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The Perceived Benefits of and Barriers to Open-Water Swimming: A Mixed-Methods Examination

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Cover Page Footnote

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Abstract

This study set out to determine the perceived benefits of, and barriers to, open-water swimming (OWS). Adopting a mixed-methods approach, six hundred and sixty-five open-water swimmers responded to an online survey consisting of the Exercise Benefits and Barriers Scale (EBBS) and a series of open-ended questions. Data from the EBBS revealed the strongest perceived benefits to be 'Psychological Outlook' and 'Life Enhancement.' In terms of barriers, those presented in the EBBS received low ratings with only 'Physical Exertion' considered as being somewhat problematic. Content analysis performed on the open-ended responses showed social aspects, mental well-being, and connection to nature as being particularly beneficial. Barriers to full participation included water pollution, accessibility, and poor weather conditions. These outcomes are discussed in relation to the uniqueness of the open-water swimming experience. Comparisons to other exercise modes also are presented.

Keywords: open-water swimming, barriers, benefits, mixed methods

Introduction

Open Water Swimming (OWS) refers to swimming in outdoor, natural environments such as lakes/lochs, tarns, rivers, and the sea. Like other modes of exercise, OWS can lead to improvements in physical and psychological well-being. For example, Massey et al. (2020) reported reductions in negative mood state (e.g., tension, anger and depression) with accompanying increases in positive mood (i.e., esteem and vigor) in participants completing a 10-week OWS course. It also appears that OWS can have a positive impact upon more serious conditions such as depression, anxiety, PTSD, bipolar disorder, migraines/headaches, fibromyalgia, blood pressure, dyspraxia, and musculo-skeletal pain (Massey et al., 2022; Christie & Elliott, 2023). Interestingly, many OWS practitioners believe such benefits to exceed those derived from more traditional forms of exercise such as gym-based activities and even pool-based swimming (Thompson Coon et al., 2011; Massey et al., 2022; Christie & Elliott, 2023).

There are various mechanisms through which OWS could promote such positive outcomes. OWS differs from traditional exercise forms as it is undertaken in so-called 'blue space' (BS). Exposure to BS (outdoor areas where water and sky are prominent features) can offer a respite from more chaotic urban areas, provide a sense of connectedness with the outdoors, encourage an appreciation of the beauty of nature, and provide an opportunity for greater social interaction (Denton & Aranda, 2020; Pouso et al., 2021; Thompson & Wilkie, 2021; Murray & Fox, 2021; Christie & Elliott, 2023). The mere act of being in water might also be implicated as certain water properties (e.g., density, viscosity, hydrostatic pressure, buoyancy, and thermodynamics) have been hypothesised to have a positive impact upon cardiopulmonary, respiratory,

musculoskeletal, and endocrinal health (Broach & Dattilo, 1996; Becker, 2009). Water immersion has also been found to decrease pain perception, induce relaxation, enhance mood states, and reduce symptoms of depression (Broach & Dattilo, 1996; Becker, 2009; Knechtle et al., 2020). The cold-water temperatures associated with outdoor swimming might amplify some of these effects as immersion in cold water has been shown to reduce inflammation and improve immune responses. It can also increase dopamine, serotonin and β-endorphin production leading to a post-swim 'high' (Tipton et al., 2017).

Given the variety and scale of the potential benefits, encouraging the populace to partake in OWS as a means of maintaining both physical and mental health would seem to be an obvious course of action. However, like other forms of exercise (e.g., Ebben & Brudzynski, 2008; Hickey & Mason, 2017), barriers to participation, factors that prevent or at least hinder engagement, are likely. Although there appears to be no specific data regarding potential barriers to OWS, some information can be gleaned from research relating to 'green exercise' (GE): physical activity performed in natural environments. Gladwell and colleagues (2013) for example, highlighted issues surrounding accessibility, travel costs, safety and suitability of footpaths and roads. Given the scarcity of research in this area, any information on perceived barriers to OWS will be a useful addition to the literature corpus.

In summary, whilst the available evidence does highlight many potential benefits associated with OWS, much has been derived from personal anecdotal testimonies provided in interviews. To date, little in the way of quantitative analysis on this subject matter has been published. Although the research of Massey et al. (2022) is an important addition to the literature, the study was primarily focused on health conditions and so did not examine other potential benefits (e.g., life enhancement, psychological outlook, and social health). Also, currently limited information exists regarding the potential barriers to involvement. As such, an understanding of factors that might hinder participation will help those prescribing the activity for health improvement purposes to take steps to limit their impact. In addition, given that the available data suggest that females are disproportionately more likely to participate in OWS – estimated at 73.5% of UK open water swimmers in the latest national survey (Outdoor Swimmer, 2022) - an examination of any potential benefits and barriers by gender needs to be conducted. This study adopts a mixed-methods approach to the questions. In the first instance, we made use of a validated Likert scale instrument designed to measure perceived benefits and barriers. We also provided the opportunity for participants to divulge additional information via a series of open-ended questions.

