriptions were checked for accuracy and analysed inductively using thematic coding techniques by the research team (PK, BC, BH) for inter-coder reliability. To protect participant's privacy, anonymous identifiers have been used.

4. Results

4.1. Demographics and beach experience

Response rates were relatively high, with only 6 of the 55 beachgoers approached declining to participate, often because they were supervising young children. Of the 49 beachgoers who agreed to participate, a majority identified as female (59%) and were aged 35–54 years old (60%) (Table 1).

Participants were predominantly 'tourists' who had travelled over 50 km to visit Gerroa (86%), though the majority of participants visited Australian beaches frequently (43%) (i.e., more than once a week). Despite 43% of participants visiting beaches frequently, only 37% reported being knowledgeable about the specific beach conditions at Gerroa.

4.2. Experiences of risk

Participants' self-reported 'risk-appetite' was evenly split (n = 25 and n = 24) between *risk-takers* (Maximax n = 3, Pareto risk n = 4 and Risk-seeking n = 18) and participants who are more *risk-averse* (Risk neutral n = 7, Risk-averse n = 11, and Minimax n = 6), respectively. Males tended to perceive themselves to be risk-takers (63%) while 55% of females perceived themselves to be risk-averse (Table 2).

On a typical visit to the beach, participants felt their risk exposure to be negligible (n = 13) to low risk (n = 12). Notwithstanding perceptions of low risk, the majority of participants reported having previously experienced a hazardous situation at an Australian beach (n = 32), most of which (78%) were characterized as either life-threatening (n = 11) or a near-death experience (n = 14).

Importantly, 72% (n = 23) of participants reported that their lived experiences of risk had a significant and lasting effect on their beach-going behaviours. Participants also tended to rate their experiences as having either no effect (n = 5) or a significant lasting effect on their behaviours (n = 23), with no participants reporting a moderate effect on their behaviour. Further, near-death experiences (n = 82%) were almost equally as likely to have had a significant lasting effect on behaviours as life-threatening experiences (80%).

4.2.1. Direct (first-hand) experiences

Qualitative descriptions of direct life-threatening experiences of risk often involved being knocked off balance after being struck repeatedly by breaking waves, typically while wading in shallow water. In one particularly life-threatening situation, a participant recalled being 'concussed' by a breaking wave, leading to a period of disorientation while struggling to exit the water:

Table 1. Characteristics of beachgoers interviewed for this study.

	N = 49
Gender	
Male	19 (39%)
Female	29 (59%)
Transgender\Intersex\Other	1 (2%)
Prefer not to say	0 (0%)
Age (years)	
18–25	6 (12%)
26–34	6 (12%)
35–44	15 (31%)
45–54	14 (29%)
55–64	4 (8%)
65+	4 (8%)
How far did you travel to get to this beach (km)?	
0-10 (Local)	0 (0%)
20–50	7 (14%)
50–100	17 (35%)
100+	25 (51%)
International visitor	0 (0%)
How often do you visit a beach?	
Rarely (1–2 times a year)	8 (16%)
Occasionally (4–6 times a year)	12 (25%)
Often (once a fortnight)	8 (16%)
Frequently (more than once a week)	21 (43%)
Are you knowledgeable about the conditions at Gerroa Beach?	
Yes	18 (37%)
No	20 (41%)
Sometimes	8 (16 %)
Unsure	3 (6%)

Table 2. Lived experiences of risk.

