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'You Have To Respect The Water': Participant Experiences of Appreciating and Managing the Risks Associated with Open Water Swimming – A Rapid Ethnographic Study

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Cover Page Footnote

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Abstract

Open water swimming (OWS) has rapidly grown in popularity, driven by the purported health benefits of cold-water immersion. A paucity of research remains specifically considering the notable risks inherent in OWS participation, and a lack of qualitative research on freshwater swimming experiences, and safety-related issues therein. This rapid ethnographic study, based at a dedicated OWS lake in the UK, conducted semi-structured interviews with OWS participants (n=17; female=11, male=6). Two core themes emerged: environmental issues impacting OWS experiences and behaviours; and knowledge and education of OWS which highlighted safe/unsafe practices, levels of education for managing risks, personal preparedness, swimming solo/with others, use/non-use of specialised equipment, anxieties relating to participation, and environmental conditions. Findings suggest a lack of safe practice persists pertaining to immersion in cold water environments. Specific strategies are suggested that organisations involved with the promotion of the sport should consider to promote safer and more enjoyable OWS experiences.

Keywords: open water swimming (OWS), cold water, risk, water safety, ethnography

Introduction

Open water swimming (OWS) is a form of 'blue exercise' that has become increasingly popular in recent years, with a significant boost resulting from the COVID-19 pandemic as a means of combating loneliness from enforced lockdowns and a resultant desire to access outdoor activities (Armitage, 2022). OWS typically involves swimming in natural bodies of water (Nuckton et al., 2000) (e.g., tarns, lakes, rivers, coastal lagoons, and sea), although some definitions include outdoor pools/lidos (Griffiths, 2022). It can be performed recreationally and competitively (Federation Internationale de Natation, 2009). It can be undertaken 'formally' through various clubs and societies, or in unorganised environments that are bereft of safety features such as lifeguards, buoys, and changing facilities. It is estimated that in the UK alone, 7.5m people swim outdoors with 2.1m swimming in open water settings, 3.15m using outdoor pools, and 2.25m participating in both options (Swim England, 2022).

Recently, there has been a growing interest in the health benefits associated with OWS, with research demonstrating OWS promotes a range of physical, psychological and wellbeing benefits (McDougall et al., 2022); including improved cardio-vascular, pulmonary, and muscular health (Moffatt, 2017; Tanaka, 2009), and enhancements in mood states and mental well-being (Massey et al., 2020); further, anxiety reduction, stress relief, improved confidence, and enriched self-image have been noted (Broach & Dattilo, 1996; van Tulleken et al., 2018). In addition, the act of cold-water immersion can benefit both the endocrine and immune systems (Knechtle et al., 2020), whilst offering more wide-ranging curative impacts as a form of aquatic therapy

(Kinnaird & Becker, 2008). There is also tentative support for reduced respiratory tract infections from regular cold-water swimming, although repeated swims without sufficient recovery may provoke more of such infections (Knechtle et al., 2020).

Whilst the activity provides many health benefits, it must be acknowledged that there are unique risks associated with OWS for novices and experienced swimmers alike (Tipton & Bradford, 2014). Environmental factors such as underwater obstructions, tidal conditions, wind chill, and cold-water temperature all contribute to possible risks (Outdoor Swimming Society, 2022). Regarding the latter, immersion in cold water can trigger numerous detrimental responses. For example, Tipton and Bradford (2014) highlighted threats to life associated with low water temperature: cold-water shock and hypothermia being particularly perilous. De Castro (2009) raised such concerns, reporting the increased risk of hypothermia even for elite athletes competing in 'marathon' swims, despite the use of wetsuits and swimming in 'relatively warm water'. Likewise, The Royal Life Saving Society UK (n.d.) references hypoventilation, sudden increase in blood pressure, and 'swim failure' as being potential dangers. It is worth stating that although repeated exposure to cold water has been shown to promote metabolic, hypothermic, and insulative adaptations (Vybíral et al., 2000), such physiological responses do not necessarily mitigate the potential dangers. Longer duration and greater distance bring their own challenges in respect to thermoregulatory function, and other factors including depletion of muscle fuel and fluid loss (Shaw et al., 2014). The fact that OWS is often performed alone can amplify such risks as aid might not be forthcoming for those experiencing distress. Succumbing to any of these potential dangers can ultimately lead to drowning.

Drowning is the third leading cause of unintentional injury death worldwide, with recent estimates of at least 236,000 annual drowning deaths reported (World Health Organisation, 2021); notably, more incidents in developed countries occur where easy access to outdoor aquatic environments for recreation purposes exist (Moran et al., 2021). Many of these incidents occur in the very environments associated with open-water swimmers. For example, during an unusually persistent heatwave in the UK during July 2022, it was reported that at least 13 people drowned in blue space contexts, including rivers, lakes, and canals (Fleck, 2022). It is estimated that of all the drownings that occur in the UK, one in 200,000 involve inland water locations such as rivers, lakes, and natural pools (The UK National Water Safety Forum, 2022). This compares to one in 5.5 million for indoor swimming facilities. Whilst drownings from OWS events are rare, they are not unknown. Di Masi et al. (2022) reported that in Brazil, a total of twelve deaths occurred during OWS competitions between 2009 to 2019. It was also found that experienced athletes were more affected (80%) and that incidents were more likely to occur in ocean waters (75%). Data provided by Tipton (2014) showed that during triathlon

events in the US between 2003 to 2011, 30 deaths occurred during the swim section. Finally, data from a retrospective analysis of water rescue race reports of UK events (2013-2016) revealed that approximately 500 swimmers required intervention from the water rescue team (Alifrangis and Kipps, 2021). Currently, no data appears to have been reported regarding occurrences from 'recreational' OWS.

To reduce the risks associated with swimming in wild environments, numerous researchers and organisations are offering safety advice. For example, The UK National Water Safety Forum (2022) recommend the use of wetsuits, slow entry into water, high visibility swimming caps, and swimming in groups. With regards to competitive OWS events, Tipton and Bradford (2014) made a number of suggestions including reducing sharp turns, swimming in smaller groups, and allowing swimmers to spread out. They do however acknowledge that these proposals are void of empirical evidence. Whilst an obvious measure would be to promote 'all water' context swimming lessons, it remains unclear as to whether such an intervention is effective in reducing risk of drowning or near drowning. It is argued that even if it were so, the very fact that people with such skills were more likely to access aquatic environments, means that the 'protective effect' might be mitigated by higher participation (Moran et al., 2011).

In summary, OWS has been shown to offer several unique health benefits; however, the activity is not void of risk. The factors discussed previously can pose significant problems to swimmers. Whilst the issues surrounding water temperature are often cited as being the primary danger, potentially numerous other factors have yet to be identified. Currently a lack of empirical detail regarding potential risks exists as well as how these might be addressed. In response, Di Masi et al. (2022) called for researchers to make concerted efforts to identify and detect the associated threats in order to propose relevant and informed solutions. This extends to careful preparation, gradual acclimatisation, confidence building, and post-swim strategies, supported by effective education on safety messages. Such details would have clear and important implications for the whole OWS community and especially for health agencies considering socially prescribed OWS as a physical activity option.

To address the apparent gaps in the research field, this study sought to (i) investigate individuals' perceptions of risk in relation to specific blue spaces, (ii) appreciate how these risks are managed; and (iii) identify and examine mitigation strategies relating to OWS participation experienced by the study participants.

Method

Location

The study was based at a privately operated lake (formerly a quarry) in the NW of England (Photograph 1). The lake offers both OWS and scuba diving opportunities and has a range of on-site amenities, including a dedicated shop with cafeteria, large car park, a set 500m course (with large buoy markers for training and racing), full safety boat support, and shallow 'beach' entry areas. 'Spotters' are mandatory, with tow floats highly recommended. Entry is via two shallow 'beach' access points either side of the main jetty. During the winter months the lake temperature varies between 5-10^{o}C (41-50^{o}F), and between 11-21^{o}C (52-70^{o}F) in late spring/summer/early autumn. A swim coach provides beginner and intermediate lessons on site.

Rationale for Study Design

To develop insights into OWS experiences and swimming behaviours relating to safety and risk, a rapid ethnographic approach was adopted (Vindrola-Padros & Vindrola-Padros, 2018), whereby, as befits an ethnographic enquiry, the field researcher (MC) kept a reflexive logbook and diary, supplemented by photographs of the site. Participants were also encouraged to reflect upon their overall OWS experiences, not just those pertaining to the study setting.

