“I’m just lost in the world”: The Impact of Blue Exercise on Participant Wellbeing

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The Impact of Blue Exercise on Participant Wellbeing

Exercise in natural environments positively impacts physical, social and mental wellbeing. However, most research has focused on green exercise, with less investigation of blue exercise (i.e. exercise in natural water). The study explored how blue exercise impacted wellbeing and whether its benefits were unique from other types of physical activity. Qualitative interviews (N = 8) were conducted with adults who participated in kayaking, canoeing, paddle boarding, surfing and open-water swimming. Semi-structured interviews focused on blue exercise type, feelings during/after, and non-blue exercise participation. Transcripts were analysed using inductive thematic analysis. Benefits from blue exercise included being in nature, seeing land from a different perspective, and escaping daily responsibilities. Health benefits included improved physical health, particularly for persons with physical conditions, relaxation/mindfulness, and managing mental health through non-medicinal methods. Participants emphasized social aspects compared with other exercise; particularly through supporting others in skill development. They highlighted respect for water and feelings of achievement by overcoming their fear of it. The findings supported social, mental and physical benefits of exercising in nature liked to restorative environments and basic psychological need fulfilment, with several unique benefits specific to blue exercise. Encouraging blue exercise may have public health potential; but research should explore barriers to engaging with it and how it differs from other nature-based exercise.

Keywords: blue space; nature-based exercise; water sports; mental health

# Introduction

The World Health Organisation (WHO, 2016) highlighted the role of urban natural environments for our health. Generally, research primarily focused on benefits linked to urban green space use (e.g. Bowler, Buyung-Ali, Knight & Pullen, 2010; Coon et al., 2011); but natural environments can be differentiated as green or blue space. The term ‘green space’ typically refers to locations where vegetation is the pre-dominant visual quality (Gascon et al., 2015). ‘Blue space’ includes locations where the central visual aspect is water and further classified as natural (e.g. freshwater coastal settings, lakes, rivers) or manmade (e.g. fountains, reservoirs) (de Bell, Graham, Jarvis, & White, 2017; Finlay, Franke, McKay & Sims-Gould, 2015; Gascon et al., 2015; Gascon, Zijlema, Vert, White, & Nieuwenhuijsen, 2017). Evidence suggests locations near rivers, lakes and oceans (WHO, 2018) may provide similar health resources as green space (Gascon, et al., 2017; Völker & Kistemann, 2011). Yet, markedly fewer studies on blue space exist (Ashbulby, Pahl, Webley, & White, 2013; Papathanaspoulou et al., 2016), despite waterside environments named as a ‘favourite place’ as often as urban green space (Korpela, Ylén, Tryväinen, & Silvennoinen, 2010) and hundreds of millions of recreational visits are made to them annually (Elliott et al., 2018; White et al., 2014). From a broader health perspective, more blue space-focused research is needed; not least based on a call by the WHO (2018) for member states to improve access and quality of blue space as a means of improving population health. The current study focused on natural, freshwater blue space located near to urban settings.

There are several potential explanations for the positive health and wellbeing effects of engaging with blue space. Blue spaces and coastal proximity are associated with physical activity (Finlay, et al., 2015; Volker & Kistermann, 2015; White et al., 2014). According to the WHO, adults need 150 minutes of weekly moderate-to-vigorous physical activity (2010; 2015). It is important to understanding why people engage in blue exercise, defined here as physical activity *immersed in* natural blue space, and whether its benefits differ from exercise in settings such as swimming indoors, gym training, or nature-based activities like hiking or cycling. This is particularly the case based on evidence blue exercise may increase quality-adjusted-life years and reduce health care costs (Papathanasopoulou et. al., 2016) but only 3% of people visiting blue space engaged in blue exercise like water sports or outdoor swimming (Elliot, et al., 2018).

Another potential benefit of blue exercise may be its impact to improve cognition. This may occur as either a direct consequence of water-based exercise on cognitive functioning (Ayán, Cavalho, Varela, & Cancela, 2017; Fedor, Garcia, and Gunstand, 2015) or as a result of the natural context. Directed attention refers to our ability to focus on cognitive tasks and is considered a finite resource (Berman, Jonides, & Kaplan, 2008; Berto, Baroni, Zainaghi, & Bettella, 2010). Urban settings deplete this resource, resulting in directed attention fatigue (DAF, Kaplan & Kaplan, 1989); nature settings restore this depleted resource resulting in recovery from DAF (i.e. attention restoration). Attention Restoration Theory (ART; Kaplan & Kaplan, 1989) suggests this is because urban environments constantly require the use of directed attention to interact with them. Nature, on the other hand, is restorative because it four possesses characteristics that require less directed attention: fascination due to visual qualities that effortlessly draw attention, a sense of being away, extent or coherence (i.e. richness to create another world) and compatibility with DAF recovery goals (Kaplan, 1995). Several studies reported improved directed attention task performance after outdoor (i.e. green) exercise (Bratman, Daily, Levy & Gross, 2015; Berman, Kross, Krpan, Askren, Burson, et al., 2012; Rogerson, Gladwell, Gallagher & Barton, 2016). Blue exercise, as a type of nature-based physical activity, should be expected to have a similar effect on directed attention; although we were unable to find any study directly testing its impact.