	N = 49
Risk appetite: What kind of risk-taker are you?	
Maximax (maximize chance of the best experience, regardless of risk)	3 (6%)
Pareto risk (only take risk when there is a substantial reward)	4 (8%)
Risk-seeking (comfortable with high risk but in a calculated manner)	18 (37%)
Risk-neutral (comfortable with risk that is taken for a good reason)	7 (14%)
Risk-averse (prefer the safest path)	11 (23%)
Minimax (risk minimization at any cost)	6 (12%)
In general, what level of risk are you exposed to when visiting an Australian beach? (0 = negligible risk to 10 = near-death experience)	
0-2 (negligible risk)	13 (27%)
3-4 (low risk)	12 (25%)
5-6 (moderate risk)	10 (20%)
7-8 (life-threatening)	8 (16%)
9-10 (near-death)	1 (2%)
Unsure	6 (10%)
Have you experienced a hazardous situation on a beach?	
Yes	32 (65%)
No	17 (35%)
How risky was the hazardous situation? (0 = negligible risk to 10 = near-death experience)	**N = 32**
0-2 (negligible risk)	0 (0%)
3-4 (low risk)	1 (3%)
5-6 (moderate risk)	4 (13%)
7-8 (life-threatening)	11 (34%)
9-10 (near-death)	14 (44%)
Unsure	2 (6%)
To what degree has this experience affected your behaviour? (0 = no effect to 10 = significant lasting effect)	**N = 32**
0-2 (no effect)	5 (16%)
3-4 (low effect)	1 (3%)
5-6 (moderate effect)	0 (0%)
7-8 (large lasting effect)	2 (6%)
9-10 (significant lasting effect)	23 (72%)
Unsure	1 (3%)

> "It was a beautiful day and I was just playing around the shallows, next minute this wave came and done me on the back of my head, and I was concussed for a couple of seconds. Yeah, even scratches on my forehead and stuff. I just stumbled out of the water like, wow, I need to get out of this. Unpatrolled beach like I should say. There's no flags, nothing" (Participant #4).

Accounts of direct near-death experiences often involved participants being unintentionally 'caught' in hazardous rip currents and uncontrollably pulled offshore:

> "When I was in my 20s, I got caught in a really bad rip and could not get out" (Participant #13).

Participants who had physically experienced the 'pull' of rips often spoke about how the experience 'stays' with them, subsequently affecting their behaviour by, for example, 'looking for rips' each time they now visit a beach:

> "Whenever I go, I'm looking for rips because it's obviously stayed with me all my life, you know? You know how dangerous they can be and how quickly they pull you out" (Participant #33).

Learning how to anticipate risk after they had experienced a hazardous situation was also described as having had a lasting effect on behaviour:

> "I've got that little knowledge now of hey, this wave is so high and there's no water under so expect it to dump you" (Participant #9).

Both life-threatening and near-death experiences tended to have occurred when participants were in their youth but were nonetheless reported to retain significant effect on their behaviours in the present. Participants also reflected on the influence of multiple experiences of risk on their current behaviour:

> "I think collectively those experiences make me a bit more wary. So I'll probably stay in the shallow part of the beach for a bit longer, suss it out [assess the risk] and then I might gradually get a bit further in" (Participant #22).

Without prompting, several participants noted whether their direct experiences took place on patrolled or unpatrolled beaches, with one participant signalling that in their youth they took more risk by swimming at unpatrolled beaches, but after experiencing risk at an unpatrolled beach, they would 'never, ever' do it again:

> "My brother got caught out in a rip. And I've been smashed by waves, swimming in beaches like this that were unpatrolled but now that I'm older I would never ever, ever do that" (Participant #11).

These qualitative insights – paired with survey ratings – provide evidence that life-threating experiences of breaking waves and near-death experiences mostly associated with rip currents, often at unpatrolled beaches, have a lasting effect on participants' behaviours. It also shows that these experiences translate to other unpatrolled beaches by 'looking for rips' each time someone visits or beach or 'never' swimming at an unpatrolled beach again.

In addition to participants' lived experiences having a significant lasting effect on their behaviour, several participants noted that becoming a parent had also significantly shaped their intentions and behaviour toward rip current risk:

> "I used to surf so I'd often get caught in rips or dangerously held underwater for long periods of time. It's always a bit risky but I probably do nothing so much now with the kids. I definitely wouldn't go out in anything big anymore. Just conscious that there's risk" (Participant #41).

Further, several participants described the importance of teaching beach skills to their children, which they were 'taught' by their parents:

> "I don't think it's our story, in my context, I don't think it's the sharing of stories that influences it [behaviour], it's actually that kind of stuff about teaching conditions and what you learn from your parents" (Participant #5).