Researchers embraced a pragmatic paradigm, with a focus upon 'best fit' methods, and an accent upon participant experiences. A key tenet of pragmatism is that actions are based on prior experiences, and the meanings people derive from those experiences (Morgan, 2014). Whilst individuals have unique personal experiences, similarities in experience may be shared. As such, researchers can highlight individual differences in experience of a specific phenomenon (OWS), whilst providing important insights into shared factors (e.g., cold water immersion) produced from interactions with specific activities (e.g., summer/winter swimming) and in given contexts (lakes, rivers, sea) (Christie, 2022). This enables research to highlight the logical relationships between people's actions and the consequences that flow from these, which in itself builds understanding and knowledge of specific issues – in this case, appreciating and managing the risks associated with OWS, potentially informing both policy and practice.

Ethics

Ethical approval for the study was obtained through the university's ethics committee. A full on-site risk assessment was completed. Full information about the study was provided to participants prior to giving consent for involvement. Participants were attributed pseudonyms to promote anonymity. All participants had the option to withdraw at any stage, but none chose to do so.

Photograph 1

Location of study setting in North Lancashire, UK

Participants

17 swimmers (6 male, 11 female) were recruited, with no withdrawals, who had a minimum of six months' experience of OWS, aged 29-68 years (Table 1). Recruitment was facilitated primarily through MC's open invitation at the lake (via a suitably positioned billboard on the jetty), in addition to social media posts on two OWS Facebook groups. Participant male-female ratio was observed to be representative of lake users during fieldwork visits, skewed in higher proportion towards females (an unsurprising sample given Outdoor Swimmer (2021) suggests 73.5% of OWS participants in the UK are female).

Process

Semi-structured interviews (see Table 2 for example questions), initially piloted with one participant, were conducted by MC at the lakeside, or the lakeside cafeteria, either before or after participants had swum, with a view to evoking more representative participant narratives *in situ*. Interviews averaged 35 minutes in length, conducted between July and September.

Table 1

Swimmer profiles

Name (pseudonym)	Age	Gender identity	Marital status	Occupation/ retired	OWS experience (years)	Proximity to OWS location
Jeff	64	M	Married	Engineer	4+	<2 miles
Kate	48	F	Married	Counselling Psychologist	4+	<2 miles
Sue	47	F	Married	Sports coach	35+	<9 miles
Gary	68	M	Single	University Professor	5+	<5 miles
Jason	29	M	Single	Ecological Scientist	4+	<2 miles
Sylvia	62	F	Married	Nurse	14+	<10 miles
Kirk	60	M	Married	Lecturer	1+	<18 miles
Tina	43	F	Single	Unemployed	4+	<30 miles
John	52	M	Married	Manager	3+	<40 miles
Anja	43	F	Married	Caterer	3+	<40 miles
Simon	59	M	Married	Engineer	20+	<10 miles
Jessica	40	F	Married	Teacher	4+	<12 miles
Sally	69	F	Married	Retired lecturer	50+	<3 miles
Lucy	52	F	Married	Business analyst	6 mos	<50 miles
Jackie	47	F	Married	Unemployed	1+	<8 miles
Paula	49	F	Single	Unemployed	6+	<8 miles
Martha	64	F	Married	Retired	3+	<7 miles

Participants were encouraged not only to review their experiences at the lake, but also in other OWS contexts, and to reflect upon their personal OWS histories. Conversations with participants focused upon their relationship with 'place', 'doing', and the 'meaning' of their experiences, and issues relating to their actions therein, and although a number of predetermined semi-structured questions were used, conversations were allowed to develop organically, assisted by the employment of open-ended questions (*'What is…?', or 'Why did you…?', or 'How does…?'* etc.), thus avoiding any risk of 'leading' questioning (Chenail, 2011).

Table 2

Examples of open questions used in semi-structured interviews

Broad theme	**Open-ended question**
Place	What open water environments do you use (prompt: lakes, lidos, outdoor pools, sea, rivers?) Why?
Place	If more than one, which is your preferred environment? Any you avoid? Why?
Motive	Why did you start open water swimming (OWS)?
Participation	How long have you been doing OWS?
Education	Did you have OWS lessons before you started? Why?
Participation	How often do you swim outdoors?
Participation	Do you swim all year round (or at what times of year do you do OWS?) Why then?
Motive Participation	Do you swim indoors too? If so, which do you prefer, and why? Do they both give you the same benefits?
Risk	Do you OWS alone, or with others? Why?
Risk	If with others, would you contemplate doing OWS alone? Why/why not?
Risk	Do you prefer wearing a wetsuit or swim costume for OWS? Why? (Prompts: other safety and/or clothing items?)
Motive	Did you take up OWS to enhance your health, or for other reasons?
Participation	We tend to assume OWS is likely to elicit a positive experience. Is that the case for you?
Participation Risk	Are there any circumstances where your experience is a negative one or less favourable one? (Why? When? How? Where? What? Who?)
Risk	How safe do you feel when you do OWS? (what approaches do you take prior to arrival, on arrival, in the water and post-swim)
Participation	Experience of events? (where, when, duration, numbers etc.)
Risk	Do you perceive OWS as a risky sport? If so, why?
Risk	How informed are you of the risks of OWS?
Risk	Tolerance of cold-water immersion? Limits?

Although there are many arguments about how and when data saturation is achieved (Saunders et al., 2018), the researchers used an incremental approach whereby a decision was reached that the diminishing returns from successive interviews became so marginal no further interviews were necessary (Mason, 2010).

Data were recorded by means of digital audio recording devices, and subsequently transcribed. The two researchers (MC/DE) analysed data independently, one manually (DE), the other using Atlas-Ti software (MC). Following initial familiarisation with the data and sketching out initial themes, researchers subsequently agreed themes and subthemes (there was little divergence in respect of content analysis, rather discussions focused upon categorisation of sub themes into relevant core themes). Data analysis followed the process devised by Braun & Clarke (2006).

Photograph 2

The field researcher swam 'skins' at the lake in water temperatures of 13-21ºC from late spring to September

Trustworthiness

To provide an insider perspective (Berger, 2015), MC, an OWS swimmer with a year's experience and membership at the lake, swam solo, as a pair, or in small groups over the course of four months at least twice a week (Photograph 2). He also had casual conversations pre- and post-swims with fellow swimmers and spectators. This enabled MC to become familiar with the site, staff, and

swimmers, build rapport, and, subsequently, facilitate obtaining participant feedback on researchers' interpretations of the data to minimise the influence of prior assumptions.

Transcripts were offered to participants to promote confirmability and dependability (Lincoln & Guba, 1985; Xerri, 2018), and a poster of initial themes with examples drawn from the transcripts was also provided (Figure 1). Thus, via all the processes identified above, triangulation of data was facilitated at all stages of the research process (Johnson et al., 2017), and trustworthiness promoted (Nowell et al., 2017). Immersion in the setting over several months; independent data analysis by an off-site co-researcher (DE); member verification; and use of a reflective diary; are all key strategies to promote reflexivity within the study design (Padgett, 2008).

Results and Discussion

Two broad themes (Figure 2) were derived from the data after independent analyses by MC and DE: environmental issues impacting OWS experiences and behaviours; and knowledge and education of OWS.

Theme 1: Environmental Issues Impacting OWS Experiences and Behaviours

Conditions

Respondents universally highlighted how the water needed to be respected, given conditions in sea, rivers and even lakes could be very changeable, thus displaying attunement to inherent risk factors whilst emphasising an attachment to 'place'. Jessica acknowledged being 'scared' by the sea and felt safer in lakes due to the absence of factors such as rip tides which, according to Woodward et al (2013), account for 67% of all UK beach rescues. This particular concern is underscored by Moran et al. (2011). Several participants referenced specific concerns regarding sea swimming, whilst highlighting their respect and understanding of the sea as an environment to engage with:

> *'I'm really, really safety conscious. Always, always, always, especially in the sea. I'll always be in my range, always, always, test if I go on my own, I can always get back, and get to where I'm going'* (Sally)