In addition to increased physical activity and improved cognitive functioning, evidence also supports nature’s impact on physical, psychological, and social wellbeing, considered to be the foundations of health (WHO, 2020). Natural environments, including blue space, affect physical wellbeing. Everyday life can be stressful and these daily stressors produce negative physiological effects such as increased heart rate and blood pressure (Irvine, Warber, Devine-Wright, & Gaston, 2013). Engaging with nature reduces stress and cortisol levels (Keniger, Gaston, Irvine & Fuller, 2013). There is evidence of similar self-reported stress-reduction from blue space exposure (Ashbulby, et al., 2013; de Bell et al., 2017). Reports also highlight the positive effect of blue space on psychological wellbeing (Gascon, et al., 2017; White, Alcock, Wheeler, & Depledge, 2013a; White, Pahl, Ashulby, Herbert & Depledge, 2013b). Visits to blue space are associated with relaxation, calmness, revitalization and mood (Ashbulby et. al., 2013; Elliott et al., 2018; White et al., 2010; White et al, 2013b), considered as indicators of hedonic and eudemonic wellbeing (Gunnell et al., 2014; Watson, Clark & Tellegen, 1985). Additionally, both visits to blue space and blue exercise facilitate social interactions (Bell, Phoenix, Lovell & Wheeler, 2015; Denton & Aranda, 2019; Finlay et al., 2015) essential to social wellbeing.

The objective of the present study was to contribute to the evidence base assessing the potential for nature to impact wellbeing and physical activity. The study explored the link between blue exercise and wellbeing and whether it had benefits unique from exercise generally. The study addressed a need for research focused specifically on exercise *in* natural blue space; the use of a qualitative approach explored subjective perceptions with this niche group of exercise participants to provide a deeper understanding of their experience.

**Methodology**

The study was conducted in North East England, an area of 1 million residents on the North Sea coast, fed by the Rivers Tyne and Wear. Although it benefits from scenic beauty, it is also a region with varied levels of socio-economic deprivation. Eight adults who were regular blue exercisers participated (*M*age = 44.0 years, range 22 = 60; Male = 5). Their blue exercise included immersive activities such as kayaking, canoeing, paddle boarding, surfing and open-water swimming. They were recruited through local blue exercise clubs and referrals to the first author. Names are pseudonyms.

## Procedure

The study was approved by the University of Sunderland Ethics Committee and followed the British Psychological Society Code of Ethics (2014). A semi-structured interview (Table 1) focused on blue exercise type, feelings during/after activities, and participation in non-blue exercise. Questions were formulated to determine whether there were aspects unique to blue exercise compared with other physical activity. Audio-recorded interviews were approximately 60 minutes.

INSERT Table 1 HERE

## Authors Experiences with Blue Exercise

At the time of the study, NT was a 43-year-old female regular blue exercise participant. From a young age, she engaged in outdoor exercise including hill walking and mountain biking; but only began blue exercise about a year prior to the study. She felt an ‘insider identity’ (Dwyer & Buckle, 2009) with others who participated in blue exercise based on her experiences similar to those of the participants. As a qualitative researcher, her approach was from interpretive-constructivist epistemology (Bryman, 1984; Tuli, 2010), attempting to understand participant experiences of an activity with which she also had considerable experience. SW was a 47-year-old female who engaged in both indoor (e.g. strength training) and outdoor (e.g. peri-urban walking) exercise 4-5 times weekly. She never participated in blue exercise but previously engaged in indoor swimming. Based on this lack of experience, her identity was as an ‘blue exercise outsider’ while simultaneously an ‘exercise insider’ related due to her long-standing commitment to indoor-outdoor physical activity. SW’s research stance was primarily from an empiricist paradigm using positivist epistemology (Bryman, 1984; Tuli, 2010). We believe the blend of different identities and epistemological stances strengthened the study design and subsequent analysis by providing varied lens’ through which to interrogate the data.