4.2.2. Vicarious (indirect) experiences

Qualitative descriptions of vicarious experiences of risk often included hearing 'stories' about drowning deaths. Below, a participant frustratingly recalled a family unintentionally putting their child at risk by not swimming at a patrolled beach:

> "We were having this conversation around the campsite the other night when we were up the coast a couple years ago now and there was a family and their little son was out and he was stuck in a rip, with his boogie board, but still stuck. And we ended up getting him in, some surfers brought him in, but I went and had a conversation with the mother, I said five minutes away there is a patrolled beach. Go there. Why do you have to be on a beach that's empty? And you clearly don't know the risks, what would have happened if those surfers didn't come along? (Participant #24)".

Similar to direct experiences, vicarious experiences were also contextualized as occurring at either a patrolled or unpatrolled beach, as demonstrated above.

Vicarious experiences of 'bystander' rescues were also prominent and, in the case below, reported to have made participants 'more aware' of the risks when attempting to rescue someone in the surf:

> "I know there's a lot of stories out there, you go to save someone's life you drown as a result, you know what I mean? So I'm well aware of those stories. So if I was going to do that, I'd have to weigh up the risks for myself. And whether or not I'd be able to pull them back in without them drowning me I guess (Participant #17)."

Through sharing and retelling drowning 'stories', participants highlighted potentially contributing factors that they believed to have influenced a drowning death. In the example below, a participant contextualized the drowning death by the victim's country of origin (i.e., England), implying that their birth overseas contributed to a lack of experience and 'awareness' of risk on Australian beaches. This lack of understanding was also suggested to influence the victim's hazardous behaviour of 'not checking warning signs', their inability to accurately perceive the social cues of 'no one else being in the water' (i.e., suggesting the beach was unsafe), and the victim's unintentionally swimming in hazardous conditions (i.e., rip currents) as they mistake a 'nice sunny day' as low risk:

> "We had a friend actually who heard there was a little boy who was killed and actually the dad drowned trying to save his two sons from a rip. Not too far from here, actually and that happened a few years ago. They were out from England. They just had no idea what they were facing. And it was the beach where there weren't people, and they didn't know on this beautiful sunny day that meant don't go in and they didn't check the signs or anything like that and went in for a swim and the boys got in a big rip and he went out to get them and he drowned actually trying to save them (Participant #25)".

These accounts demonstrate that, unlike direct experiences of risk, when people recount vicarious experiences of risk, or potentially when they are told about drowning deaths, beachgoers often reflect on other people's actions and behaviour, identifying potential factors that they believe influenced the drowning, often providing a list of ways that the drowning could have been prevented if the deceased 'knew what they were facing'.

4.3. Interacting with lifeguards

Nearly three quarters of participants had interacted with a lifeguard on an Australian beach (71%) with several participants having multiple,

different types of interactions (Table 3). Direct interactions (n = 35) were the most common and were typically framed as 'friendly day-to-day' interactions that included 'saying hello' or asking what time high tide was, while vicarious (n = 27) interactions typically involved watching lifeguards instruct swimmers to stay between the flags over a loudspeaker. The most commonly experienced 'interaction' with a lifeguard was vicarious, that is: being told about a rescue (i.e., spillover) (n = 21), while 'experiential' interactions were more commonly associated with receiving first-aid for cuts or jellyfish stings (n = 15) rather than being rescued.

Interactions with lifeguards were mainly 'very pleasant' (71%), with participants almost unanimously expressing a sincere gratitude for lifeguards and their role in beach safety. Despite beachgoers interactions being very pleasant, only 57% of participants noted that their interaction(s) had a significant and lasting effect (i.e., rating of 9–10) on their behaviour (Table 3), suggesting that the casual and routine reasons for interacting with lifeguards had little lasting impact. This is compared to 72% of participants reporting that their direct experiences of risk had a significant lasting effect on their behaviours (Table 2). This suggests that directly experiencing risk is more likely to affect beachgoers' behaviour than the typical interactions that beachgoers have with lifeguards.

When describing what was memorable about their interactions with lifeguards, participants often described lifeguards as a trustworthy 'vehicle' for disseminating safety messages, particularly by inexperienced beach users:

> "From an awareness point of view for the public, I think they [lifeguards] do a very good job of telling the public that the beach is dangerous, and that there are rips and things like that and I would have no clue how to identify a rip, so I would trust them" (Participant #26).