Method

Participants

In total, six hundred and sixty-five open-water swimmers completed the survey (*M* age = 52.80yrs., *sd* = 10.30). Of these, five hundred and thirty-five were female (*M* age = 52.52 yrs., *sd* = 10.23), one hundred and sixteen were male (*M* age = 54.28yrs., *sd* = 10.56) and four 'preferred not to say' (*M* age = 40.0yrs., *sd* = 10.19). Eighty-seven percent of respondents were UK nationals. On average, the participants had been involved in OWS for 11.4yrs (*sd* = 15.88).

Measures

Exercise Benefits and Barriers Scale (EBBS)

We assessed perceived benefits and barriers using a modified version of the Exercise Benefits and Barriers Scale (EBBS). The EBBS contains twenty-nine questions relating to exercise benefits. These are categorised into five subscales: life enhancement (8 questions), physical performance (8 questions), psychological outlook (6 questions), social interaction (4 questions), and preventative health (3 questions). The barrier component comprises fourteen questions categorised into four subscales: exercise milieu (6 questions), time expenditure (3 questions), physical exertion (3 questions), and family discouragement (2 questions). All responses are recorded on a 4-point Likert Scale (1 = Strongly agree and 4 = strongly disagree). In its original form the EBBS has been shown to be a valid and reliable measure. Previous research has shown the internal consistency (alpha) of the scales for assessing the benefits and barriers of exercise to range between 0.86 and 0.95 and a test: re-test reliability to be between 0.89 and 0.77 (Lovell et al., 2010). As stated, for the current investigation the scale was reworded to direct focus towards OWS. Specifically, the term 'exercise' was amended to 'open water swimming.' Internal consistency values for the ameliorated scale were for the benefit items: 'Preventive Health' $\alpha = .814$; Physical Performance $\alpha = .90$; Psychological Outlook $\alpha = .81$; Life Enhancement $\alpha = .86$; and Social Interaction $\alpha = .71$. For the Barrier items, Exercise Milieu $\alpha = .71$; Time Expenditure $\alpha = .78$; Physical Exertion $\alpha = .77$; and Family Discouragement $\alpha = .73$. Thus, internal reliability ranged from 'acceptable' to 'excellent.'

Open-ended Questions

Although the EBBS covers a wide range of perceived benefits and barriers, due to the uniqueness of OWS, it is likely that there are some areas that will not be addressed by the EBBS alone. Thus, two open-ended questions were included to allow participants to freely state any additional factors they perceived to be important. The additional items were: 'Are there any other benefits you get from OWS?' and 'Are there any other barriers to your participation in OWS?'

Procedures

The JISC online system was used to distribute the survey. This survey consisted of (1) study information and informed consent procedures, (2) demographic

details, (3) questions asking for swimming location (i.e., lake, sea, rivers, lochs) and length of participation. Next, the EBBS was presented along with the open-ended questions. Finally, withdrawal procedures and debrief information was provided. The survey was distributed via several targeted social media sites (i.e., open-water swimming Facebook groups), Twitter and Swim England's webpage. The survey was open to any individual over the age of sixteen who participated in OWS. Full ethical approval from the University of Cumbria Ethics Board was gained prior to distribution. The survey was also piloted using an initial sample of ten swimmers. No major concerns were raised from this pilot procedure and thus no amendments were necessary.

Data Analysis Strategy

Mean totals for each subcategory of the EBBS scale were calculated. Descriptive data for each category are presented in Tables 1 and 2. Two-way repeated measures ANOVAs with gender as a fixed factor were used to test for differences between the survey outcomes for both the benefits and barriers components. Post hoc analysis of gender interactions was conducted via independent t tests. Summative content analysis was used to analyse open ended responses. This is a method that is commonly used for open ended survey questions and involves identifying and quantifying words and phrases that relate to a phenomenon. It is not an attempt to infer meaning; rather it is used to explore and understand a situation (Hseih &Shannon, 2005). The analytical procedures followed the recommendations of Hseih and Shannon (2005). One author read all the responses and identified key words. These were then placed into themed categories. The number of responses in each category were subsequently quantified using frequency counts. This was the most suitable approach given that most of the responses were either single words or short sentences. The second author was then provided with the data and tasked with confirming the themes and the associated content. Upon completion of the content analysis, Chi-squared statistic with post hoc procedures were used to examine whether significant gender differences existed. Selected quotes were identified and presented as additional evidence.