## Data Analysis

We considered inductive thematic analysis to be the most appropriate framework to explore the subject experiences of these participants, particularly in regards to possible ways in which blue exercise differed from other physical activity. Inductive thematic analysis was also chosen for its flexibility and positioning which allows themes to be integrated into theoretical frameworks and existing literature (Braun & Clarke, 2006; Braun, Clarke, Weate, 2016). Throughout the research process, NT’s approach was from a “Big Q” position, while SW readily acknowledged her “small q” viewpoint (Braun & Clarke, 2019). Blending these approaches, in reality, likely achieved what has been described as codebook thematic analysis or “medium q” (Braun & Clarke, 2019; Clarke & Braun, 2018). It allowed us to strike a balance between our differing insider/outside identities, research experience/training, and epistemological stances. Overall, our analysis strategy was to reflect the entire data set rather than focusing solely on a specific topic (Braun & Clarke, 2006). We felt this was the most appropriate to explore the experiences of this somewhat under-researched group of participants; and contribute not only our understanding of blue exercise, but also enhance the potential for transferability of the findings (Smith, 2018) to experiences of nature and outdoor-based physical activity more generally.

The minimum sample size of six recommended for thematic analysis (Braun, Clarke & Weate, 2016) was achieved. Interviews were transcribed by NT. She read transcripts multiple times before reviewing them again to make descriptive notes and identify codes by hand. During this stage of the analysis, participant accounts were coded separately and each of their transcripts revisited until she felt there were no additional codes to identify. This process was primarily “semantic” (Braun, Clarke & Weate, 2016) because the codes represented explicit participant statements. A semantic approach was suited to exploring experiences across participants in this niche type of outdoor exercise (Braun & Clarke, 2006).

Mind-mapping (by hand) was used to cluster similar codes within each participant’s account; superordinate and subordinate themes were initially developed using these clusters. Each time the data was revisited, NT reflected on whether the findings addressed the research questions (Braun, Clarke & Weate, 2016); and whether the themes resonated with her own experiences of blue exercise. In some cases, they did (e.g. social aspects, being outdoors is good for mental and physical health). Across participants, consistent themes were defined as appearing in at least half of the participant’s accounts.

Once NT completed her analysis, SW reviewed all transcripts, codes and themes for consensus and to ensure no additional themes could be identified. To some extent, it may appear that SW was conducting an ‘inter-rater reliability’ analysis, a method commonly used to establish methodological rigour (McGannon, Smith, Kendellen & Gonsalves, 2019; Smith & McGannon, 2018). Instead, this was a deliberate decision intended to preclude, as much as possible, the analysis moving away from an inductive process towards one that was deductive and theory-driven, given SW’s epistemological position and research experience in the psychological benefits of nature on a range of psychological outcomes. However, we did discuss specific phrases and the development of codes and themes, as well as the influence of our different epistemological approaches throughout the analysis process. In this way, we used something similar to the “critical friends” approach (Smith & McGannon, 2018) between us to enhance rigour; after the initial analytic narrative was outlined we also sought feedback from a peer “critical friend” within the School, who was independent of project. Participants were not contacted to provide either member checks or reflections (Smith & McGannon, 2018).

# Results

The analysis produced four consistent superordinate themes: benefits of being outdoors, physical/mental health benefits, social interaction, and fear of water. The first three contained also contained subordinate themes. Each theme is supported by participant quotations; their age is in brackets with their first quotation.

## Benefits of Being Outdoors

Most participants described how blue exercise enabled them to spend time outdoors; and this appealed to them for a variety of reasons, including fresh air, wildlife and the scenery.

I love seeing the wildlife, I just I just like being outside even if it’s freezing cold. I just love it. You just get to places you wouldn’t have got to otherwise. (Louise, 54)

It’s the same with kayaking. It’s got, it’s got the aspect of the fresh air and the kind of that being free in the open. You know in the open environment. Kind of getting out there in more of the wilderness. (Adam, 47)

There was also a sense from their words the appreciated the ways the natural world offered variety with the changing seasons or weather conditions. This provided them with unlimited options, even when returning to the same place.

I love being outside. I love being, seeing something different. And it changes every time you go, no matter where you are it’s, everything is different. (Tim, 29)

These ever-changing characteristics also occur in green space, for example with the changing autumn leaves; but a distinctive aspect of blue exercise was experiencing the world from a visual perspective not everyone could access. Because they could look back onto the land from the water, they felt a unique viewpoint only experienced by someone who engaged in blue exercise.

You are seeing things most people don’t see because you are looking from a river up onto the banks. You are looking on to the backs of some people’s houses that aren’t visible to anyone else. (Neil, 60)

You can see things, that you can’t see from the coast. We live on an island and I don’t think we get that. But when you start paddling round that little bits of the island. (Rebecca, 50)

In addition to this unique vantagepoint, being detached from land allowed them to escape their day-to-day existence. They could disconnect from the world and experience life without phones, social media or motorized transportation.