> "They're a good kind of vehicle for passing on safety messages. Particularly if people don't know what those messages are" (Participant #29).

Table 3. Interactions with lifeguards.

Have you ever interacted with a lifeguard on an Australian beach?	N = 49
Yes	35 (71%)
No	14 (29%)
What types of interactions have you had?	N = 35
Direct (speaking with a lifeguard)	35 (100%)
Vicariously (I watched a lifeguard interact with someone)	27 (77%)
Experiential (I was rescued/received first-aid)	15 (43%)
Spillover (I was told about a rescue/someone receiving first-aid)	21 (60%)
Was the interaction pleasant? (0 = very unpleasant to 10 = very pleasant)	N = 35
0-2 (very unpleasant)	0 (0%)
3-4 (unpleasant)	0 (0%)
5-6 (neither pleasant nor unpleasant)	1 (3%)
7-8 (pleasant)	7 (20%)
9-10 (very pleasant)	25 (71%)
Unsure	2 (6%)
To what degree has this experience affected your behaviour? (0 = no effect to 10 = significant lasting effect)	N = 35
0-2 (no effect)	1 (3%)
3-4 (low effect)	1 (3%)
5-6 (moderate effect)	0 (0%)
7-8 (large lasting effect	7 (20%)
9-10 (significant lasting effect)	20 (57%)
Unsure	6 (17%)

When asked what lifeguards could do to improve beach safety practices, several participants expressed a desire to learn from lifeguards, with one participant wanting to learn how their kids could become a lifeguard:

> "We know that they're here [patrolled beach] and that they're looking out for people but I guess we don't know what to interact with them on, or what services we could get from them. Yeah, it'd be nice, I'd like my kids to know how to become a lifeguard. And I have no clue how they would get to know that or how they would go about doing that" (Participant #2)."

Beachgoers also expressed a desire to learn from lifeguards how the beach conditions influence the position of the red and yellow safety flags, as most participants were aware that they should swim between the flags, but many did not know 'why' the flags were positioned where they were, as demonstrated below:

> "Like why here [points to flags], they've obviously selected this part of the beach. There must be something that they're seeing here that means this is a good place to swim. And so my understanding is that because most beaches in Australia are not patrolled, so we do go to beaches sometimes that are not patrolled and I wouldn't know where to swim at that particular place" (Participant #5).

This finding is critical because it demonstrates that many beachgoers in the vicinity of flags are aware that they should swim between the flags and are content to comply. However, without knowing 'what' or 'how' hazardous beach conditions influence the positioning of the safety flags, beachgoers are unable to learn how to avoid risk or transfer that learning to other hazardous situations when lifeguards and flags are absent.

Further, participants also noted a lack of understanding for why and when safety flags change position:

> "Often times, I've wondered, we've come here today, the flags are here now if you come yesterday, the flags were over there. So, you know, how do they know where to put them and why" (Participant #37)?

The significance of not understanding why lifeguards reposition safety flags was highlighted during an account of a near-death experience, when a participant described how he intentionally entered the water 'safely' (i.e., between the flags), but after a short period of time, the flags had moved, and he found himself and his young nephews unintentionally swimming in a rip current:

> "[Name of beach] is a beach where the rip can drag you pretty quickly and change pretty quickly. So we went into the water. It was okay. Wasn't in there long and the Rip changed. And we were getting dragged and all of a sudden the flags were here, the lifeguards moved them from where they were, then they were yelling out for us to move and my nephews were basically teaching me how to swim against the Rip and get us out of there. Yeah, it was a bit scary because I had two kids with me" (Participant #4).

Several participants suggested that lifeguards could contextualize the positioning of beach safety flags with the daily site-specific beach conditions, helping beachgoers to understand 'why' they should not swim in certain locations, while simultaneously helping them to develop the skills needed to assess risk:

> "They could inform people that don't know what they're doing more about the conditions not just 'you can only swim here'. Like give them a reason why they can't swim there" (Participant #8).