Normality Checks

It has been suggested that for sample sizes >300, normality tests need not be performed (Demir, 2022). As such, distribution checks were only conducted on the male sample. Z-scores of the skewness and kurtosis coefficients were calculated with the 'acceptable' range of ±2.58 being applied (Demir, 2022). Data for all the scale subcategories were deemed to be normally distributed except for 'Family Discouragement;' skewness $z = 4.2$. An inspection of the highlighted outliers revealed that two participants had reported a mean value of 4 for this construct. Omission of these data points did reduce skewness to an acceptable level. The decision was made not to exclude these values from the data corpus. Instead, parametric analysis was conducted. The fact that this

subscale was not normally distributed will be considered when interpreting relevant findings.

Results

For the benefits (Table 1) analysis, Box's Test of Equality of Covariance Matrices was not significant: Box's M = (13.43, p = .58). Mauchly's test indicated that the assumption of sphericity had been violated, $\chi 2(9) = 227.38$, p = .00. Epsilon values were >.75 and as such, Huynh-Feldt corrections were used. For main effects, significant between-condition differences were evident: F (3.4, 1912.66) = 311.22, p=.00. Significant interactions for gender were also apparent F (3.4, 1912.66) = 9.59, p = .00. Pairwise comparisons with Bonferroni corrections highlighted consistent differences for 'Preventative Health' (significantly lower than all others) and 'Psychological Outlook' (significantly higher than all others), p <.00. Between gender analysis using independent t-tests showed significant differences for 'Physical Performance': t (616) = 2.22), 'Psychological Outlook': t (640) = -3.99 and 'Social': t (624) = -3.21 at p<.05.

For barriers (Table 2), Box's Test of Equality of Covariance Matrices was not significant: Box's M = (16.5, p = .09). Mauchly's test indicated that the assumption of sphericity had been violated, $\chi 2(5) = 91.10$, p = .001. Epsilon values were >.75 and as such, Huynh-Feldt corrections were used. For main effects, significant between-condition differences were evident: F(3, 1597.26) = 95.45, p=.001. Significant interactions for gender were also apparent F(3, 1912.66) = 8.43, p = .001. Pairwise comparisons with Bonferroni corrections highlighted consistent ratings for 'Physical Exertion' and 'Exercise Milieu' with these being significantly higher than 'Time Expenditure' and 'Family Discouragement'(p<.05). Between gender analysis showed significant differences for 'Physical Exertion' only: t (630) = 4.74, p=.001.

Table 1

Descriptive data for the benefit components of the EBBS

	Total Mean/Sd	Male Mean/Sd	Female Mean/Sd
Preventative Health	2.64 (sd = .62)	2.73 (sd = .65)	2.62 (sd = .60)
Physical Performance	3.10 (sd = .53)	3.21 (sd = .50)	3.08 (sd = .54)
Psychological Outlook	3.72 (sd = .33)	3.61 (sd = .34)	3.75 (sd = .33)
Life Enhancement	3.12 (sd = .49)	3.11 (sd = .47)	3.13 (sd = .50)
Social	3.10 (sd = .53)	2.95 (sd = .52)	3.13 (sd = .52)

Table 2
Descriptive data for the barrier components of the EBBS

	Total Mean/Sd	Male Mean/Sd	Female Mean/Sd
Physical Exertion	2.07 (sd = .64)	2.33 (sd = .62)	2.01 (sd = .63)
Exercise Milieu	1.73 (sd = .50)	1.73 (sd = .48)	1.74 (sd = .51)
Time Expenditure	1.62 (sd = .53)	1.64 (sd = .46)	1.62 (sd = .54)
Family Discouragement	1.59 (sd = .65)	1.66 (sd = .72)	1.58 (sd = .63)

Content Analysis – Open Responses

Benefits

The Chi-squared tests revealed no significant gender differences were present for any of the categories; $\chi^2 = 2.51$ (5, N = 396); p = .77.