I think just getting out in the complete quietness of the sea, erm away from the cars and the land and phones and everything like that you are just able to disconnect so much quicker. Erm, whereas like walking down the street there is so many distractions there like cars, the people, your phones. Erm, whereas when you are paddle boarding for instance you cannot just get out your phone and scroll through Facebook or anything like that. (Andy, 22)

Perhaps more importantly, at least one participant implied she used blue exercise as a way to regulate contact with others when she stated “You just feel free and it goes quiet. And, people can’t get to you. You switch your phone off. Awesome.” (Rebecca).

However, other outdoor physical activities provided a similar sense of escape, as well as access to nature. This suggested both escape and experiencing nature were common reasons for nature-based physical activity, rather than a specific benefit of blue exercise.

## Physical and Mental Health Benefits

Participants clearly associated being outside with being active. More than half engaged in blue exercise because of its physical benefits; this was not unique from other fitness activities. Yet, their language about activities such as the gym was very different to descriptions of blue exercise. They took part in other exercise because they felt they *must* do so, but described it as boring, a means to an end, or even “torture”.

I do the Great North Run most years, depending on what bit of us still is or isn’t working. Erm, that’s for fitness and to try and keep my weight down. Erm, I can’t particularly say I run to enjoy it because it is boring. (Richard)

Rebecca noticed important and specific physical changes that only resulted from blue exercise. A limiting medical condition meant land-based exercise was not advised. It resulted in weight gain and potentially becoming wheel-chair bound. Her choice of language about the differences in her body referred not just in fitness but also in physical appearance. These changes positively influenced her self-esteem:

It brings a level of fitness. You know, erm, I love it. I love the changes in my body, I love the strength. I love that fact that you know I can do chin ups, pull ups. So that’s proper kind of, like yeah, I can do a chin up. Couldn’t do a chin up when I was a (horse) rider because I had different muscle mass and different needs. (Rebecca)

Most participants echoed her reports of the mental health benefits received from blue exercise. There were consistent references on how being on the water generated a feeling of calm and relaxation.

I’m just lost in the world. I’m not thinking about what’s happening at work, I am not thinking about what I am doing next week, I am just, it’s just my mind was clear. And, I, I equate it a bit to like meditation. (Neil)

Just sitting, just relaxing, watch a bit and I think that comes down to the relaxation (Richard).

The language of other participants could be associated with meditation or mindfulness, when they used phrases such as “shut down”, “lost” and “clearing the mind” in reference to their experience. This differed from descriptions of other sports. Activities in the water were described as requiring a different focus to those on the land. They were acutely aware water was always moving and changing from moment to moment, day to day, season to season; it required constant attention. This total focus on the task left no cognitive space to think about anything else.

When you are walking down the street, the pavements, there is nothing moving, there is nothing going to change. Whereas when you are on the water anything can change, and you are constantly thinking about what’s in front of you. And, how can I put it, you are always thinking about the water. Because the water is constantly moving, and you have got, you cannot have time to think about anything else. (Andy)

This suggested blue exercise was a restorative or almost meditative practice. They reported feeling calmer by the sea, due to the cleansing nature of the water and the waves. Heather (46) describes this when she talks about swimming:

I can feel the whole pressure and stress just draining out of my body. And I just feel really calm, really relaxed. Erm, and it’s like I probably picture it like if you have ever done any mindfulness training. When you sit having done your mindfulness training and you are focusing on you know how you focus on, how your body feels at that, at that moment. And then you might think about something and you, give, you allow it acknowledgement and then you sort of allow it to disappear again and bring it back down. I can literally feel like that in the water. I can feel, I can feel me fingers, I can feel my toes, I can feel how the water just makes me body feel.

These wellbeing benefits were used almost clinically to manage mental health. Heather had been affected by mental health conditions since childhood and blue exercise kept her anxiety and stress under control. This particularly came through when asked what her life would be like without swimming. She relied on swimming to cope with a busy work/family life.

If I didn’t swim, I find that I don’t really have a release. Erm, I don’t get the release I need from an anxiety and a stress perspective. Especially having a busy life working, having the sort of role I do and having two children who are now hitting, one’s a teenager he is very demanding and the girl who is becoming a teenager. So, the demands of have, having a family is quite hard. So, I, I do need to have a release. Erm, and just through the experience of trying lots of different things, trying running, going to the gym, doing classes, I always, it’s like I always find myself going back to swimming. (Heather)

Tim had depression and rediscovering blue exercise changed his lifestyle. He left his job to become a kayaking coach, stating he spends about 75% of his time associated with the activity, which he believes has improved his mental health. He knows when he feels bad, he needs to “self-medicate” on the water. Because of his new job he knows the time between blue exercise sessions is likely to be brief, so he is able to relax and feel more in control of his wellbeing.

