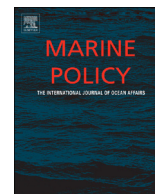




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## Recreational visits to marine and coastal environments in England: Where, what, who, why, and when?

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### ABSTRACT

Health and economic benefits may accrue from marine and coastal recreation. In England, few national-level descriptive analyses exist which examine predictors of recreation in these environments. Data from seven waves (2009–2016) of a representative survey of the English population ( $n = 326,756$ ) were analysed to investigate how many recreational visits were made annually to coastal environments in England, which activities were undertaken on these visits, and which demographic, motivational, temporal, and regional factors predict them. Inland environments are presented for comparison. Approximately 271 million recreational visits were made to coastal environments in England annually, the majority involving land-based activities such as walking. Separately, there were around 59 million instances of water-based recreation undertaken on recreational visits (e.g. swimming, water sports). Visits to the coast involving walking were undertaken by a wide spectrum of the population: compared to woodland walks, for instance, coastal walks were more likely to be made by females, older adults, and individuals from lower socioeconomic classifications, suggesting the coast may support reducing activity inequalities. Motivational and temporal variables showed distinct patterns between visits to coastal and inland comparator environments. Regional variations existed too with more visits to coastal environments made by people living in the south-west and north-east compared to London, where more visits were made to urban open spaces. The results provide a reference for current patterns of coastal recreation in England, and could be considered when making policy-level decisions with regard to coastal accessibility and marine plans. Implications for future public health and marine plans are discussed.

### 1. Introduction

The use of marine (in the sea) and coastal (land adjoining the sea) environments for leisure and recreation is popular worldwide [1] and can potentially confer numerous economic and health benefits. In the UK, marine recreation has an estimated market turnover of £2.74 billion per year and £1.29 billion gross value added [2]. A valuation, conducted in 2012, of England's South West Coast Path (630 miles of waymarked, publicly accessible footpath along the coasts of Devon, Cornwall, and Dorset) attributed a total direct spend of £436 m by visitors to regions along its length in that year [3]. Recreational contact with coastal environments has also been associated with the attainment of health-enhancing physical activity [4–7], better general health [8,9], and better mental health [9,10]. An estimated 12.4 million people participated at least once in marine and coastal recreation in the UK in 2015 [11] and in an analysis of the Health Survey for England, such

activities were found to have resulted in a national gain of 24,853 quality-adjusted life years (QALYs), the monetary value of which was estimated at £176 million per year [12].

In recognition of the various benefits resulting from marine recreation, Part 9 of the UK Marine and Coastal Access Act 2009 [13] details the objective of creating a continuous, walkable route around England's coastal margins (effectively joining the South West Coast Path discussed above with other stretches of coastline path across the country). The impact assessment of the Act conducted by the Department for Environment, Food and Rural Affairs [14] describes the UK government's priority in securing "a healthy natural environment for everyone's well-being, health and prosperity" (p.99). Furthermore, this impact assessment links the government's intervention in marine and coastal accessibility issues directly with the coastal environment's popularity for leisure and recreation: "The coast is popular for many forms of recreation - beach activities, enjoying scenery, walking, etc." (p. 96). To

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date however, there appears to be little published evidence that supports these statements with clear quantitative estimates. The majority of the existing literature either focuses on water-based recreational activities rather than recreation in marine and coastal environments more generally, or collapses water-based recreational activities into superordinate categories of 'leisure pursuits' or 'outdoor pursuits,' rendering interpretation difficult [15]. Other papers provide little information on demographic characteristics of those visiting the coastal environments [16]. In short, when compared with routine descriptive analyses of recreation in greenspaces, which use national survey data to identify activities undertaken and the demographic and motivation profile of greenspace visitors [17–19], descriptive analyses of data on the use of marine and coastal environments are limited.

The study presented in this paper was conducted as part of the BlueHealth project [20]. Seven years of data from a large representative survey of the population of England were analysed to examine patterns of usage of coastal environments in terms of key demographic, motivational and temporal variables (compared to key inland natural environments) with the aim of informing marine planning decisions. Results can also be used to contextualise answers to other research questions in marine and coastal policy [21], such as: (a) annually, how many leisure visits were made to coastal environments in England between 2009 and 2016?; (b) annually, how many leisure visits involved water-based recreational activities in coastal environments?; and (c) what demographic, motivational and temporal factors can predict such visits and activities?