Table 3
CA themes pertaining to benefits derived from OWS presented as frequency counts and as a percentage of total responses

	Total (%)	Female	Male
Wellbeing	81 (20.4%)	76 (21.4%)	5 (11.9%)
Social	108 (27.2%)	95 (26.6%)	13 (30.9%)
Self-esteem/ Confidence	51 (12.8%)	46 (12.9%)	5 (11.9%)
Connection to Nature (CTN)	77 (19.4%)	68 (19.2%)	9 (21.4%)
Accomplishment	51 (12.8%)	45 (12.7%)	6 (14.2%)
Calming	28 (7.0%)	24 (6.7%)	4 (9.5%)
TOTAL	396	354	42

Six major themes emerged from the open question data with respect to benefits (Table 3). The most popular theme related to the social aspects of OWS with 26.6% females and 30.9% of males suggesting this as a major participatory benefit. Most of the comments emphasised the sense of connection and belonging to a 'community' of swimmers and the friendships – new or existing – that were developed or enhanced through meeting up for OWS experiences:

> *"I also get to do events with the group that I'm part of, chill swim, bike rides, running events, triathlons. We do all these but it is our weekly swim sessions that gel us together as a group."*

Such friendships extended in some cases to beyond swimming itself:

"I've made friends with some wonderful women who I wouldn't have met if it wasn't for swimming/dipping. We socialise outside of swimming too now."

Several respondents highlighted the inclusiveness of the OWS community, and the camaraderie generated through, for example, swapping life stories, feeling supported, and simply have fun and laughter together.

Psychologically, self-esteem, self-worth, and self-confidence, including in several cases feeling more 'body confidence', were emphasised as particular benefits derived from OWS:

"If I can get into cold water on a cold day, I can face anything."

"I am no longer body conscious at all in a swim costume."

Wellbeing outcomes, both physical and psycho-social were emphasised by many. There were several references to specific medical conditions that were either improved or better managed through OWS, including chronic fatigue syndrome, arthritis, problem joints, blood sugar levels, menopause, blood pressure, fibromyalgia, muscle inflammation, foot pain such as plantar fasciitis, and other chronic pain issues, for example:

"OWS greatly improves my menopausal symptoms (and those of my peers), which in turn aids sleep, mood and overall wellbeing."

"Improvement in arthritis, reduced joint pain, normalisation of inflammatory markers and blood sugar levels."

Stress reduction and managing issues relating to depression and anxiety were often cited, as posited by Stress Reduction Theory (Ulrich, 1991). Further, several spoke of a mental 'reset', as suggested by Attention Restoration Theory (Kaplan, 1995). Whilst identified by respondents as a benefit, nature connectedness has been consistently highlighted as a key driver for wellbeing outcomes, especially in respect of mental wellbeing (Berto, 2014; Capaldi et al, 2014; Christie, 2022; Christie & Elliott, 2023; Rogersen et al, 2020), for example OWS survey comments included:

"*The joy of swimming outdoors is like being cocooned in nature."*

"The connection… is just unmeasurable… it's a feeling that touches your soul."

"Being immersed in nature is both thrilling and peaceful."

Others spoke of the stimulation of the senses, experiencing the elements (e.g., sun, tides, cold, rain, moon, sky), the different fauna/flora to interact with,

seasonal changes, dawn and dusk experiences, fresh air, silence, and peacefulness. This was especially true for a visually impaired participant:

> *"It also gives me a much better connection to the outdoors, nature, and wildlife, which as a totally blind person, is often more difficult for me to have."*

Testimonies also suggested a spiritual aspect to nature connectedness, hitherto identified as a potential mediator for wellbeing impacts (Kamitsis & Francis, 2013; Schauer et al, 2016). For example, testimonies mentioned experiencing 'freedom,' feeling alive,' and being at 'one with nature,' even 'sharing' nature with wildlife. Whilst 'calming' as a benefit could be included within the 'wellbeing' theme, the numbers mentioning this as a particularly beneficial aspect of their OWS experience were significant enough to warrant its own category. 'Solace,' 'relaxation,' 'calm,' 'peace,' 'mindfulness,' 'destressed,' 'tranquillity,' 'reset,' and 'happier' were typical words used by respondents.

Many spoke of personal development with respect to 'accomplishments,' 'achievements,' 'challenge,' 'purpose,' 'pride,' 'courage,' 'empowerment,' and 'overcoming fear.' Striving to be the best of yourself (self-actualisation) is a key tenet of Maslow's Hierarchy of Needs[i] and also resonates with Self-Determination Theory[ii]. Such benefits are closely allied to feelings of self-worth, self-confidence, and self-esteem, another key benefit cited by females and males in similar proportions.

Barriers

The Chi-square tests showed no significant gender differences were present for any of the categories; $\chi^2 = 5.33$ (4, $N = 395$); $p = .25$.