And up until that point I had been off work for a couple of weeks at that point through it and I was like struggling. And it was the, of was through my girlfriend and the doctor who were like no definitely you need to still do this trip. And it wasn’t until I had done that trip that I realised it had actually helped me and then, yeah that was when I realised that every time I felt bad I would go out and do some and that when I then took the decision to quit what I was doing, to become a coach. And see if that would help. And since doing it I have, it has totally changed me, because even when I do feel rubbish, odds on I will be on a session pretty soon. So, I get out and that just being able to relax and whatever is on my mind goes out of my mind. (Tim)

Even without a clinical mental health diagnosis, blue exercise was used to stay mentally healthy.

I personally get quite agitated easily, if I haven’t been out on the water for a while. And that’s not, not like angry or anything, I can feel it in myself when I haven’t been out in a while. And when you do get in you always feel a lot more relaxed and chilled about everything. (Andy)

The only consistent sub-theme for all participants related to challenge and achievement. It was important to improve their skills and feel achievement at the end of each session. Their words implied participants needed to be “good enough” or “competent” to help others and be safe. Paddle sports such as canoeing and kayaking provide the opportunity to gain qualifications, one way to track improvement and achievement. This may be one of the reasons why people are attracted to blue exercise because of defined levels of difficulty (e.g. the grade of water). Participants enjoyed moving out of their comfort zone to stretch their abilities.

And that means I can like build on that for the next time and then I will know what to do and then in turn I can help other people who have similar problems. (Louise)

How do I close that gap? How do I improve this? Where do I get the skills from? What do I do so that that doesn’t happen again? (Rebecca)

This aspect of challenge was not unique to blue exercise and was also a reason several participants took part in other nature-based activities.

I do snow-boarding and stuff like that where I think I do get a kind of a buzz about tackling something you are nervous about doing. And then doing it and then you get the feeling of almost euphoria feeling afterwards, that you have almost cracked it. (Adam)

Over half the participants stated they enjoyed or even felt addicted to the adrenaline generated by blue exercise. Some participants were looking for risk and enjoyed the feeling of adrenaline they were left with afterwards.

I think on the personal side it’s; I think there’s an element of the adrenaline side certainly in the surf. (Richard)

I am quite addicted to the feeling pumped, I am quite addicted to the, there is a little element of physical contact. (Rebecca)

This is not the case for all the participants. Some reported trying to achieve a carefully-controlled balance; they enjoyed some risk and the adrenaline this delivers but did not want to do anything dangerous. Neil highlighted how he does not enjoy the adrenaline side of the water sports, stating he was “not a wild water type of person, I like the gentle side of life.” It took him a while to become comfortable enough with kayaking to engage in it outside.

 (We) played in that kind of session for possibly, well a good few months before we did anything whereby, we would even consider going outdoors. We just went backwards and forwards to the pool and that was it, there was the hour, hour and a half, I would say it was over a year actually just the pair of us for that. (Neil)

Generally, blue exercise provided many of the same benefits of other types of nature or indoor-based exercise in terms of physical fitness; the key difference was that participants reported enjoying blue exercise more, which appeared to be an important motivator for continued engagement. Blue exercise also provided these participants with impactful mental health benefits closely tied to the presence of water rather than simply the presence of nature.

## Social Interaction

Most participants identified helping and coaching others as central to their enjoyment of blue exercise. They wanted to share their experience with others and talked about how they were helped by others to improve or when they were in trouble. There was a sense of a distinct social culture, where support and knowledge were passed on to others, even to strangers they met on the water.

I mean the biggest thing for me is trying to get other people or wanting other people to get involved to experience what I experience to some extent. (Andy)

You meet somebody out on the river and….some people will just come across and say, watch out for that down there, or they will say did you realise your, you are not holding your paddle straight or something like that, they will comment on maybe something that you are doing. Oh, I never seen that done that way before. And people generally want to help other people that are paddling. (Neil)

This support was further described by references to how they followed others through difficult or technical sections of river and encouraged them to try a section with an assurance that support is there if they need it.

Because that is generally when I am doing the likes of white water or something and I will be led down so I’m not responsible for anything which is totally all of the weight lifted off me. And I get that kind of adrenaline rush because I’m pushing myself into something that I’m not, that’s not my strong area. So, when I start going down [something] that’s grade three or four or getting onto the higher end of where I am and when I achieve it then the feeling coming off the adrenaline rush, the buzz is just amazing. It’s that sense of, actually I can do that. (Tim)

This reference to support from more knowledgeable others resonates with the concept of scaffolding in educational psychology (Boblett, 2012), whereby goals normally outside an individual’s existing competencies might be achieved through working with more-skilled others. The desire for challenge and skill improvement meant there was a dependency on others to help them achieve this. As a consequence of, a feeling of responsibility was instilled to pay it back by helping, supporting and coaching others.