## 2. Material and methods

### 2.1. Sample

The data in this study were drawn from waves 1–7 (2009/2010 – 2015/2016) of the Monitor of Engagement with the Natural Environment (MENE) survey [22]. This is an ongoing, national, repeat cross-sectional survey of the population of England which employs a face-to-face administered interview protocol using a weekly quota-sampling methodology to capture a representative sample of the population of England throughout the year. A total of 326,755 individuals were sampled in the seven waves. In addition to asking a battery of demographic questions, the survey asks respondents to recall the number of leisure visits they made to natural environments in the previous week. If at least one leisure visit was reported (approximately 40% of the total sample), a randomly selected visit in that time frame was followed up with further questioning of details (e.g. the date of the visit, specific type of environment visited, activities undertaken, motivations for visiting, outcomes of visit etc.). Over the first seven waves of the survey, 130,851 such visits were randomly selected for follow-up; these data were used in the current analysis.

Some questions are not asked of all respondents every week. For example, in the first three annual waves of the survey (2009/10 – 2011/12), motivations for visiting natural environments were only asked of one week's sample of respondents per month, whereas they were asked of every respondent in the subsequent four waves of the survey (2012/13 – 2015/16). Weights based on demographic data are provided for each record in the data set such that the sample of visits can be scaled up to be representative of the total population of England's visits. Information on sampling methodology, data collection, and procedures for producing weights have been described in detail previously [22].

### 2.2. Outcomes

#### 2.2.1. 'Where'

Respondents were asked: "Which of the following list of types of place best describe where you spent your time during this visit?" They could choose one of 15 options or select "other." In the present study, we focused primarily on two coastal visit categories: "a beach," and

"other coastline," and three inland comparator categories: (a) "a river, lake, or canal"; (b) "a park in a town or city" (hereafter 'urban open spaces'); and (c) "a woodland or forest". These comparators were chosen to reflect, respectively: (a) the only other primarily aquatic environment in the list; (b) the most visited natural environment in an urban area; and (c) one of the most visited and researched natural environments in a rural area.

Although exploring inland comparator sites may not seem important in a paper aimed at informing marine planning, we believe it is crucial in clarifying what is unique for visitors to marine and coastal environments in terms of demographics, motivations etc.; and thus not only what needs to be considered within a policy/management context to maintain the benefits, but also what opportunities might exist to extend the benefit.

#### 2.2.2. 'What'

Respondents were presented with a list of 20 activities and asked: "Which of these activities, if any, did you undertake?" They could choose as many as were applicable. Four specific water-based activities undertaken in coastal environments ("a beach" and "other coast" combined) were investigated: fishing, water sports, swimming outdoors, and sunbathing/paddling (paddling referring to informal walking in shallow water). Again, to provide context, these were contrasted with the most frequent non-water-based activity, walking (collapsed from the separate activity categories of walking with a dog, and walking without a dog) in both coastal environments and the three key inland environments (see Section 2.2.1).

### 2.3. Predictors

#### 2.3.1. 'Who'

Based on previous research using the MENE survey data, we focused on the three demographic variables that have been shown to be the best predictors of leisure visit activities in natural environments: sex (male/female), age, and socioeconomic classification [5]. Age was self-reported by the respondent in terms of one of eight categories though for present purposes this was collapsed into three, reflecting early adulthood, middle adulthood, and late adulthood (16–34 years, 35–64 years, and 65 years and over, respectively). Socioeconomic classification was defined in terms of a social grade variable that is widely used in the UK; this was created post-hoc from answers to other items, and coded in line with a four-category classification developed for use in the National Readership Survey [23]: AB, C1, C2 and DE. AB represents respondents in higher and intermediate managerial, administrative, and professional occupations, C1 represents respondents in supervisory or clerical and junior managerial, administrative or professional occupations, C2 represents those working as skilled manual workers, and DE represents respondents in semi-skilled and unskilled manual occupations; this classification also includes state pensioners, unemployed persons, and lowest grade occupations.

#### 2.3.2. 'Why'

Regarding visit motivations, respondents were asked: "Which of the following, if any, best describe your reasons for this visit?" Participants could select as many reasons as they wished from a list of 14 (see the MENE technical report for the full list [22]). In this study responses to the options "for health or exercise" and "to relax and unwind" were used to denote 'health' and 'relaxation' motivations respectively. Additionally, responses to the options, "to spend time with family" and "to spend time with friends," were collapsed into a single category to denote 'social' motivations. Such motivations have previously been investigated with regard to outdoor recreation in natural environments [24].