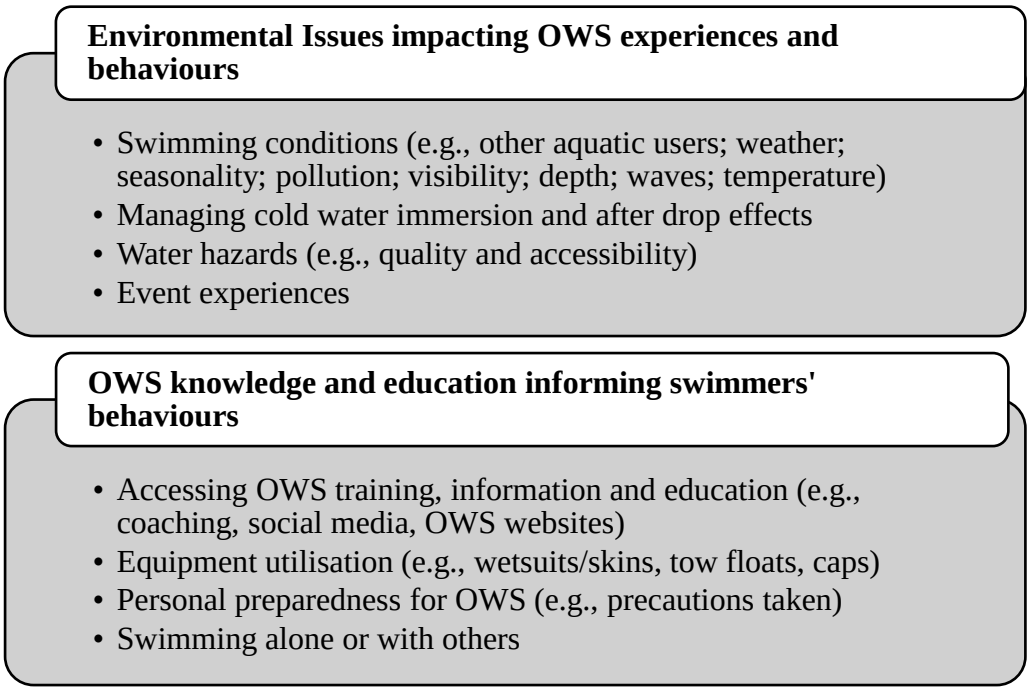
Having an awareness of the potential problems different aquatic environments and conditions can present is crucial to saving lives and promoting successful, enjoyable experiences of OWS whatever the setting. Kate highlighted the need to be fully committed to a swim:

Figure 1

Member verification via a poster with core themes and selected quotes

Figure 2

Core themes with sub-themes



> *'...it's not something I actively worry about, but I think it's sensible, to know who's about you, know what's going on, and that you're physically feeling up to what it is you are doing. You're not doing something too stupid. Because the potential for something going wrong – I mean here there's lots of people around (at the lake), but down the road in Coniston Lake in the middle of January, you've really got to be committed.'*

Participants' respect for conditions extended to specific immersive practice behaviours. For example, understanding your personal limitations, having appropriate support (tow float, spotter, swim buddy) and/or seeking out venues with good safety systems in place if swimming alone. Martha, more generally, highlighted the need to always respect the water:

> *'...you can't fight the water. The water will always win. So, you've got to treat the water as your friend. And then you know what you're doing.'*

Almost universally, respondents mentioned a degree of trepidation, anxiety, even fear, when entering open water. This was prompted by factors such as possible underwater obstructions, algal blooms, darker patches of water, sea or lake creatures including fish and jellyfish, water flora, water depth, temperature, a lack of confidence, and general water conditions (tide, currents, waves). Such anxiety, if ingrained, may prove to be a significant barrier to those wishing to access the sport, and thus may present challenges for the health sector

in promoting OWS as a social prescribing option. However, overcoming these anxieties raised confidence and feelings of satisfaction:

> *'I'm rubbish when I enter the water… I always think 'bloody hell it's cold!' but as soon as I start swimming, I'm in my happy place!'* (Sue)

Anya, as with others, preferred clear water conditions, but also suggested a lack of familiarity with OWS environments meant there were natural triggers for anxiety, even if non-threatening in nature:

> *'…when I came [here], I probably realised I prefer clear water, as I don't like reeds, I imagine they almost have a life of their own, and they're going to come for me'.*

As Foley (2015) suggested, swimmers identify both known and unknown variables that they associate with OWS environments, which induces a respect for the water, but also invokes specific, individualised anxieties alike. Sylvia recalled an incident regarding a performance level swimmer whose first attempt at OWS led to extreme anxiety:

> *'…by the time she got to the first buoy she was clinging on, just petrified. She'd not done it before, and it was nothing like she'd expected'.*

This suggests there may be naivete amongst competent indoor pool swimmers when self-evaluating their competency for participation in OWS conditions, and thus is a potential area to focus on for both safety messaging and coach education.

Cold Water Shock

Cold-water temperatures were mentioned by the majority as being particularly dangerous. Whilst there remains debate about what constitutes 'cold water swimming' (Griffiths, 2022), there appears some consensus over 'cold water' as a temperature of between 10-15C (Tipton & Bradford, 2014) with 'extreme cold' involving temperatures <10C and 'ice swimming' <5C (Griffiths, 2022). Skin swimmers are most at risk of cold-water shock (Tipton & Bradford, 2014), although there is wide variation in swimmers' ability to maintain body temperature around 37C when experiencing cold water immersion (Saycell et al., 2019). Simon related to his first experience, in 13^{o}C in open water at Wigan, where he acknowledged *'…you can't stay in long, twenty minutes tops'*. Although an OWS coach, Sue found that an unpleasant experience of extremely low temperatures meant that she now had clarity over winter swim participation:

> *'…I went in the bay when it was 3^{o}C, and it hurt so badly when I got out, it made me cry… (so) you just need to know your limitations. And yet I was with friends, it was safe, and I was fine when I was in there, but it was when I got out, it was so painful getting all my circulation back, so I thought 'I think my cut off point is 4^{o}C!'*

Jason's first experience of OWS, having been a successful swimmer for his local Lancashire based club in competitive pool swimming, was diving into less than 10^{o}C water at the lake:

'…complete cockiness on my part; I paid for it! Pitch black, a handful of swimmers in there… it was a run into the water then forward dive, got cold water shock…but a good lesson learnt.'

The cold-water shock Jason experienced typically includes gasping for air, tachycardia, uncontrolled hyperventilation, and a stress response through increased stress hormonal activity (Tipton et al., 2022). Moran (2011) highlighted that male youths are twice as likely as females to dive headfirst into water of an unknown depth, and, similarly, access unpatrolled areas from beaches. Whether inspired by adolescent needs such as seeking out excitement and adventure, nonetheless these risky behaviours, which can often also involve alcohol consumed prior to swimming (Sinkinson, 2014), are clearly areas of concern for educators and safety messaging. Despite Jason's naïve and potentially dangerous first encounter with cold water, he had since developed into a highly competent OWS performance-oriented swimmer, engaging in regional events, and helping at group OWS swims with the local coach at the lake setting.

Paula also admitted to a major error of judgement, whereby, having been frustrated with lockdown restrictions preventing a Christmas social reunion with friends, she had set off in similarly very cold water of just 7^{o}C:

> *'…I nearly drowned! I'd been confident about the distance; it wasn't that far… I was half way there before I realised how cold I was, and because I was in a foul mood, it was bloody mindedness, I was going to swim that far, and it's when you turn back, like 'that looks a really long way', probably only hundred metres, but my arms were getting heavier, and heavier, and it was just like I can really see how people drown…it took me about ten minutes just to get my swimming costume off, I was almost at the point of asking someone for help. It took me the whole day to get warm, it really scared me…the next few swims I did I was really scared.''*

As Tipton & Bradford (2014) noted, due to different body morphology; swimming either as a 'skins' or wetsuit swimmer; and variation in swimming intensity, it is problematic to determine a specific water temperature at which exercise itself accelerates deep body temperature cooling. Paula's experience of her limbs becoming 'heavier' is highly likely due to the impairment of muscle contractile force in colder water because of a range of factors including increased water viscosity, reduced muscle enzyme activity, and slower rates of diffusion and conduction (Knechtle et al., 2020). Cooled muscle leads to a decrease in oxygenated blood flow to limbs and the impaired removal of

metabolic waste products with a switch to anaerobic metabolism (even at sub-maximal working intensity), resulting in early onset of fatigue (Tipton & Bradford, 2014). Further, displaying 'anger' as an emotion has also been linked to swimmers being at risk of cardiac arrythmias (Tipton, 2013).

Participants represented a wide range of body somatotypes (endomorphic, mesomorphic, or ectomorphic). Having a higher body fat % has previously been viewed as an advantageous factor in managing body temperature regulation in cold/very cold-water, especially in longer duration OWS activities (de Castro et al., 2009) and for elite and non-elite alike (Diversi et al., 2016). Lean swimmers (less body fat insulation) demonstrate more rapid drops in deep body temperature (Saycell et al., 2019), compensating for this by swimming for shorter durations, and acknowledging when their core temperature drops to subjectively uncomfortable levels. As such, very thin people are less likely to be attracted to OWS or be sufficiently naturally equipped to cope with cold water conditions (Keatinge et al., 2001). Crow et al. (2017) argued that BMI values are not the most crucial factor; instead other influences on performance, including limiting immersion time and effectively managed acclimatisation, are key. Studies have also suggested that those who regularly engage in winter swimming, as in, for example, the Baltic countries, are better adapted in respect of thermoregulatory function, and therefore not reliant on requiring a higher percentage of body fat (Knechtle et al., 2020). This results in swimmers experiencing less heat loss and less heat production during exposure to cold/very cold-water conditions (Vybiral et al., 2000). Previously, Golden et al. (1980) suggested that competitive long distance OWS athletes were not dependent on a higher BMI rating to experience success. Anecdotally, the field researcher (MC), with a body fat of 19%, found that his tolerance as a skin swimmer of open water between 15-16ºC resulted in swims of between 20-25 minutes, whilst comfortably managing up to 45-minute swims in temperatures of 17-21ºC:

> *'It becomes a 50/50 choice at a water temperature of 15-16ºC – my natural preference is to swim skins, but the wetsuit means longer duration swims which in turn aid my technical development as an outdoor swimmer. However, there's something about water on skin that feels so much more natural, so even if it means a shorter swim, I tend to feel the benefits more both mentally and physically, whilst appreciating the extra risk involved' (Kirk, Day Six)*

The cold water might be particularly problematic for those with medical conditions. Sylvia, an asthmatic, who also presents with worsening arthritis, finds winter cold now *'too much for my asthma'*; her experience was compounded by the difficulties in removing her wetsuit quickly enough after OWS. Reluctantly, she has opted for pool swimming during winter with the added benefit of an on-site gym. According to Huttunen et al. (2004), certain

conditions may benefit from regular winter swimming, including fibromyalgia, asthma, and rheumatism.