Erm, you do get a feeling of camaraderie as well I think, even if something goes wrong, probably more often if something goes wrong actually. Because when people pull together, you know and when someone’s going for your paddle, someone is going for your boat. (Adam)

In addition to a culture of scaffolding others, a key reason for blue exercise was social interaction. The language used indicated the importance of group membership, with references to their community and like-minded people. It was important to be able to share experiences with people and this initiated friendship and camaraderie.

And it’s quite a social thing, I think there’s, there’s definitely a little bit of a kind of, community you know. (Adam)

It gets me out, I’ve met loads of new friends, and it (pause) it’s just really opened up my world. (pause) Because having children and being having my children brought up, now I’ve got something for me. (pause) So, it’s just what I do. (Louise)

I think certainly in the surfing environment having that camaraderie, the banter. (Richard)

Blue exercise was also an opportunity to engage in physical activity with family. Those with families liked sharing it with their children. This was often a complex situation, with family commitments originally the reason to cease blue exercise. However, there was opportunity to become more involved with blue exercise again as their children got older.

Erm, then it was my son, when he, I kept saying when he was older I would take him canoeing and he started off and I realised why the hell did I stop? I really enjoy this. (Richard)

The exception was Heather, who mentions she would have liked social support from others but none of her friends or family were interested.

Unfortunately, nobody is mad enough to want to do open water with me, so I tend to do it on my own. (They) look at me as if I have ten heads, why on earth would I possibly want to put on a wetsuit and go in the sea or river, lake. I have got no desire to do that. (Heather)

Earlier, several participants noted blue exercise provided an escape from daily life, particularly for some by regulating social interaction or other’s access to them through technology. Conversely, the important contribution of inherently “face-to-face” interactions on the water was also highlighted; this strengthened bonds between fellow blue exercise participants.

## Fear of Water

A fear of water reflected a sense of respect for nature. Some participants were more scared and fearful of specific types of water such as the sea and rivers because of the unpredictability, but this was not specific to any particular type of blue exercise. For these people, water would not have calming effect and could induce a stress response.

I am more scared in the sea, I have anxieties being in the sea, I start to think about rip tides, I start thinking about what will happen if I hit a rip tide and I am pulled out to sea, how would I mentally and how would I physically cope with that. (Heather)

Some used words such as “relentless”, “punish” and “fight” to describe their interaction with water. This highlighted how difficult blue exercise could be in some conditions. It commanded your respect and a constant sense of vigilance.

If you are getting out in some bigger conditions you would end up having to fight with the sea to get, to get out the back so you can surf the waves. Or just purely being out on the water and on a such a small board you always feel a little bit vulnerable. (Andy)

Simultaneously, overcoming fear was considered healthy. It reminded them that “water was never your friend” so to stay safe you needed some element of fear. In another respect, it was an aspect of achievement. For example, Rebecca stated she could feel a “mastery over your own weaknesses and your own fears” and this appeared to be a strong motivation for blue exercise. Yet, others stated they never overcame those fears but managed them with peer social support.

# Discussion

This study focused on blue exercise in natural settings. The aim was to explore whether it had benefits distinct from other nature or indoor-based physical activity. The findings indicated blue exercise provided similar benefits to other outdoor physical activities but also had some unique advantages.

Participants engaged with blue exercise to experience nature. The sense of the outdoors as a therapeutic landscape came through in their descriptions. Nature’s spiritual benefits were documented by reports of experiencing wilderness, awe and inspiration from the landscape. This interaction with wildlife and landscape has been shown to promote a sense of wellbeing and spiritual fulfilment (Keniger, et al., 2013). The importance of the nature experience also reinforced it as an important motivation to engage in ‘green exercise’ (including on or near water), as reported by others (Calogouri & Elliot, 2017).

A distinctive aspect of blue exercise was visually, it provided a different perspective; one very few others get to see, such from coast back to shore. From a psychological perspective (e.g. Tajfel & Turner, 1979), this unique vista may have had positive social implications, reinforcing group membership with others who share the same view and differentiating them from those who do not. Group membership can also reinforce positive aspects of an individual’s social identity and enhance their self-esteem. This unique visual perspective also illustrated a complete separation between the individual and land, creating a sense of extent, or ‘richness constituting another world,’ a key characteristic of restorative environments (p. 173, Kaplan, 1995). In this way it may have contributed to the belief blue exercise was a means of escaping the day-to-day.

Blue exercise’s restorative potential was further reinforced in participant reports it provided a sense of ‘being away’ from daily responsibilities, another restorative environment characteristic (Bell et. al, 2015; Kaplan, 1995). In this regard, participant views were similar to open water swimmers who used the sport to disconnect from daily life (Denton & Aranda, 2019). Participants discussed this with other outdoor physical activities; together, the findings reinforce the restorative potential of outdoor physical activity more broadly (Rogerson et al., 2016; Weng & Chiang, 2014).