One participant even identified the limits of awareness raising for behaviour change by arguing that swimmers 'can't understand' from being 'yelled at' but instead, could learn from explanations of what rips look like, where rips are located on a particular day, and what will happen if they swim in that rip:

> "Maybe they could explain why they're doing certain things to people to help them actually understand. So if they're just yelling at kids to get out of the water, often people can't understand that but if you say look, you know this rip here, if you get caught in this rip, it's gonna suck you 300 meters out. You'll see a lot of them don't do that, some sort of just use the power to say 'get over here'" (Participant #38).

This description demonstrates that developing a more relational understanding of risk could help beachgoers learn how to skilfully identify and avoid rip currents, moving risk prevention from top-down deficit-based risk awareness methods to experiential learning and skill development. In addition to suggesting that lifeguards could help beachgoers learn which beach conditions influence the (re)positioning of safety flags, several participants suggested that lifeguards could run 'safety lessons' near the lifeguard tower about how to identify rips and other surrounding coastal hazards, which they argued would be beneficial for their kids and for themselves:

> "If you just had, I don't know how you offer it, but like particularly opportunities to teach anybody how to identify rips. But my experience we rely on parent's knowledge and parents passing that [knowledge] to kids. Maybe rather than like having to do nippers [child beach education] actually running like really short things [lessons] here [at the beach] like I'd get my kids to do like a half an hour, having more interaction with the lifeguard" (Participant #1).

Participants also noted that the responsibility of drowning prevention lies with the public improving their water safety skills by, for example, learning how to swim and 'being more aware' of how to avoid swimming in rip currents:

> "It's just about being aware of how to swim and where not to swim [rips]" (Participant #9).

The evidence above demonstrates a public desire for a skill-based model of community engagement at patrolled beaches that empowers the capacity of beachgoers – and their families – to learn from trusted lifeguards about the beach conditions that influence the (changing) position of safety flags. Perhaps most importantly, participants state clearly that such skills would enable learning that they could then use to more skillfully avoid unintentionally entering hazardous rip currents in the absence of lifeguards.

5. Discussion

5.1. Learning beach skills

This study reveals that while most beachgoers are aware of public awareness campaigns that encourage beachgoers to 'swim between the flags' at patrolled beaches, many are unaware of what beach conditions determine the positioning of the flags, nor why the position of the flags can be changed throughout the day. Similar findings of beachgoers not being aware of what safety flags mean have been found in the United Kingdom (Gallop et al., 2016), suggesting that deficit-based awareness raising practices are effective at communicating expert-determined objectives (i.e., swim between the flags), but are ineffective at generating public capacity to mitigate drowning risk at beaches that are not patrolled by lifeguards. This lack of capacity and subsequent dependence on swimming at patrolled beaches is problematic because it leaves many beachgoers vulnerable to taking unintended risks when choosing where to enter the water at the majority of beaches in Australia, which are unpatrolled. If the aim of the coastal risk sector in Australia is to reduce coastal drowning deaths by 50% by 2030 (Australian Water Safety Council, 2021), then the successes of risk reduction at patrolled beaches will need to extend beyond flagged locations (Uebelhoer et al., 2022).

In line with this thinking, participants suggested that lifeguards could lead safety 'lessons' on patrolled beaches that teach beachgoers – and their families' – how to identify site-specific beach conditions that influence the emergence of rip current hazards and other beach risks. This expert-led approach to experiential learning promotes a novel and participatory way of helping beachgoers learn how to identify beach hazards and to develop safer beachgoing practices. Learning with lifeguards how to mitigate risk is supported as an effective approach to community engagement at patrolled beaches by previous research in the United Kingdom, which found that learning with lifeguards was the most effective approach to teaching beachgoers how to avoid rip hazards (Woodward et al., 2015). This suggests that beachgoer's participation in skill-development with 'trusted' expert lifeguards at the beach might be an effective addition to community engagement activities on patrolled beaches in Australia and around the world.