Table 4

CA themes pertaining to barriers to OWS presented as frequency counts and as a percentage of total responses

	Total (%)	Female	Male
Seasonal	33 (8.3%)	25 (7.5%)	8 (12.6%)
Weather	124 (31.3%)	104 (31.3%)	20 (31.7%)
Pollution	87 (22.0%)	71 (21.3%)	16 (25.3%)
Access	129 (32.6%)	115 (34.6%)	14 (22.2%)
Safety Concerns	22 (5.5%)	17 (5.1%)	5 (7.9%)
TOTAL	395	332	63

Five major barrier themes emerged from the analysis (Table 4). As with any potentially dangerous outdoor pursuit, several potential barriers (Table 4) to OWS participation were highlighted. Unsurprisingly, numerous safety concerns, as previously noted in an ethnographic study by Christie and Elliott (2024), were raised, some more generally (5.5% of respondents), but many

specifically related to pollution concerns (22% of total) and weather conditions (31.3%). As such, it is acknowledged that OWS presents some unique issues to manage/overcome (Tipton & Bradford, 2014) including dynamic OWS hazards (e.g., tides, currents), but also debris in the water and water depth (Tipton et al., 2022). Weather issues typically revolved around conditions including gales, cold air and water temperatures, rain, tides, rivers in flood, waves, and storms. In some cases, these weather issues were linked to stress and anxiety, here suggesting 'flight' if alone, but 'fight' in the comfort of being with others:

> *"My anxiety levels are always raised before I meet up for a swim with others mostly due to the water conditions."*

Although some OWS participants embraced the cold by continuing to swim through the winter months, cold weather naturally presents challenges in getting changed before and after a swim, needing to avoid cold water shock (Tipton & Bradford, 2014), and risking after-drop - or 'continuous cooling' (Griffiths, 2022). Some comments varied about what constituted 'too cold,' with one respondent commenting:

> *"When the water temperature is under 14C, I will not go."*

Pollution risks were referred to in numerous comments, a common issue for OWS participants (Christie & Elliott, 2024) and also noted by a 'Trends' Report by *Outdoor Swimmer* (2022) whereby 1 in 5 OWS participants cited concerns about pollution risks to their health having a negative impact on their swimming participation, especially raw sewage in watercourses and the sea, which was blamed on the Government's lack of tighter regulation, and water companies dumping sewage after heavy rainfall (Armitage, 2022):

> *"I have been badly ill a couple of times in the last five years due to poor sea water quality."*

> *"Sewage overflows and alerts of health risks stops me swimming."*

Access issues were another major concern, revolving around lack of locations proximal to home base, restrictions (such as bylaws) on access to water such as reservoirs (with one respondent admitting to trespassing); cost at privately managed venues (one citing a £10 charge); a lack of open-air pools/lidos compared to indoor alternatives; road conditions to venues; poor public transport networks; wheelchair/mobility access; and a lack of supervised settings. Similar issues were noted by Christie and Elliott (2023), whilst a prior study by Wood, Vimercati, Ferrini and Shackleton (2022) highlighted that roughly half of OWS participants travel less than 20km to their nearest OWS venue. The contemporary crisis in cost of living had implications for some respondents. For example:

"Geographically people like a nearby lake or open water venue for their regular swims; with current petrol costs that could become a barrier as to where they go."

Discussion

This study set out to uncover the perceived benefits and barriers associated with OWS. Given the popularity of this activity amongst females, it was also considered useful to explore potential gender differences. Addressing benefits included in the EBBS, the data showed that for the total sample all the categories were above the median-split value; indicating at least some agreement with the items included therein. 'Psychological Outlook' was the highest rated benefit and 'Preventative Health' the lowest. Gender differences were evident with females placing greater importance on 'Psychological Outlook' and 'Social' factors than males. Conversely, males rated 'Physical Performance' more highly. Regarding the data garnered from the content analysis (CA), the social aspects related to OWS were most often cited. The weight placed upon perceived psychological benefits was further highlighted through the themes of 'Wellbeing' (mostly referring to mental rather than physical), 'Calming,' 'Sense of Accomplishment,' and 'Improved Self-Confidence.' 'Connection to Nature' was also frequently mentioned. No gender differences were evident for any of the CA data.