This preference for indoor swimming in colder months was mentioned by others, with Gary stating:

> *'…my tolerance for cold is limited – (as for) swimming outdoors in winter, never. So, I swim in the pool (instead) two or three times a week.*'

Kirk, and others, were tempted to *'give winter swimming a try'*, even in skins. The risks associated with cold-water swimming have hitherto been highlighted by Keatinge et al. (2001), amongst others. In a study involving eight OWS athletes undertaking a long-distance relay event, three experienced a hypothermic drop in core temperature. deCastro et al. (2009) found elite swimmers in full wetsuits competing in 21°C water all experienced hypothermia from a 10km event. There may be very justified concerns over the preparedness and competency of non-elite participants in less prestigious events and/or whilst participating recreationally, whether in skins or wetsuits, and even for a shorter duration, especially in colder climates. Knechtle et al. (2020) suggested that people in generally good health who undertake regular cold-water swimming with a graded approach to acclimatisation are likely to reap the reported health benefits; however, they caution that those who are unfamiliar or lack sufficient adaptations are at higher risk of death because of either a developing hypothermic reaction, or from the initial cold shock response. Further, from a health perspective, undiagnosed cardiovascular contraindications can pose significant risk of acute cardiovascular events. Therefore, if OWS is to become part of a broader social prescribing offer, then to maximise health dividends a step-by-step approach that accentuates acclimatisation is essential (Knechtle et al., 2020) in addition to all necessary medical screening.

After Drop or 'Continued Cooling'

The deleterious effects of cold water were not confined to the actual swim. After-drop, or 'continuous cooling' (Griffiths, 2022), is a phenomenon where body temperature continues to decline upon leaving the water. This was mentioned by several respondents. Paula recounted when she had exited the water in *'fab weather'* and simply placed a towel over her wet swim costume before driving home:

> *'…I thought 'I'll be fine' [but] I was shivering so badly, halfway home I almost had to pull in, because I wasn't sure I was going to get home, but that made me think, however long it takes to get my swimming costume off, because basically I was sitting in freezing wet clothes, so that scared me.'*

Consequently, Paula now exits the water earlier than *'…I need to, simply because if I'm on my own, and I've got to drive for an hour, I don't want to have*

a cold-water [shock] crash on a motorway, so I always now get out, even if I think I could stay in another ten minutes.'

According to NOWCA (2022) in order to bring an individual's core temperature back to normal (37^{o}C) and preserve it, upon exiting the water swimmers should take time to warm up, including towelling down and changing into dry clothing as soon as practicably possible. Adding extra layers (hat, gloves, coat, socks, for example), drinking something warm, and eating a high energy snack, all assist the body's return to a more normal state. Taking a hot shower or bath immediately after cold-water immersion should be avoided as it can add to the after-drop effect (NOWCA, 2022), so advice is always to allow the body to warm up naturally. Further, swimmers should refrain from driving until they are confident their body has regained warmth. A short walk can also assist (Griffiths, 2022). Lucy and others appeared conversant with some of this advice:

> '*…knowing my own body and knowing when it's time to get out and warm up, (as) it can have a huge effect on you if you haven't warmed back up, had a hot drink. Putting loads of warm clothing on afterwards.'*

As a relative newcomer, Kirk found the advice from specific OWS agencies, fellow swimmers, and the coaching he had received at the lake meant he felt well informed about managing after-drop:

> *'…I use a golden rule when the water temperature is much colder, as in April and May… look to get out as soon as I notice some very early signs of fatigue. On the jetty, I'd have thin and thick layers to put on, plus a dry robe, do a little wander around, and then sit in the warm with a hot drink, snack and wait at least fifteen minutes before driving home' (Kirk, Day Four)*

Whereas Jackie suggested, perhaps erroneously in the absence of extensive scientific evidence, that her medical condition (fibromyalgia) provided some insurance against cold water immersion and the after-drop effect:

> *'I've always been lucky; I'm a 'hot' body anyway; my internal thermostat is set on high, so going in cold water my core temperature doesn't go as cold as most people. I've never suffered with aftershock, I get pretty much warm straight away, and then I'm good to go. I've never had the shivers, but it's because I've got a strange body'.*

For beginners, ensuring good awareness of post-swim strategies is essential in order to prevent hypothermia, as much as understanding when the body is compromised in the water (e.g., as swim failure sets in, such as losing dexterity, poorer swim performance, fatigue, less efficient stroke).

There has been much debate regarding the 'after-drop' effect and how it occurs. Originally, a 'circulatory' explanation was proposed, whereby circulating blood from the extremities (hands, feet, arms, legs) cools the warmer parts of the body (better known as convective after-drop) (Steinman & Haywood, 1995). This explanation also suggested risks to swimmers from the heart cooling further from venous return post-immersion, and the potential for fibrillation. Subsequently, Nuckton et al. (2000) acknowledged two possible mechanisms, which could operate simultaneously: the cooled blood returning from the periphery, or, alternatively, the conduction of heat from a warmer core to a relatively cold periphery. An early proponent of the latter explanation was Webb (1986), who argued that during the post-swim re-warming phase, core body temperature continued to drop for around 10-30 minutes, before rising gradually, affirming the fundamental principle that heat flows only from regions of higher temperature to regions of lower temperature (Webb, 1986). Rewarming activity therefore does not reach the deeper layer for several minutes, so that the cooling pattern continues (heat continues to flow outward from deep warm regions to cooler outer ones). More recent research has attempted to clarify this. Tipton and Massey (in Immerse Hebrides, 2021) cite compelling evidence highlighting after-drop as a conductive phenomenon, whereby heat is conducted down a thermal gradient from a relatively warm core to a colder periphery. Using a somewhat humorous comparison, the researchers demonstrated how the core temperature of a melon continues to cool post cold-water immersion when placed in hot water, in the same way as with the human body, thus confirming the conductive response and dismissing the circulatory flow concept (given that a melon does not have any blood flow!). Eventually, the body gradually regains equilibrium through appropriate re-warming behaviours. Whilst gradual rewarming is essential (including use of dry robes, layers of clothing, hot drink, snack, warm shower), vigorous exercise after immersion can potentially worsen after-drop effects with severe consequences (Giesbuecht & Bristow, 1987; Nuckton et al., 2000).

Given the participant testimonies, the potential for accidental hypothermia associated with OWS is real, especially with inexperienced swimmers. More awareness of how to manage the potentially life-threatening impact of after-drop successfully is essential, and it may be useful for OWS kit manufacturers and retailers to offer simple advice literature when purchasing open water merchandise (e.g., wetsuits, tow floats) from either online or in store retailers.

Water Hazards

Concerns regarding pollutants and other water quality issues were raised by several participants, so much so that in some cases, swims were abandoned. Paula and Jackie referenced getting updates from social media about specific swimming loci to help decide where and when to swim, especially where coastal or river swimming was involved. Sewage systems in the UK are prone to being

overwhelmed after heavy rainfall (Armitage, 2022), and, although there are strict regulations in place, water companies have often been fined for breaching these requirements through illegal spillages into rivers, lakes, and seas. Swimming in such conditions could threaten OWS participants' health through communicable diseases, including gastro-intestinal infections and other pathogens affecting the respiratory tract, skin, and even liver and kidney function (Armitage, 2022).

Further hazards of concern to participants included other aquatic users, including paddleboarders, boat traffic and kayakers present in lake settings (Wood et al., 2022). Jessica highlighted one access point at a National Trust property in Windermere, where although she could stand up easily in the relatively shallow waters, '*you've got to be careful there because of boats going up and down.'*

The shallow entry and exit points were important comfort factors for the more inexperienced swimmers using the lake setting, as opposed to the steep drop-offs within a few metres of the shore in wilder locations, which for the uninitiated can be unnerving and pose potential risks if the body has not adjusted to the water temperature sufficiently. Having access to obvious 'exit' points from the water was a consideration for Lucy, who highlighted concerns over her capability of completing the set course at the lake, which had taken considerable psychological effort to overcome before experiencing success. Baker (2019) highlighted that the typically 'flat and still' nature of inland waters can lull recreational swimmers into a 'false sense of security', whilst emphasising having an 'exit strategy' prior to entering water is a key consideration to promote safer swimming.