Public participation is known to be fundamental to learning that is incorporated into a 'community of practice' (Lave and Wenger, 1991), which when requested by the public, as shown here, is likely to be more effective at creating the conditions needed to nurture lasting, transformative behaviour change relative to current deficit-based awareness raising methods. There are however limitations to lifeguards inviting publics to participate in safety lessons while on patrol. For example, facilitating safety lessons distracts lifeguards from their primary duties of supervising flagged areas, meaning additional lifeguards would be needed to facilitate safety lessons, putting added pressure on already stretched council budgets. One approach that could circumvent this logistical challenge is to encourage experienced volunteer lifesavers to facilitate safety lessons as part of their on-duty volunteering responsibilities. Enthusiastic volunteer lifesavers who may be unable to perform rescues due to older age or physical impairments, but who still want to play an active role in beach safety, could spend part of their time 'on duty' teaching interested beachgoers what conditions influence the position of safety flags and how to avoid site-specific rips. Although this would require a culture change in what is expected of a lifesaver in Australia and coastal nations around the world, this study found that learning with lifeguards/lifesavers at patrolled beaches is not only a desired extension of current community engagements at patrolled beaches by the public, but one that could simultaneously expand the types of empirical impacts that lifesaving services have on drowning prevention.

5.2. Embodying beach skills

In exploring whether beachgoer's experiences of risk influence their behaviours, we found that direct experiences of breaking waves and rip currents typically 'stay' with beachgoers and affect their behaviour by, for example, motivating them to 'no longer swim at unpatrolled beaches' and to 'check for rips' each time they visit a beach. In the context of public safety, this finding is critical because the reported changes in behaviour that result from experiencing risk reflect chief national safety messaging to 'swim between the flags' (i.e., not at unpatrolled beaches) and to 'check for rips' before entering the water (i.e., Think Line) in Australia. This suggests that providing the beachgoing public with opportunities to develop embodied understandings of risk as part of a 'community of practice' enabled by lifeguards could be an effective extension of current awareness raising and community engagements at patrolled beaches.

We also found evidence of vicarious experiences of by-stander rescues affecting behaviour by, for example, beachgoers assessing the risks of attempting a rescue before entering the water to help someone in distress after hearing about a bystander rescue/fatality. Further, becoming a parent was also found to affects beachgoer's behaviours, with many participants acknowledging the importance of learning beach skills from their parents and the need for their own children to develop similar beach skills through child-centred programs similar to the Nipper's program. Through qualitative explorations of the influence that experiences of risk have on behaviour, we found that both direct and vicarious experience, as well as becoming a parent, have lasting effects on behaviours that are currently overlooked in favour of deficit-based approaches and subsequent expectations to swim between the flags.

Here, we are not suggesting that beachgoers need to have near-death experiences to influence their behaviours. Instead, we suggest that, similar to rock fishers developing the skilful ability to anticipate over-topping wave hazards (Kamstra et al., 2019), beachgoers can develop the skilful ability to anticipate where risks are and how to avoid them by experiencing risk under the supervision and guidance of trained and trusted lifeguards. Measurement of these effects on beachgoer's risk perceptions and behaviours requires further study, which responds to participants' expressed desires for a skill-based model of drowning prevention.

Previous attempts to educate beachgoers about beach risk have used visual-based methods of community engagement that involve the release of coloured dye in rip currents, with the aim of raising beachgoers awareness to the 'presence' and flow characteristics of rip currents (Brander et al., 2022; Zhang et al., 2021). Other methods of engaging the public include the assessment of beachgoer's ability to correctly identify photographed 'calm' areas in the surf zone, which signify the presence of rip currents (Brander et al., 2022; Brannstrom et al., 2014; Pitman et al., 2021; Uebelhoer et al., 2022). Although participation in these studies can raise participants awareness' to the existence of rip hazards, these rip education programs are rarely evaluated (Brander et al., 2022; Koon and Peden, 2021) and efforts to influence behavioural change by raising awareness' of rips on their own are unlikely to be effective (Lejano et al., 2021) for two main reasons.