It was apparent that there are many perceived benefits associated with the activity. That the results emphasise the psychological benefits derived from OWS is in line with what others have described (e.g., Sam, 2020; Massey et al., 2022; Christie & Elliott, 2023). The prominence of the CA themes relating to self-esteem and sense of accomplishment was an unanticipated outcome given that such sentiments have not been as frequently highlighted in previous blue exercise (BE) research endeavours. This is an important finding as enhancements in these elements can have a significant impact upon mental health and general well-being. For example, across the lifespan, improvements in self-esteem can have a positive effect upon global self-worth in both males and females (Haugen et al., 2011). The sense of accomplishment attained from OWS can be linked to theories such as Competence Motivation and Self-Determination Theory which propose a relationship between achievement and intrinsic behaviours such as enjoyment and adherence (Teixeria et al., 2012; Koole et al., 2019). Self-esteem and sense of accomplishment are in turn related to self-efficacy (Chen et al., 2004), enhancements of which can buffer any negative psychological impacts of occasional failure and increase persistence (Costello et al., 2019). It can also improve life satisfaction (Zamani Sani et al., 2016); this might provide an explanation for the relatively high score given to the 'Life Enhancement' factor. As Massey et al., (2022) described, some reference was made to OWS alleviating the symptoms of physical ailments such as hypertension, fibromyalgia, and arthritis. These were less frequent; however, it can be assumed that most of the sample did not actually suffer from chronic

physical illnesses and as such, the impact of this perceived benefit should not be underestimated.

As might be expected, references to connection to nature (CTN) were frequently mentioned. CTN is often proposed as being one of the fundamental drivers for participation in BE forms such as OWS (Denton & Aranda, 2020; Pouso et al., 2021; Thompson & Wilkie, 2021; Murray & Fox, 2021; Christie and Elliott, 2023; Sam, 2020). Engagement in Blue Space (BS) can offer numerous psychological benefits such as promoting an appreciation of and sense of connectedness with nature as well as a respite from more chaotic urban environments (e.g., Ulrich et al., 1991; Kaplan, 1995). These can have a calming effect of the human system (Sam, 2020). Indeed, the CA theme labelled 'Calming' expressed these ideas with phrases such as 'sense of peace' and 'relaxing' being frequently used. In accordance with theories such as Stress Reduction Theory (Ulrich, 1991) and Attention Restoration Theory (Kaplan, 1993) it is likely that CTN plays a mediating role in the some of the other outcomes relating to mental well-being.

The importance placed upon social elements also reflects the findings of others (Thompson & Wilkie, 2021; Christie & Elliott, 2023). The sense of community developed through OWS can offer immediate benefits such as providing a chance for conversation and networking (Costello et al., 2019; Christie & Elliott, 2023). Over the long-term, these positive social interactions can lead to improvements in mental well-being (Plante et al., 2007). It is interesting to note that with regards to the EBBS outcomes, there was a slight, yet statistically significant tendency for females to rate the social aspects more highly. This contradicts previous research that shows males to place a greater emphasis on exercise participation for social reasons (e.g., Molanorouzi et al., 2015). Regardless of gender, OWS as a communal activity is clearly aligned to the tenets of Social Capital Theory (Putnam, 1995). Individually, participants are enriched through new friendships, new social groups, accessing support systems, a sense of belonging, and feeling part of a network which is information rich. Thus collectively, OWS networks become a means of sharing knowledge about OWS, whether relating to equipment, safety, favourite swimming spots, pollution alerts, social activities, and technique. The EBBS score for 'Physical Performance' (i.e., improving physical attributes such as strength, endurance, muscle tone and body image) whilst not deemed statistically different from three of the other factors, was not perceived to be especially important. This conclusion is supported by the lack reference to such outcomes in the open-ended responses. Performance-related motives such as weight management, appearance, and body image are often cited as primary drivers for exercise participation (e.g., Molanorouzi et al., 2015). This does not appear to the case for those involved in OWS. Participation for long-term 'Preventive Health' benefits was considered the least important EBBS benefit.

Whilst not recognised as such, it is likely that long-term participation in OWS will provide numerous prophylactic effects.