Tipton et al. (2022) note a range of dynamic OWS hazards, several highlighted earlier (e.g., tides, currents), but also including debris and depth. Good local knowledge of safe OWS loci can be publicised through local groups via social media platforms, with advice offered in terms of safe entry and exit points and notifying any untoward issues that could compromise safety.

Event Experiences

Eight respondents spoke of their experiences of participation in OWS events, with distances ranging from 500 metres to 6 miles. Some of these were perceived as 'well managed' from a safety perspective. At others, safety was perceived to be compromised. This suggests a lack of clarity on behalf of race organisers regarding when events should be cancelled or curtailed. It also demonstrates a lack of understanding of the potential anxieties caused in pressing ahead with an event that may present unnecessarily difficult conditions to overcome:

> *'…it's having trust (in the event) … I mean I did the [Scottish Lake swim] once, you could see the buoys going (up and down) and the*

> *(organisers) were like saying we're just trying to decide if we can do this or not!'* (Sylvia)

In another event, Sylvia found she was unable to sight fellow entrants which caused her to reluctantly end her participation due to the very choppy conditions. Sally suggested a northern event *'was one of the worst organised events I've ever been to. It was terrible, big waves, couldn't see the (safety) canoes…'* and Jessica had felt one event had put swimmers at risk:

> *'…they should have cancelled it really; it wasn't very safe. Waves in your face, there were kayakers, but it was so choppy you couldn't see where you were going.'*

By contrast, at least five swimmers had been regular participants in an annual event in NE England where Sylvia suggested '*the safety cover is next to none'.*

Anya and her partner, John, had found their first experience of an entry level event a rather traumatic one, whereby Anya literally froze, but overcame her fear with the kind support of race marshals in kayaks, whilst John *'just lost it'*, ironically because of the presence of the kayaks, which communicated to him the dangers of what he was doing, *'so I just couldn't swim relaxed'*. Such responses are synonymous with reversal theory, in which an experience can quickly turn from a positive, low or optimal arousal state (relaxed/flow) to very high, and negative, arousal (fear) (Hudson et al., 2016). In this respect, swimmers also commented on the stress of mass race starts, often involving waves of up to 100 or more people at a time, reducing anxieties by sensibly seeking out either a quieter start point or starting towards the back of the field.

Nuckton et al. (2000) further cautioned that OWS events should ideally be supported by medical personnel given the very real risks of participants becoming hypothermic, and that close monitoring of participants should occur post-swim due to the risks associated with cold water exposure and after-drop.

Theme 2: Knowledge, Education & Safety Awareness About OWS

OWS Coaching

Whilst some swimmers had either sought out training, or at least advice, about engaging in cold water swimming conditions, some admitted to '*schoolboy errors*' over their earliest experiences, which taught them to be more respectful of conditions and the impact it could have upon their body's ability to cope. Several interviewees felt that because of their longstanding experience of swimming, that they had no need for specific OWS lessons, including Tina who was a confident breaststroke swimmer. She did however restrict herself to being *'a fair-weather swimmer';* even then, she always checked the weather forecast before preparing to travel to her nearest venue. Most referenced official training they had received as either a solo swimmer or as part of a group lesson. Martha,

as with others, had attended group coaching sessions at the study lake. Lucy, however, highlighted a local case of someone who had undertaken OWS lessons, but nonetheless had died from the shock of entering cold water, possibly due to an underlying medical condition. Despite this unnerving story, Lucy felt confident she could effectively manage the risks having herself undergone training in 'cold water breath' sessions, which alerted her to how to safely enter the water, stay relaxed whilst swimming, and look after herself on exit, given that *'it can be really dangerous to get it wrong'*.

As such, most participants appeared to be self-aware of their limitations, developed over experience (in some cases, in a relatively short time supplemented by coaching), which served also as a means of both enhancing the positive experiences they encountered through OWS, and minimising future risk, akin to Foley's theory of accretive practice (Foley, 2017). Further, Sally felt *that '…in terms of safety, I think we're really well informed and briefed with things like social media and stuff'.* As noted previously, swimming competency may not be an effective 'protective effect' (Moran et al., 2011) because swimmers may be emboldened to take on higher risk, out of a false sense of security in their own ability to manage difficult conditions.

Relatedly, several spoke about early experiences as being instructive in developing a need to become more safety conscious and recognise that open water is a quite different experience to indoor swimming. This self-confessed naivete of safety issues was referenced to when first starting out as an open water swimmer. Further, Jeff highlighted that there was a *'judgement'* call to be made between *'challenging yourself'* and taking *'too big a chance'* whilst Martha was particularly concerned about the effectiveness of water safety education, especially with young people. A former primary school teacher, she felt children historically were better equipped to swim at least 25 metres, but with recent closures of pools, pressures on resources to fund transport to and from swimming pools where opportunities did exist, and a lack of motivation by parents to access swimming locally, meant contemporary youngsters were '*more at risk*' than their predecessors. This was further compounded, she believed, by a lack of education on OWS dangers:

> *'Then it's summer holidays, off they go with their mates, and it's always daring, jump off things… and they don't know what's underneath. And even if they can swim, the cold-water shock, they don't know about it, they're not expecting it, and it'll take their breath away.'*

Martha's concerns are shared by water safety organisations. Naivete about what lurks under water can lead to accidents and fatalities (e.g., spinal injuries), for instance resulting from impact with submerged, invisible hazards (especially from headfirst antics), including branches or rocks (Baker, 2018).

***Swim Buddie*s**

Anya, as with others, found that have a swim buddy, or training partner – and one that was a confident, *'strong swimmer'* - gave her added confidence to engage with OWS, although most interviewees were comfortable swimming solo (if necessary), but were more mindful of location if so (e.g., swimming closer to shoreline). Swimming with 'buddies' promoted a sense of security, but also the social interactions respondents valued as part of the OWS experience; whilst swimming alone offered a sense of escape from everyday concerns, essential 'me' time, but could, in some cases, increase anxiety levels for fear of getting into difficulties.

Experiencing cramp was not a common issue for the majority of swimmers, although there was anxiety it could occur. Martha managed to keep her calm when an incident of cramp occurred on a rare occasion:

> *'…I was swimming more and more, and over there (pointing) my leg went into cramp. If it ever crops up in the pool, you can stretch it off at the end of the pool, but in open water you can't. I was alright…you just have to remind yourself, 'keep relaxed, keep the legs relaxed', until it's over.'*

People prone to cramp should ideally look to swim with a partner or group to assuage concerns (Griffiths, 2022). Cramp can be caused by a range of potential triggers, including a lack of adequate hydration, as swimmers are often fooled into thinking they are not sweating whilst swimming (Bharam & Kocharekar, 2022), hence OWS participants need to prepare for such eventualities (for example, having a tow float to rest on temporarily in any emergency; or remembering to float on their back to recover). Increasing awareness of causal factors should form part of future coach education, given how potentially frightening such an occurrence can be in open water conditions.

Most swimmers felt their connections within the OWS community were incredibly supportive, including at the study lake, especially when welcoming novices. For beginners, and from a safety perspective, having an OWS social group to engage with can distil confidence in taking initial steps into the sport, and some of those interviewed were actively engaged in social media including Facebook groups, which alerted them to group swim opportunities, but also to potential issues at some locations (difficult conditions, or algal bloom, sewage etc.). As such, social capital enhancements through OWS appeared to not only promote a deeper enjoyment of the activity, but also facilitate awareness of safety messaging, and necessary equipment purchases (price, quality, utility, how to obtain, etc.).

Whilst there is limited evidence of the protective role of swimming with others (Moran et al., 2011), here respondents nonetheless felt more secure having a training partner to swim with. Whilst those who did occasionally swim

solo at the lake were aware of the potential risks, the fact that typically there were other swimmers and spectators in and around the water promoted sufficient feelings of security.

Pre-Swim Preparation

Most respondents recognised the importance of being prepared prior to participation, anticipating potential difficulties, matching environments and conditions to their own skills and competencies, and, as Kate suggested, *'being really honest with yourself, is this really stupid or is it within our capabilities?'* However, several also admitted to taking on challenges that, with retrospect, they would have avoided. People unfamiliar with conditions, and how to manage them, are much more exposed to drowning risk (Guse et al., 2007). Koon et al. (2021) argue that for prevention efforts to be effective, the aquatic context and circumstances therein are key considerations given the varied nature of such settings. Whilst it is impractical to have supervision at every OWS opportunity, there is a case for lifeguards to be present at all private or publicly operated venues. The United States Lifesaving Association (USLA), for example, assert that there are five times more drowning fatalities at unguarded sites compared to those with lifeguard supervision. Likewise, Branche & Stewart (2001) provide evidence showing that when lifeguards are provided at previously unguarded beaches, there is a reduction in drownings. However, whilst Moran et al. (2011) recognise the potential benefits of providing lifeguards at OWS venues, they also reference the fact that there is insufficient data regarding their effectiveness in such locations, a point echoed by Gilchrest and Branche (2016).