Blue exercise contributed to physical and mental health. Coastal settings were associated with physical activity, as reported by others (Ashbulby et. al, 2013; Elliott, White, Taylor, & Herbert, 2015). One participant used blue exercise to overcome a physical condition and noted the physical benefits blue exercise provided over other types of activity. Water is a unique medium with immersive properties other natural landscapes do not offer (Denton & Aranda, 2019; White et al., 2010). In this regard, blue exercise was also unique because it can be a great leveller for individuals with specific physical challenges, allowing them to improve physical fitness.

Improved mental health through relaxation and reduced stress resulted from blue exercise; thus, further supporting varied wellbeing outcomes from blue (Ashbulby et. al, 2013; de Bell, et al., 2017; Denton & Aranda, 2019) and urban green space use (Houlden, Weich, de Albuquerque, Jarvis, & Rees, 2018). Blue exercise was used to manage mental health, so like urban green space, can be useful in reducing depressive symptoms (Korpela, Stengård, & Jussila, 2016). However, the mechanism by which these benefits occurred in blue exercise may be have been due to the extreme focus participants described as necessary for blue exercise, which allowed them to “switch off” from the stresses of modern of life. Total focus is consistent with immersive therapeutic experiences (Bell et. al, 2015). Mental health benefits may have also resulted from improved cognitive functioning resulting from attention restoration, consistent with the interplay between improved cognitive function and mental health outcomes from water-based physical activity (Ayan et al. 2017).

Participants enjoyed feelings of challenge and achievement experienced with blue exercise. They discussed pleasure from improving their skills and acquiring certificates as a sign of their improvement. In the current context, there was a clear theme suggesting the use of peer support to encourage skill development. This way of learning is referred to as scaffolding (Boblett, 2012). The ‘social norm’ of scaffolding in blue exercise creates a culture of helping each other and passing this knowledge on to others. It also engendered a sense of community and group cohesion. Positive social interactions were a therapeutic benefit of visiting the coast (Ashbulby et. al, 2013; Finlay et. al., 2015; Volker & Kistermann, 2011). This social aspect was also demonstrated in the current study and earlier work on open water swimming (Denton & Aranda, 2019).

There was also a dark side to water with a sense of fear in some participants, an acknowledged level of respect for blue settings, and an understanding of the associated risks. This view mirrors open water swimmers (Denton & Aranda, 2019; Foley, 2015), who recognized the inherent dangers with blue exercise. Yet, it was this danger and fear that fed their sense of challenge and attracted them to blue exercise. The importance of fear to the current participants also links to the appeal of other outdoor extreme sports. Brymer and Schweitzer (2012) found participants in a variety of extreme sports also made similar links between fear, respect, and the personal achievement associated with overcoming fear. In this regard, blue exercise was similar to these activities.

When the themes are viewed collectively, the mechanisms by which blue exercise contributed to wellbeing may be further understood through two complementary theories: attention restoration theory (ART, Kaplan, 1995) and basic psychological needs theory (Ryan & Deci, 2001; Ryan, Huta, & Deci, 2006). The premise of ART was cognitive fatigue due to urban living has negative consequences for individuals but nature settings possess four characteristics allowing recovery from this fatigue to enhance wellbeing: fascination, being away, coherence/extent, and compatibility. Although no explicit reports of improved cognitive functioning were made by participants, it was implied by statements about being able to “switch off” and focus on the task at hand. In this way, blue exercise provided a task, although cognitively quite complex, was compatible with their desire to achieve a cognitive disconnect from their daily life via ‘being away’ in a unique visual environment (i.e. extent). It could be also be argued these blue settings contributed to cognitive restoration because they were fascinating, as evidenced by reports of the ever-changing qualities of blue exercise environments. Therefore, the themes presented here were consistent with presence of the four restorative characteristics in ART.

Additionally, themes broadly mapped onto the WHO’s definition of health through physical, social and mental wellbeing (WHO, 2020). Enhanced physical wellbeing was directly evidenced in participants reports of improved fitness and continued motivation to maintain physical activity. Social and mental aspects of wellbeing may have been achieved because blue exercise fulfilled three basic psychological needs: autonomy, competence, and relatedness (Ryan & Deci, 2001; Gagné, 2003). Autonomy refers to an individual’s perception they are free to make their own decisions, without a sense of feeling pressured or being told what to do (Gagné, 2003). Participants made multiple references to blue exercise being ‘their own thing’ and a way to escape daily pressures. It was also a way to set personal goals and achieve milestones, which suggested blue exercise fulfilled their need for competence involving learning new skills and experiencing a sense of accomplishment (Gagné, 2003). Social wellbeing was also enhanced when their psychological need for a relatedness, or positive social relationships (Gagné, 2003), was fulfilled through scaffolding others to achieve their goals, using blue exercise as a way to interact with family, and the sense of general camaraderie experienced with their peers.