#### 2.3.3. 'When'

Three temporal variables were also used as predictors. Firstly, each

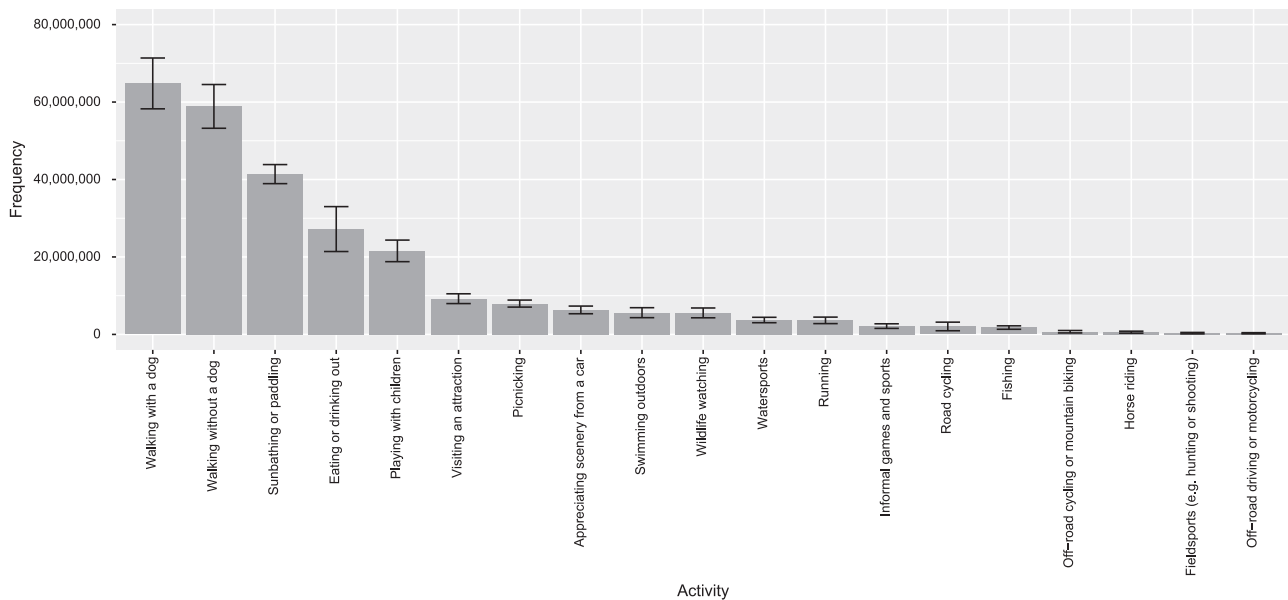


Fig. 1. Annual estimated frequencies of leisure visits to beaches in England taken by the population of England which involve different activities (2009/2010 – 2015/2016).

respondent was asked to recall the day on which the randomly selected visit took place. This allowed classification of visits as either being on a weekday or at the weekend. Secondly, the season of the respondent's visit was deduced from the date of visit as recorded in the MENE survey data: visits made in March–May were classified as 'spring' visits, in June–August as 'summer' visits, in September–November as 'autumn' visits, and in December–February as 'winter' visits. Thirdly, survey wave (2009/2010 – 2015/2016) was used as a predictor to observe potential year-on-year differences in visit numbers and recreation participation. These temporal variables have been used previously as important predictors in analyses of the MENE survey data [25].

#### 2.3.4. 'Where'

Each respondent's home address was identified as being in one of the nine regions of England (East Midlands, East of England, London, North East, North West, South East, South West, West Midlands and Yorkshire and The Humber). The region of residence has been associated with both the odds of achieving recommended levels of physical activity [6] and eudaimonic (meaningfulness, worthwhileness) and experiential subjective well-being [25] in analyses of the MENE survey data previously.

#### 2.4. Statistical analysis

Firstly, frequency weights (see Section 2.1) were used to estimate the average annual number of leisure visits made by adults in England to the two coastal and three comparator environments (see Section 2.2.1) according to the demographic, motivational, and temporal predictors listed in Section 2.3. The same procedure was used to estimate the average annual number of leisure visits that involved each of the four water-based recreational activities undertaken in coastal environments detailed in Section 2.2.2. The final descriptive analysis employed the same procedure to estimate the average annual number of those leisure visits that involved walking in the two coastal and three comparator environments (see Section 2.2.2).