First, becoming more aware of the existence of rip currents does not address beachgoer's inability to skilfully identity a safe location to enter the water (Short and Brander, 2014; Short and Weir, 2018), nor how to avoid unintentionally entering of rip currents while wading in the water (Brighton et al., 2013; Williamson et al., 2012). Raising awareness of rip current risk is an important step, but awareness to the existence of rips alone is less likely to influence behaviour change than having the skilful ability to identify and/or avoid rips. Second, social scientists Spaargaren et al. (2016) argue that learning how coastal conditions influence the emergence of rip hazards from lifeguards – on the beach – is more likely to produce learning outcomes that encourage behaviour change than simply becoming aware of the presence of rip current hazards. This is because when beach environments change, the acquisition of skills or the adaptation of existing skills (i.e., identifying calm areas in photos) can never be simply copied (Ingold, 2000b). Rather, a 'skilful beachgoer' is someone who is attentive to evolving beach conditions and continually improvises in response to the emergent task of identifying rip currents at different beaches (Ingold, 1996, 2000a) that are known to change quickly and often without warning (Brander and Scott, 2016).

5.3. Next phase in community engagement at patrolled beaches

To perform their role successfully, lifeguards have to be educated, trained, and experienced in all appropriate lifesaving activities (Meir et al., 2021). During this process, as practitioners, lifeguards continually develop their lifesaving 'skills' through experience, while also unreflexively absorbing culture-specific values and unwritten rules of 'safe' behaviour on the beach. In this way, lifeguards develop skilled identities as they join a community of practice (Lave and Wenger, 1991). From an 'awareness' point of view, beachgoers reported 'trusting lifeguards to be effective vehicles of safety messaging'. At the same time, beachgoers also acknowledged that current interactions with lifeguards at patrolled beaches are often exclusionary, with beachgoers feeling separated from a lifesaving community of practice and instead are expected to passively obey lifeguard's commands to 'stay between the flags'. Research into the intersection between disaster risk reduction education and behaviour change suggests that experiential, place-based approaches to learning can promote transformative change, however participation is crucial to long-term behaviour change (Redman, 2013). One participant, in particular, acknowledged the gap between current engagements and learning how to identify rip hazards by discussing how they cannot 'learn from being yelled at'.

Instead, beachgoers reported a desire to learn from lifeguards how to more skilfully scan the surf zone and to identify site-specific rip hazards (i.e., what is being learned) at the beach (i.e., how this learning is being is reinforced). This presents an opportunity for beachgoers to develop an experiential understanding of risk, which is more likely to influence behaviour change because, straight-forwardly, beachgoers have expressed an 'organic' desire for such lessons and capacity development. Recent research exploring 'lifeguarding skills' supports the need for extending engagements at patrolled beaches by teaching the public how to identify rip current hazards in relation to the site-specific coastal conditions 'of a given beach, on a given day' (Meir et al., 2021).

Unlike traditional survey methods, the mixed quantitative and qualitative survey-interview approach enabled analysis of the effects of lived experiences and interactions with lifeguards on learning and behaviour change, thereby identifying potential gaps between policy objectives (i.e., mitigating drowning risk at all beaches), beachgoing practice (i.e., how risk is experienced), and drowning prevention practice (i.e., how risk is managed by professionals). Through an expansion of existing interactions with lifeguards at patrolled beaches, participants in this study advocate an evolution in community engagement at patrolled beaches that could facilitate the admission of beachgoers into a community of practice through skill-development with skilled practitioners (i.e., lifeguards) using safety lessons. This novel proposal to mitigate drowning risk at unpatrolled beaches through skill development at patrolled beaches provides Australian coastal risk agencies with a method that can contribute to the overarching target of reducing coastal drowning deaths (Australian Water Safety Council, 2021; Lawes et al., 2020).

5.4. Limitations

Findings from this preliminary study should be interpreted in light of the following limitations. First, all beachgoers that participated spoke English. Replication of the results with a more extensive and diverse speaking sample at different inter-state patrolled and unpatrolled beaches would help determine the representativeness of the findings. Second, participants in this study were mainly frequent beach users (43%) and families on vacation (78%), and thus a more balanced multi-group analysis of different beach users with different frequencies of beach visitation might provide different insights in future case studies. Thirdly, the sample of participants was too small in order to conduct rigorous statistical analyses of the quantitative survey results, nor compare those statistical results to related qualitative responses. This means our findings cannot and are not intended to be representative of other beachgoers experiences and interactions with lifeguards at other patrolled or unpatrolled beaches across Australia. Instead, this preliminary study addresses Shaw et al. (2014) call for expanded social scientific research approaches in rip current science by exploring the effects of lived experiences of beach risk on behaviour change.