When comparing BE benefits to those obtained from Green Exercise (GE), there are understandably many similarities. For example, literature reviews conducted by Gladwell et al., (2013), Pretty, Peacock, Hine, Sellens, South and Griffin, (2007) Loureiro and Veloso (2017) and Lahart, Darcy, Gidlow and Calogiuri (2019) all highlighted the importance placed upon CTN and GE's impact upon aspects of mental well-being such as improved self-esteem, enhanced mood and decreased depression and stress, as well as the improvements in physiological markers such as blood pressure, the endocrine system, and autonomic function. We argue that what makes BE distinctive is the emphasis placed upon the social benefits, sense of accomplishment, and confidence building along with the fact that many claim to experience positive long-term effects. There are also similarities to the benefits derived from the more traditional exercise forms. For example, agencies such as the American College of Sports Medicine extol the virtues of physical activity for mental, cardiorespiratory, and cognitive health; there is vast corpus of evidence to support this stance (e.g., Penedo & Dahn, 2005; Ruegsegger & Booth, 2018). When direct comparisons are made to studies that also have utilised the EBBS some differences do emerge. From a sample of female university students, Lovell et al., (2010) found the greatest perceived benefit from exercise to be 'Physical Performance' followed by 'Psychological Outlook.' 'Social Interaction' was considered least important. Likewise, EBBS data from Nolan, Sandaba, and Surujlal (2011) highlights 'Preventative Health' as the most important benefit and 'Social Interaction' as the least amongst a sample of South African students. Whilst Kastrati, Gontarev, Gashi and Georgiev (2022) found 'Psychological Outlook' to be scored highly by female respondents, 'Social Interaction' received a relatively low rating. This lack of regard for the social aspects also has been highlighted by Larsen, Mozdoorzoy, Kristiansen, Nygaard Falch, Aune and van den Tillaar (2021). Lastly, using the Reasons for Exercise Inventory (REI), Craft, Carrol and Lustyk (2014) found exercising for health and fitness and weight loss to be primary motives for exercise participation; this was evident for both males and females. In this instance, exercise for psychological changes received a low rating. It is apparent from such comparisons that the benefits derived from OWS are primarily psycho-social and that many of the benefits ascribed to alternate activity modes are not perceived as being overly important to OWS practitioners.

Addressing the barriers, the values for those presented in the EBBS were all below the median which suggests that these had negligible impact. It was, however, evident that 'Physical Exertion' (i.e., issues surrounding intensity and fatigue) rated significantly higher than 'Time Expenditure' and 'Family Discouragement;' this was more pronounced for the female cohort. The CA provided stronger evidence of barriers to participation. The most often cited

were related to meteorological factors such as seasonal influences and poor weather conditions. Whilst there are obvious connections between these, we presented as distinct barrier themes as seasonal concerns related specifically to issues surrounding winter swimming and reduced daylight hours, atmospheric and water temperature whereas weather constraints were more related to elements such as the wind and rain making swimming conditions difficult and/or unpleasant. Access to facilities and concerns regarding water quality were also raised by many. Interestingly, given the potential dangers associated with OWS (Tipton & Bradford, 2014), safety concerns were not believed to be a particularly strong barrier to participation. Expanding on some of the outcomes, the fact that 'Physical Exertion' was the most prominent EBBS barrier indicates that OWS provokes some unpleasant physical sensations. This barrier has been noted by others (e.g., Lees et al., 2005; Egan et al., 2013). Despite this acknowledgement, it is apparent that it does not necessarily deter participation. The fact the many persons experience such sensations yet continue to swim might be partially explained via the behavioural theory of 'acceptance and commitment' whereby individuals recognise the discomfort but accept it and commit to continuing the behaviour (Butryn et al., 2015). 'Time Expenditure' (as measured by the EBBS) was not perceived as being a hinderance. This outcome does appear to contradict some of the comments included in the CA theme 'Accessibility' as it could be assumed that time required to travel to such locations would have been problematic. Whilst it was mentioned by some, the majority of the accessibility issues actually related to a lack of suitable swimming areas. Such protestations are valid as many open bodies of water in the UK are restricted access. According to The River and Lake Swimming Association for many areas of the UK (England and Wales) there is no guaranteed right to swim in rivers and lakes. In addition, landowners are not compelled to provide access to the public and many water utility companies ban swimming in reservoirs. According to Borg (2022) less than 3% of England's water bodies are legally accessible to the public.

The issues surrounding weather and seasonal factors might have been anticipated given that when swimming outdoors participants are more exposed to the elements. The main barriers were related to adverse conditions that made it unpleasant to swim and that winter conditions exacerbated these concerns; cold air and water temperatures were particularly problematic. Whilst encouraging the use of wet suits could help alleviate some of these issues, acclimatisation is viewed as the most crucial element in adapting to cold water (Crow et al., 2017) with Knechtle et al (2020) showing open water swimmers from colder climates (e.g., Nordic countries) to be better adapted in terms of thermoregulatory function. Thus, it might be prudent to encourage shorter swim durations for beginners and/or those with low levels of natural insulation (Keatinge et al., 2001). Facilities for post swim showers, changing and amenities for warm drinks and food might also be beneficial. As such, open-water swimmers should be directed to locations that provide such services. It is

interesting that one of the aspects of OWS that is often lauded as being particularly advantages is the act of cold-water immersion (Demori et al., 2021; Becker, 2009; Broach & Dattilo, 1996). As we have shown, there was little mention of this being a specific benefit and instead, it was, in the main, perceived negatively. It is possible that low water temperatures are acceptable up to a point after which they become intolerable. Tipton, Massey and Harper (2017) explained that water temperatures of approximately 10-15^0 C can provoke dangerous responses including reduction in blood flow, gasping, panic, cold-water shock, and hypothermia. Despite the potential dangers associated with OWS, safety concerns were low. Perhaps given that the sample were in the main experienced swimmers they took appropriate precautions and thus, the impact of this potential barrier was minimised. Pollution was another major impediment with numerous references to poor water quality and raw sewage in swimming locations being made. This is a genuine concern given that these issues have received attention at the Governmental level and have been debated in the UK's House of Lords (Tudor, 2022). In response, various proposals have been advanced with the aim of 'cleaning up' the UK's waterways.