A few respondents highlighted their awareness of appropriate hydration, and nutritional intake, prior to and post-immersion, typically through consumption of sufficient water or energy drink, and a carbohydrate snack. Such practice enables swimmers to both prolong swimming duration in open water, as well as delay the onset of fatigue. More performance oriented OWS athletes however, given the typically large training volumes at high aerobic intensities, have substantial energy demands and thus require nutrition strategies focused on glycogen replacement (Shaw et al., 2014).

Recent popularisation of OWS on TV shows and in social media has on a positive note awakened people's awareness of the potential of OWS for health benefits; however, the downside is where uninformed or ill-informed newcomers to the sport are put at risk. Sally felt the boom in interest in the sport had created problems in terms of uninformed swimmers putting themselves at risk by staying submerged for too long. The OWS coach, Sue, highlighted concerns around a lack of preparedness, and reckless behaviour, as contributory factors in lives being at risk, citing publicised deaths during the summer:

> *'…I think most people are aware 'don't go in on your own', or at least make sure someone's on the shore, wear something that makes you*

> *visible, same as you do anything, if you walked up a mountain, you'd have emergency contact details on you somewhere, so put them on your tow float…for most people it's common sense, but it's when we get weather like this (hot) is when the idiots come out. What was it the other day, a reel of someone jumping off the [city] bridges, a boy died, and they were obviously three sheets to the wind, and you just think 'that's when it goes wrong''.*

Previously, gender has been noted as a factor in drowning incidents (Segura et al., 2020) with males in Australia accounting for 80% of sea drownings near beaches (Morgan, 2006) and male teenagers the most likely demographic to be involved in rip incidents off beaches (Woodward et al., 2013). 83% of drownings in the UK in one year were attributed to men, with swimming 'under the influence' of alcohol or drugs one contributory factor (Morgan, 2006). 25% of all drownings involved such risky behaviours (Fleck, 2022).

Equipment Utilisation

Immersive practices, which at face value appear socially shared, but offer up very individual responses, extended beyond how swimmers entered the water (e.g., gingerly, with trepidation, purpose, keen anticipation, or with genuine confidence), but extended to consideration of choice of swimwear (i.e., either wetsuits, or simple swimsuits). The extra buoyancy offered by wetsuits was seen as a significant advantage which also instilled confidence that even in the event of getting into difficulties (e.g., experiencing cramp) would mean the swimmer could float until help arrived. In that sense, Gary felt '*100% safe*' when swimming: *'I mean you'd struggle to drown in a wetsuit, unless you're incredibly unlucky'*.

Most swimmers adopted wetsuits for the feelings of safety, as well as functional performance (warmth, and more speed). Those who preferred skin swimming often referenced the awkwardness of getting in and out of wetsuits, exacerbated if trying to raise body temperature post-swim, as opposed to simply putting on a dry robe. Sometimes items designed to enhance enjoyment and performance failed, for example Martha spoke about her goggles misting up on a cold day, resulting in not being able to see where she was going, *'and I was dying to get out, I really was!*'. It was the first time she had doubted her preparedness for swimming outdoors:

> *'It was a good job I was generally fit anyway, but I was glad to get to the end. I'm sure it was to do with the temperature, so that was the only time when I've gone round and thought, 'now was that an intelligent thing to do?' I wasn't prepared, and the more you do something, the more prepared you are. You learn about your gear, everything.'*

Almost all swimmers used tow floats for visibility, but it also served as a mental prop to know they had something to fall back on in case of difficulties (even though tow floats are not designed to be lifebuoys). Gary begged to differ but acknowledged he did use one in certain contexts: *'when there's (pleasure) boats around, but only for visibility, not for (my) safety, like for drowning.'* Jessica admitted not using one when she first started OWS, but *'now I do, I think you feel if you have a cramp you can hold onto it'.*

There were rarely any exceptions to people entering the water without one or more of these immersive practices being adhered to. Kirk reflected on his first lake swim of the year mostly with positivity, but also a degree of lingering self-doubt provoked by the inherent risks associated with OWS:

> *'A lovely late spring day with warm sunshine and a gentle breeze. Two women in wetsuits were exiting the water as I prepared to set off from the shallow beach. One commented that her lips felt numb with the cold which caused me to take a big intake of breath in anticipation! They appeared to signal their admiration for me braving the conditions in swim briefs. Bracing myself, I was pleasantly surprised by the temperature, I later discovered it to be 13.5C. Within a minute of wading gently into the water, I was up to my neck and feeling ready to go. With a quick mental note to relax and breathe out through my nose and use the core to help with stroke recovery, I set off cautiously, sticking close to the shoreline. Whilst my mind allowed a few negative thoughts to intrude ('what if I get cramp? etc.'), I soon banished these, overcome by a sense of free spirit, joy, and pure satisfaction. Although I accidentally took in a gulp of water rounding the first buoy, I quickly regained a relaxed tempo, remembering that any anxiety (or panic) can lead to cramping. It's in those moments your conscious mind brings you back to the potential dangers of being in deep, cold water, and the need to be prepared by having a spotter, using a tow float, and wearing a swim hat, gloves and socks to keep the extremities warmer, even having an exit strategy.'* (Kirk, Day One)

Whilst Kirk had followed guidance in terms of water safety equipment, the cost of such items (amounting to approximately £500 including wetsuit, tow float, gloves, socks, hat, goggles, dry robe) may be a barrier to OWS participation, but, more importantly, compromise the safety of those from lower socio-economic groups who struggle to afford the optimal level of kit to participate.

Conclusion

This study highlighted several key issues surrounding OWS participation. For example, swimmers overall showed a reasonable awareness of risk issues, even if, in a few cases, some of this had been derived from at best naïve practices, or at worst where they had put themselves (and potentially others) in considerable

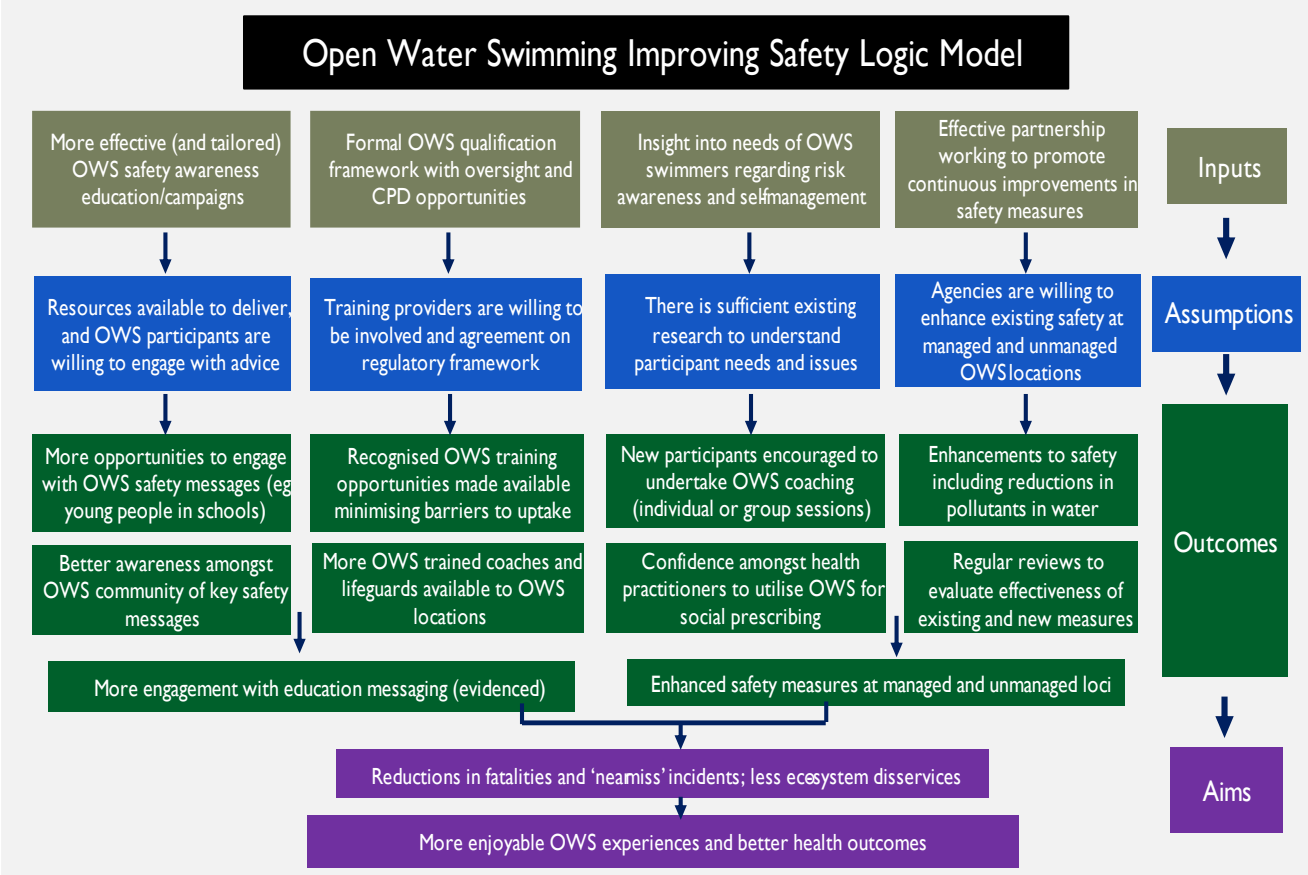
danger, thus learning salutary lessons in the process. This highlights there is much to do from the perspective of facility operators, natural resource management, coach education and safety messaging – especially for novice swimmers taking their first steps into OWS. As Morgan (2006) identified, whilst secondary prevention might reverse potential fatalities in open water scenarios, the optimal way to prevent such occurrences is through effective proactive strategies (i.e., education, training, using safety procedures).