*Study Strengths and Limitations*

Although the study aim was to understand individual experience and subjective perceptions of blue exercise, recruitment of a small sample from blue exercise clubs could be considered both a strength and a limitation. As a strength, this purposefully selected sample provided an opportunity for rich exploration with a niche exercise group (Smith, 2018). Yet, this sample may have inadvertently resulted in a study limitation, with participants who were focused on the social aspect of the activity due to the club-based context. In future, it would be beneficial to interview people who participate in individual blue exercise (e.g. swimming, surfing), as well as those who do not engage with blue exercise despite a close proximity to blue settings. This would broaden future findings, particularly in regards to barriers that prevent people from engaging with blue exercise; and potentially enhance transferability (Smith, 2018) to other types of outdoor-based exercise.

Research suggests taking part in any physical activity on/near water (Gascon et. al, 2017; White, et. al, 2013b) can positively impact on physical and mental wellbeing. However, our participants engaged in strenuous blue exercise; it may be the physical and mental health benefits reported would have been similar to other strenuous, indoor or outdoor activities and future studies should address this limitation. The strenuous blue exercise in the current study was also inconsistent with reports blue settings are associated with leisure activities such as light physical activity or sedentary behaviour (Jansen, Ettema, Kamphuis, Pierik, & Dijst, 2017; Völker & Kistemann, 2015).

Overall, a clear strength of the study relates to its naturalistic generalizability, or its ability to evoke an account with which the reader is familiar (Smith, 2018). This was evidenced through a comment made by one reviewer, who anecdotally reported how our account evoked memories of their first experience with blue exercise. In addition, many (though not all) themes resonated with NT’s experience of blue exercise. Naturalistic generalizability was evident through our account of the research process more broadly, which required us to balance the tensions between our differing epistemological stances and experiences; and hope that evoked similar considerations by readers. This process of researcher reflexivity and the analysis choices intended to avoid potential pitfalls from those differences also enhanced the methodological rigour (McGannon, et al., 2019; Smith, 2018).

*Conclusion*

The current study focused on blue exercise. Few studies have explored the motivations for blue exercise or whether these differ from other types of outdoor physical activity. There was some indication of unique aspects associated with blue exercise differentiated it from other outdoor activity, particularly through the different vista it provided. This viewpoint was not only restorative (Kaplan, 1995) but also provided a sense of group cohesion with others who shared the same (visual) view. Blue exercise was also unique because it helped participants overcome physical limitations, with the water physically embracing them to allow them to engage in physical activity when land-based exercise may not have been feasible. Generally, however, many of the benefits identified (e.g. improved mental health, social inclusion, or experience of nature) are also associated with other physical activity (Pretty, Peacock, Sellens, & Griffin, 2005; Pasenen, Ojala, Tyrvainen, & Korpela, 2018) or high-intensity outdoor sports (Kerr & Mackenzie, 2012).

Green space regularly features in public health policy, but blue space does not receive the same focus (Foley & Kistermann, 2015). Perhaps this is because the types of blue exercise are not accessible to most people due not only to a lack of coastal proximity but also the expense of hiring or purchasing equipment to take part. It may even be the “fear factor” reported by participants precludes individuals from considering activities in open water. Before blue settings can be used to inform public health policy recommendations, more research focused specifically on them is required. In particular, future research should identify how outcomes vary between green and blue locations, by type of leisure activity within the environment, or for different demographic or epidemiological groups. Potential barriers such as lack of access and safety concerns, as well as the inherent risk of injury that could inadvertently create other public health burdens need further investigation. Yet, the findings reiterated engaging in leisure activity in/on/near blue space has the potential to be an important health resource (White, et al., 2014); and blue exercise benefits can potentially target multiple national (Department of Health, 2015) and international (WHO, 2015) health and wellbeing indicators including physical activity, mental health, and social isolation.

# Declaration of Interest Statement

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Table 1. Semi-structured Interview Questions

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| **Questions and Prompts** |
| Can you tell me what place water sports has in your life? |
| How did you get started with water sports? |
|  How long ago?  |
|  What brought it about?  |
|  How did it make you feel? |
| Can you tell me about a recent time you took part in “specific water sport”? |
| How do you feel after taking part in “specific water sport”? |
|  What do you like about it?  |
|  What don’t you like about it? |
| Can you tell me why you engage in “specific water sport”? |
|  Which is most important and why? |
| How do you think your life would be without (specific water sport)? |
| Can you talk to me about what other physical activities you take part in? |
| How do you feel after these physical activities compared with (specific water sport)? |