Comparisons to previous research are difficult as limited research exists regarding barriers to OWS participation. The current findings do, however, reflect those of Christie and Elliott (2024) who also noted pollution and accessibility as being obstacles to participation. Similarly, few have examined barriers to GE in the general population, again making direct comparisons difficult. For GE, the barriers that have been uncovered tend to be activity specific. For example, cyclists tend to cite apprehensions about safety concerns surrounding traffic, driver behaviours, and potholes (Bauman et al., 2008; Iwińska et al., 2018; Manaugh et al., 2017). Some general issues exist in other GE activities such as walking, jogging, recreational play, and horticultural activities including accessibility to sufficient tracts of manicured or wilder greenspace, which is particularly an issue for urban dwellers, but also for those living in more deprived and high-density housing areas (Pincetl & Gearin, 2005). Common environmental barriers to walking have included inclement weather, unsupervised dogs, and a lack of interesting places to walk nearby (Lee et al., 2013).

It is possible to relate the current findings to research conducted on the more traditional exercise forms; particularly those studies that have implemented the EBBS. Referring to the previously mentioned investigations, Lovell et al. (2010) found 'Physical Exertion' and 'Time Expenditure' to be the primary barriers to participation; these outcomes were emulated by Kastrati et al. (2022). Nolan et al. (2011) also highlighted the impact of 'Physical Exertion' as well as 'Exercise Milieu' upon exercise participation. The current findings suggest that the barriers often associated with exercise are not necessarily relevant to OWS practitioners. Several unique problems exist that might hinder full engagement.

Limitations and Strengths

This investigation is limited in some respects. First, the relative lack of male respondents means that the conclusions drawn from this cohort are not as robust as those derived from the largely female sample. Similarly, whilst no constraints were set, most of the sample were drawn from the UK. Analysis between the nationalities was not feasible, and as such, there may well be some unique national or international trends that were not uncovered. Second, to increase response rates, the survey was distributed via online platforms. It is therefore likely that there was some degree of self-selection bias; this occurs when the researchers have no control over who responds to the survey and can result in the recruitment of a non-probability sample (Bethlehem, 2010; Khazaal et al., 2014). Thus, it is possible that those who engaged with the research possessed overly positive views about OWS. Self-selection samples can also lead to under-coverage, for example, the omission of those without internet access. Third, it is apparent that we have captured the views of those who are currently involved in the activity. Future research therefore needs to uncover the opinions of those who no longer participate, particularly with regards to barriers. These factors need to be considered when interpreting the results.

This study also does have strengths. Despite the gender imbalance, which nonetheless mirrored participation levels in OWS as noted earlier, we received a large number of responses and the level of detail from the open-ended questions was particularly informative. It is also the first study in this area to utilise a validated instrument which allowed for comparisons to alternate exercise forms. In addition, this is the first investigation that has focused on OWS barriers and so has allowed us to highlight some of the negatives surrounding the pursuit.

Conclusion

This investigation set out to discover the perceived barriers and benefits associated with OWS. In terms of benefits, the data overall revealed a strong focus on positive psychological outcomes related to mental well-being, social interaction, and the sense of accomplishment one can gain from partaking in this activity. The emphasis on the psychological benefits appears to be somewhat unique to the activity; particularly when comparisons are made to the more traditional exercise forms. Based upon the current findings we argue that the positive mental and social consequences should be made more explicit to those considering taking up OWS as well as those involved in prescribing exercise interventions (e.g., GPs and health advisors). The barriers to participation are also rather distinctive. Many of those that are correlated with traditional modes of exercise, for example, physical exertion and cultural norms do not appear to be especially relevant to those presently involved in OWS. Many of the barriers are unfortunately aspects that cannot readily be overcome (i.e., weather) however at a governmental level, access to facilities and concerns surrounding water quality could, in theory, be addressed. Minimising the impact

of these constraints might increase participation. When the positive psychological outcomes are considered, this could, over the long term, reduce the burden of health care providers. More research is required to examine the unique benefits of this activity and how potential barriers could be minimised.

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