Whilst the findings from this study are not necessarily generalisable, nonetheless they provide important insight into a range of personal perspectives upon safety issues pertaining to OWS, highlighting areas of concern to be addressed as part of broader safety messaging campaigns, which might benefit from being tailored to specific audiences (e.g., novices, young men, winter swimmers, skin swimmers, 'first-time' event participants). Further, there is potential for multi-agency collaboration to reinforce safety messaging, provide more effective safety measures at managed and non-managed sites, and promote engagement with specific training to facilitate more enjoyable, and safer, OWS swimming experiences. Collaborations are especially important given the rapid popularisation of the activity. This may be difficult to achieve given the array of organisations involved: public (e.g., national, and local authorities, health agencies, national park authorities), private (e.g., facility operators, landowners), and voluntary (e.g., governing bodies, clubs/societies, safety organisations). An important voice in the process should be the OWS community itself. Various social media platforms, including two Facebook sites with over 100,000 subscribers on each, have a wealth of knowledge, advice, and information derived from novice to expert OWS participants, acting in itself as an influential de facto community of practice to engage with and encourage into any future consultative framework and dialogue (although there is always a risk of conflicting advice). A balance needs to be struck in terms of promoting safety whilst not over-reaching in terms of regulation, which may detract from the exhilaration of 'wilder' swimming experiences in unpatrolled locations and their associated benefits. We should recognise the need for OWS participants to take personal responsibility for educating themselves and managing risks inherent in the pursuit of the sport.

Environmental and aquatic recreation interest groups should be given a stronger voice in monitoring the management of water courses while holding government and privatised water utility companies to account. Stiffer penalties as a percentage of profits could be imposed for failing to invest in sewage management infrastructure and failure to comply with existing and future regulatory controls. These are important considerations for future public health policy (Armitage, 2022) and for protection of vulnerable and depleted eco-systems. A logic model based on this paper's findings, and others, is proposed in Figure 3.

Figure 3

Potential action-based 'logic model' to inform relevant open water swim agencies, practitioners, and participants of how to manage safety risk relating to OWS



Finally, from a research perspective, significant gaps remain in the evidence base regarding evaluation of prevention strategies, including education; use of safety signage; provision of safety and resuscitation equipment; and patrolled/non-patrolled OWS venues, for example. Further, a need exists for more qualitative and quantitative research into experiences from a risk management perspective, and related physiological and/or psychological issues associated with the varied OWS loci opportunities, including other freshwater settings such as rivers.

References

Alifrangis, A., & Kipps, S.M. (2021). The incidence of injuries and illness during open-water swimming events: optimising swimmer safety. *British Journal of Sports Medicine, 55*, A39.

Armitage, R. (2022). Sewage in UK waters: a raw deal for wild swimmers. *British Journal of General Practice, 72*(723), 486-487. https://doi.org/10.3399/bjgp22X720833

Baker, S.D. (2019). Validating water safety competence. *International Journal of Aquatic Research and Education*, *11*(4), Art. 5. https://doi.org/10.25035/ijare.11.04.05

Berger, R. (2015). Now I see it, now I don't: research's position and reflexivity in qualitative research. *Qualitative Research, 15*(2), 219-234. https://doi.org/10.1177/1468794112468475

Bharam, P., & Kocharekar, A. (2022). Assessment of knowledge and hydration awareness among swimmers. *Indian Journal of Physical Education, Sports and Applied Science*, *12*(2), 43-48.

Branche, C.M., & Stewart, S. (Eds.) (2001). *Lifeguard effectiveness: A report of the working group.* Atlanta: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.

Braun, V. & Clarke, V. (2006) Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101. https://psycnet.apa.org/doi/10.1191/1478088706qp063oa

Broach, E., & Dattilo, J. (1996). Aquatic therapy: a viable therapeutic recreation intervention. *Therapeutic Recreation Journal, 30*, 213-229.

Chenail, R. J. (2011). Interviewing the investigator: strategies for addressing instrumentation and researcher bias concerns in qualitative research. *The Qualitative Report, 16*(1), 255-262.

Christie, M. 2022. *'Digging deep': how specific forms of green exercise contribute to positive outcomes for individuals, groups, and communities*. Doctoral thesis, University of Cumbria.

Crow, B. T., Matthay, E. C., Schatz, S. P., Debeliso, M. D., & Nuckton, T. J. (2017). The body mass index of San Francisco cold-water swimmers: comparisons to U.S. national and local populations, and pool swimmers. *International Journal of Exercise Science, 10*(8), 1250–1262. https://pubmed.ncbi.nlm.nih.gov/29399251/

de Castro, R.R., & da Nóbrega, A.C. (2009). Hypothermia in open-water swimming events: a medical risk that deserves more attention. *Wilderness & Environmental Medicine, 20*(4):394-5. http://dx.doi.org/10.1580/1080-6032-020.004.0394

Di Masi, F., Costa e Silva, G., Mello, D., Szpilman, D., & Tipton, M. (2022). Deaths in open water swimming races in Brazil from 2009 TO 2019. *International Journal of Exercise Science, 15*(6), 1295 - 1305. https://doi.org/digitalcommons.wku.edu/ijes/vol15/iss6/16

Diversi, T., Franks-Kardum, V. and Climstein, M. (2016). The effect of cold-water endurance swimming on core temperature in aspiring English Channel swimmers. *Extreme Physiology & Medicine, 5*(3), 1-12. https://doi.org/10.1186/s13728-016-0044-2

Federation Internationale de Natation (2009). *Open-water swimming*. In: Federation Internationale de Natation. FINA handbook - Constitution and rules 2005-2009, 146-553. FINA Office.

Fleck, A. (2022). *UK drownings: far more men than women drown in the UK*. https://www.statista.com/chart/27855/number-of-drownings-in-the-uk/

Foley, R. (2015). Swimming in Ireland: immersions in therapeutic blue space. *Health & Place, 35*, 218-225. https://doi.org/10.1016/j.healthplace.2014.09.015

Foley, R. (2017). Swimming as an accretive practice in healthy blue space, *Emotion, Space and Society, 22*, 43-51.

Gilchrest, J., & Branche, C. (2016). Lifeguard effectiveness. In M. Tipton & A Wooler (Eds.) *The Science of Beach Lifeguarding* (1st ed.). CRC Press. https://doi.org/10.4324/9781315371641

Golden, F.S.C., Hampton, I.F., & Smith, D. (1980). Lean long-distance swimmers. *Journal of The Royal Naval Medical Service, 66*(1), 26–30.

Griffiths, S. (2022). *Swim wild & free*. Bloomsbury Sport.

Guse, C. E., Cortés, L. M., Hargarten, S. W., & Hennes, H. M. (2007). Fatal injuries of US citizens abroad. *Journal of Travel Medicine*, *14*(5), 279–287. https://doi.org/10.1111/j.1708-8305.2007.00133.x

Hudson, J., Males, J.R., & Kerr, J.H. (2016). Reversal theory-based sport and exercise research: a systematic/narrative review. *Psychology of Sport and Exercise, 27*, 168-179. https://doi.org/10.1016/j.psychsport.2016.08.008

Huttunen, P., Kokko, L. & Ylijukuri, V. (2004). Winter swimming improves general well-being. *International Journal of Circumpolar Health, 63,* 140–144. https://doi.org/10.3402/ijch.v63i2.17700

Johnson, M., O'Hara, R., Hirst, E., Weyman, A., Turner, J., Mason, S., Quinn, T., Shewan, J., & Siriwardena, A.N. (2017). Multiple triangulation and collaborative research using qualitative methods to explore decision making in pre-hospital emergency care. *BMC Medical Research Methodology, 17*(11). https://doi.org/10.3310/hsdr02560

Keatinge, W.R., Khartchenko, M., Lando, N., & Lioutov, V. (2001). Hypothermia during sports swimming in water below 11ºC. *British Journal of Sports Medicine, 35*, 352-3.