Secondly, a series of logistic regressions were conducted on pooled data for all seven years (i.e. not disaggregating across each wave). These models predicted: (a) the odds ratios (ORs) that a leisure visit took place in the coastal or comparator environments; (b) the ORs that a leisure visit to a coastal environment involved a water-based recreational activity; and (c) the ORs that a leisure visit involving walking was

to either a coastal or one of the three comparator environments (see Section 2.2.2). All of the predictors listed in Section 2.3 were used in all models.

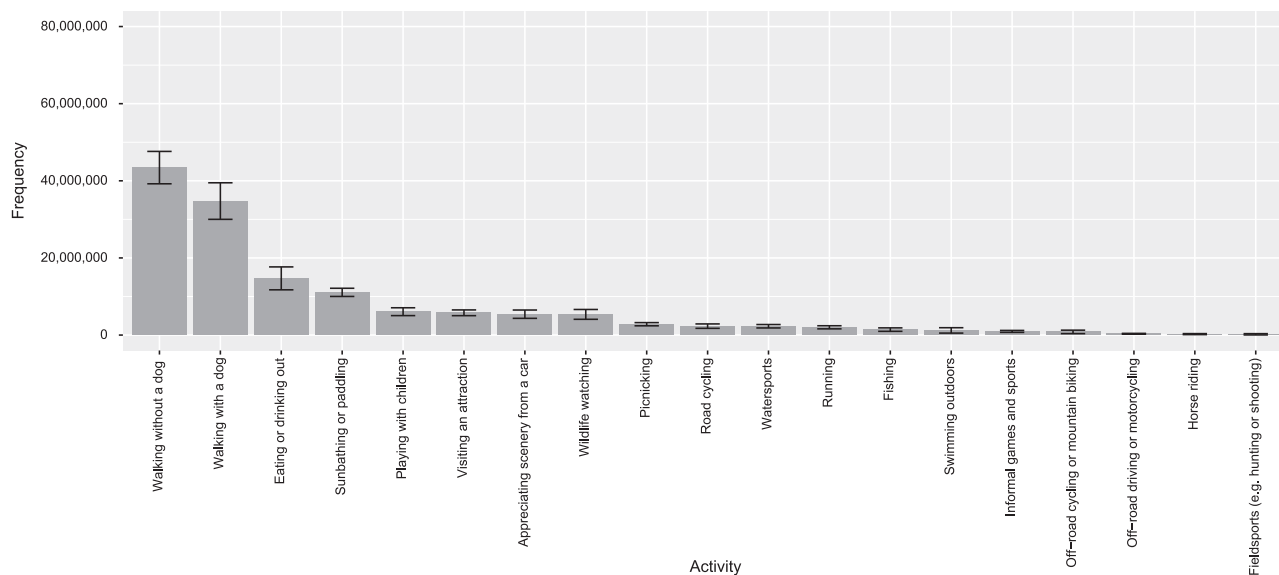
Females and 35–64 year olds were selected as reference categories for sex and age due to being the most frequent subcategories of their respective variables. The AB socioeconomic classification was selected as a reference category in order to observe any differences between higher and lower socioeconomic classifications. For motivational predictors, visits made by respondents who did *not* report that their visit was motivated by health, relaxation, or social reasons were used as reference categories separately. Consistent with previous analyses of MENE survey data [25] weekday visits, winter visits, visits made in the first survey year, and individuals living London were used as reference categories. As frequency weights are unsuitable for inferential analyses, all regressions used unweighted data. All analyses were conducted in R, a programming language and environment for statistical computing [26].

### 3. Results

#### 3.1. How many people visit coastal settings for recreation, and what do they do there (compared to other natural settings)?

In total, it is estimated that 171.7 million recreational visits to beaches in England were made annually by adults over 16 (Supplementary Table A). This means 6% of all recreational visits to natural environments included a beach (at least in part). Twenty-four percent of all visits to beaches ( $\approx 41.4$  million visits) involved sunbathing or paddling, the most popular water-based recreational activity undertaken at beaches. Other water-based activities were undertaken substantially less often with swimming outdoors taking place on  $\approx 5.6$  million visits, water sports  $\approx 3.7$  million visits, and fishing  $\approx 1.8$  million visits (Fig. 1).