6. Conclusions

This preliminary study found that awareness raising methods of 'swim between the flags' is not meeting the public's desire engagements with lifeguards at patrolled beaches that facilitate the development of beach skills that are needed to identify and avoid site-specific hazards. Learning from lifeguards at patrolled beaches could lead to more embodied understandings of risk that 'stay' with people and transfer to preventive and precautionary behaviours at unpatrolled beaches; this topic will be explored in a future study. This preliminary study also shows that understandings of risk developed through experience do affect the ways that beachgoers learn how to behave in response to coastal hazards, which is not included in current deficit-based practices that instead tend to rely on obedience to swimming between the flags or awareness raising via warning signs. This demonstrates the value of public perceptions, as well as the sophisticated and reflective understandings that arise from meaningful engagements on the beach. With regard to future community

engagements on Australian beaches, our suggestion is to use a similar survey-interview methodology to assess the effectiveness of safety lessons at patrolled locations, including the potential transfer of skills or changed behaviours to unpatrolled beaches by following up with participants after an initial safety lesson.

Declarations

Author contribution statement

Peter Kamstra; Brian R Cook: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Robert W Brander; Jasmin C Lawes; Bernadette Mathews; Hannah Calverley; Angelo J Imperiale; Benjamin Hooper: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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The data that has been used is confidential.

Declaration of interest's statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

Appendix 1

1) How far did you travel to come to this beach? (i.e., Gerroa)

- 0–10 km (I live locally)
- 20–50 km
- 50–100 km
- 100 + km

2) Do you consider yourself knowledgeable about the local beach and conditions?

- Yes
- No
- Unsure
- Sometimes (i.e., changes frequently)

3) How many times a year do you visit the beach?

- Rarely (1–2 a year)
- Occasionally (4–6 times a year)
- Often (once a fortnight)
- Frequently (more than once a week)
- Unsure

4) On a typical visit to the beach, what level of risk do you feel you are exposed to (0 = negligible risk to 10 = near-death experience)?

5) What type of risk taker are you?

- Maximization (always seeking the most risk)
- Maximax (maximizing chance of the best experience regardless of risk)
- Risk seeking (comfortable with high risk but in a calculated manner)
- Risk neutral (comfortable with risk that is taken for a good reason)
- Pareto risk (only take risk when there is a substantial reward)
- Risk adverse (prefer the safest path)
- Minimax (risk minimization at any cost)

6) Have you ever experienced a hazardous situation on an Australian beach?

- Yes
- No

7) If not too distressing, could you please tell me more about that experience and how it happened?

8) How life threatening do you think this experience was (0 = negligible risk to 10 = near-death experience)?

9) To what degree has this experience affected your subsequent beach-going behaviours (0 = no effect to 10 = significant lasting effect)?

10) Have you ever interacted with a lifeguard on an Australian beach?

- Yes
- No

11) What type of interaction(s) have you had with a lifeguard?

- Direct (a lifeguard spoke to me)
- Vicariously (I watched a lifeguard interact with someone)
- Experiential (I experienced a rescue/first-aid)
- Spill over (someone told me about a rescue/first-aid)

12) Could you please describe your interaction(s) with lifeguard(s)?

13) Was the interaction pleasant?

14) Was the interaction effective, in the sense that it affected your subsequent behaviours?

15) Could you suggest any changes to how lifeguards interact with the public (i.e., how they could help make beaches safer)?

16) Could you suggest any changes to how the public could interact with lifeguards (i.e., how they could help make beaches safer)?

17) Which age range do you belong in?

- 18-25
- 26-34
- 35-44
- 45-54
- 55-64
- 65+

18) To which gender do you most identify?

- Male
- Female
- Transgender/Intersex/Other
- Prefer not to say

19) Country of origin, in what country (ies) did you spend your formative years (i.e., 0–10 years old).

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