Kinnaird, D.W., Becker, B.E. (2008). Contemporary aquatic therapy and pain management. In: Audette, J.F., Bailey, A. (Eds.) *Integrative Pain Medicine. Contemporary Pain Medicine*. Humana Press. https://doi.org/10.1007/978-1-59745-344-8_14

Knechtle, B., Waśkiewicz, Z., Sousa, C.V., Hill, L., & Nikolaidis, P.T. (2020). Cold water swimming - benefits and risks: A narrative review. *International Journal of Environmental Research and Public Health*, *17*(23), 8984. https://doi.org/10.3390/ijerph17238984

Koon, W., Peden, A., Lawes, J.C., & Brande, R.W. (2021). Coastal drowning: a scoping review of burden, risk factors, and prevention strategies. *PLoS ONE 16*(2): e0246034. https://doi.org/10.1371/journal.pone.0246034

Lincoln, Y., & Guba, E.G. (1985). *Naturalistic Inquiry*. Sage.

Mason, M. (2010). Sample size in qualitative interview studies: guided by information power. *Qualitative Health Research*, *26*(13), 1753-1760. https://doi.org/10.1177/1049732315617444

Massey, H., Kandala, N., Davis, C., Harper, M., Gorczynski, P., & and Denton, H. (2020). Mood and well-being of novice open water swimmers and controls during an introductory outdoor swimming programme: a feasibility study. *Lifestyle Medicine*, *1*(2). https://doi.org/10.1002/lim2.12

McDougall, C.W., Foley, R., Hanley, N. Quilliam, R.S., & Oliver, D.M. (2022). Freshwater wild swimming, health, and well-being: Understanding the importance of place and risk. *Sustainability*, *14*(10) 6364.

Moffatt, F. (2017). The individual health & wellbeing benefits of swimming. In: *Swimming and Health Commission Report for Swim England*. https://www.swimming.org/swimengland/health-and-wellbeing-benefits-of-swimming/ Accessed: 6th December 2022.

Moran, K. (2011). (Young) Men behaving badly: dangerous masculinities and risk of drowning in aquatic leisure activities. *Annals of Leisure Research*, *14*(2-3), 260-272. https://doi.org/10.1080/11745398.2011.615719

Moran, K., Quan, L., Franklin, R., & Bennett, E. (2011). Where the evidence and expert opinion meet: a review of open-water recreational safety messages. *International Journal of Aquatic Research and Education*, *5*(3), Art. 5. https://doi.org/10.25035/ijare.05.03.05

Morgan, D. J. (2006). Analysing the risk of drowning at surf beaches. *Tourism Review International*, *10*(1), 125 - 130.

Morgan, D.L. (2014). Pragmatism as a paradigm for social research. *Qualitative Inquiry*, *20*(10), 1–9. https://doi.org/10.1177/1077800413513733

National Open Water Coaching Association (2022). *Official website*. https://nowca.org/ Accessed: 15th June 2022.

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods, 16*(1), 1-13. https://doi.org/10.1177/1609406917733847

Nuckton, T.J., Claman, D.M. & Goldreich, D. et al. (2000). Hypothermia and after-drop following open water swimming: the Alcatraz/San Francisco swim study. *American Journal of Emergency Medicine, 18,* 703-707. https://doi.org/10.1053/ajem.2000.16313

Outdoor Swimmer (2021). *Trends in outdoor swimming report*. https://outdoorswimmer.com/news/trends-in-outdoor-swimming-report-available-now/ Retrieved: 25th November 2022.

Outdoor Swimming Society (2022). *Is It Safe?* https://www.outdoorswimmingsociety.com/is-it-safe/ Retrieved: 29th November 2022.

Padgett, D.K. (2008). *Qualitative methods in social work research.* Sage.

Royal Life Saving Society UK (n.d.). *Cold water shock – the facts*. https://www.rlss.org.uk/cold-water-shock-the-facts%EF%BB%BF Retrieved: 29th November 2022.

Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., Burroughs, H., & Jinks, C. (2018). Saturation in qualitative research: Exploring its conceptualization and operationalization. *Quality & Quantity, 52*(4), 1893–1907. https://doi.org/10.1007/s11135-017-0574-8

Saycell, J., Lomax, M., Massey, H., & Tipton, M. (2019). How cold is too cold? Establishing the minimum water temperature limits for marathon swim racing. *British Journal of Sports Medicine, 53*, 1078-1084.

Segura, L.E., Arozarena, I., Koon, W., & Gutiérrez, A. (2020). Coastal drowning in Costa Rica: Incident analysis and comparisons between Costa Rican nationals and foreigners. *Natural Hazards, 110*(2), 1083-1095. https://doi.org/10.1007/s11069-021-04980-7

Shaw, G., Koivisto, A., Gerrard, D., & Burke, L. M. (2014). Nutrition considerations for open-water swimming, *International Journal of Sport Nutrition and Exercise Metabolism*, 24(4), 373-381.

Sinkinson, M. (2014). Having a good time: Young people talk about risk and fun when combining alcohol consumption and water activities. *International Journal of Health Promotion and Education, 52*(1), 47-55, https://doi.org/10.1080/14635240.2013.852348

Steinman, A.M., & Hayward, J.S. (1995). Cold water immersion. In P.S. Auerbach (Ed.): *Wilderness Medicine, Management of Wilderness and Environmental Emergencies* (3rd ed.) (pp. 104-128). Mosby.

Swim England (2022). *Key Swimming Statistics and Facts*. https://www.swimming.org/swimengland/key-swimming-statistics/ Accessed: 9th December 2022.

Tanaka, H. (2009). Swimming exercise: impact of aquatic exercise on cardiovascular health. *Sports Medicine*, *39*(5), 377-387.

The National Water Safety Forum (2022). *Open water swimming advice*. https://nationalwatersafety.org.uk/media/1145/open-water-swimming.pdf Accessed: 9th December 2022.

Tipton, M.J. (2013). Sudden cardiac death during open water swimming. *British Journal of Sports Medicine, 48*(15), 1134-5. https://doi.org/10.1136/bjsports-2012-092021

Tipton, M., & Bradford, C. (2014). Moving in extreme environments: Open water swimming in cold and warm water. *Extreme Physiology & Medicine*, 3(12), 2014. https://doi.org/10.1186/2046-7648-3-12

Tipton, M., Massey, H., Mayhew, A., & Morgan, P. (2022). Cold water therapies: minimising risks. *British Journal of Sports Medicine*, 56, 1332-1334.

van Tulleken, C., Tipton, M., Massey, H., & Harper, C. M. (2018). Open water swimming as a treatment for major depressive disorder. *BMJ Case Reports*, bcr2018225007. https://doi.org/10.1136/bcr-2018-225007

Vindrola-Padros, C., & Vindrola-Padros, B. (2018). Quick and dirty? A systematic review of the use of rapid ethnographies in healthcare organisation and delivery. *BMJ Quality & Safety*, *27*(4), 321–330. https://doi.org/10.1136/bmjqs-2017-007226

Vybíral, S., Lesná, I., Jansky, L., & Zeman, V. (2000). Thermoregulation in winter swimmers and physiological significance of human catecholamine thermogenesis. *Experimental Physiology*, *85*(3), 321–326.

Wood, L.E., Vimercati, G., Ferrini, S., & Shackleton, R.T. (2022). Perceptions of ecosystem services and disservices associated with open water swimming. *Journal of Outdoor Recreation and Tourism*, *37*, 100491. https://doi.org/10.1016/j.jort.2022.100491

Woodward, E., Beaumont, E., Russell, P., Wooler, A., & Macleod, R. (2013). Analysis of rip current incidents and victim demographics in the UK. *Journal of Coastal Research*, *65*(10065), 850–855. https://doi.org/10.2112/SI65-144.1

World Health Organisation (2021). *Drowning – Key Facts*. https://www.who.int/news-room/fact-sheets/detail/drowning Accessed: 6th November 2022.

Xerri, D. (2018). Two methodological challenges for teacher-researchers: reflexivity and trustworthiness. *The Clearing House: A Journal of Educational Strategies, Issues, and Ideas*, *91*:1, 37-41. https://doi.org/10.1080/00098655.2017.1371549