An estimated 99.3 million visits were made to other coastline environments. This means 3.5% of visits included an 'other coastline' environment, at least in part. Similarly, 'sunbathing or paddling' was the most popular water-based activity undertaken here, undertaken on 11% of all visits to other coastline environments ( $\approx 11.1$  million visits), with other water-based activities undertaken less often (swimming outdoors  $\approx 1.2$  million, water sports  $\approx 2.3$  million, and fishing  $\approx 1.4$  million; see Fig. 2). In both coastal settings, the most popular activities



**Fig. 2.** Annual estimated frequencies of leisure visits to other coastline environments in England taken by the population of England which involve different activities (2009/2010–2015/2016).

undertaken were walking, either with or without a dog, conducted on  $\approx 123.7$  million beach visits annually, and on  $\approx 78.2$  million other coastline visits. Other popular activities in coastal environments included eating or drinking out ( $\approx 27.2$  million beach visits,  $\approx 14.7$  million other coastline visits), playing with children ( $\approx 21.6$  million beach visits,  $\approx 6.1$  million other coastline visits), and visiting an attraction ( $\approx 9.2$  million beach visits,  $\approx 5.8$  million other coastline visits; see Figs. 1 and 2).

Substantially more recreational visits took place to the three inland comparator environments than coastal environments. Rivers, lakes or canals were visited  $\approx 267.4$  million times annually (9% of all recreational visits to natural environments), urban open spaces  $\approx 722.6$  million times (25% of all visits), and woodlands or forests  $\approx 371.2$  million times (13% of all visits). Unsurprisingly, most water-based recreational activities were undertaken less often in all three comparator environments than at coastal environments, except fishing at river, lake, or canal environments ( $\approx 9.9$  million visits); water sports at river, lake, or canal environments ( $\approx 4.5$  million visits); and swimming outdoors in urban open spaces ( $\approx 2.5$  million visits).

Similar to coastal environments, walking was the most popular recreational activity undertaken in all three comparator environments;  $\approx 221.2$  million times at rivers, lakes, or canals;  $\approx 534.1$  million times in urban open spaces; and  $\approx 334.2$  million times at woodlands or forests. Other popular activities undertaken at rivers, lakes, or canals included eating or drinking out ( $\approx 19.4$  million visits), wildlife watching ( $\approx 18.3$  million visits), and playing with children ( $\approx 16.6$  million visits). Other popular activities undertaken in urban open spaces included eating or drinking out ( $\approx 53.4$  million visits), running ( $\approx 33.9$  million visits), and visiting an attraction ( $\approx 19.4$  million visits). Other popular activities undertaken at woodlands or forests included wildlife watching ( $\approx 20.2$  million visits), playing with children ( $\approx 19.6$  million visits), and eating or drinking out ( $\approx 15.2$  million visits).

Supplementary Tables A, B and C present: (a) frequencies of visits to coastal and comparator environments; (b) frequencies of water-based recreational activities undertaken on visits to coastal environments, and; (c) frequencies of walking visits taken to coastal and comparator environments; according to different demographic, motivational, temporal and regional variables. The relative importance of these factors is discussed in Section 3.2.

### 3.2. Who visits coastal environments for recreation; why, when, and in which regions?

Visits to beach environments were more popular among females, those aged 35–64 (compared to 16–34 year olds), and those categorised in the middle two socioeconomic classifications (compared to the highest socioeconomic classification; see Table 1). Beaches were visited more for relaxation and social reasons—and less for health reasons—than for any other reason. Beaches were visited more often at weekends (vs. weekdays), in warmer rather than cooler seasons, and by individuals living in all regions apart from the West Midlands (as compared to London), and in particular those in the North East and South West.

Visits to other coastline environments were more popular among males, older people and people categorised in the highest socioeconomic classification (compared to the lowest socioeconomic classification). Visits to other coastline environments were more often made for relaxation and social reasons. Like beaches, they were also more often visited at weekends, in warmer seasons and by individuals living in all regions compared to London. Again, individuals living in the North East and South West visited other coastline environments particularly often.

While visits to coastal environments showed broadly similar patterns in terms of motivations, temporal characteristics, and regional differences (although not demographics), inland settings showed distinctly different associations. Rivers, lakes or canals were most commonly visited by males, those aged 35–64 (compared to those aged 16–34), and those assigned the highest socioeconomic classification (compared to the two lowest socioeconomic classifications). They were more often visited for health and relaxation reasons (rather than social as with coastal environments). They were also visited more often in summer and spring (compared to winter); and by individuals living in all regions compared to London, especially the East and West Midlands.

Urban open spaces were visited more often by females, those aged 16–34, and people assigned lower socioeconomic classifications. They were more often made for social reasons, and less often made for relaxation reasons. They were visited more often in warmer seasons, in 2013–2016 (compared to 2009–2010), and by individuals living in London compared to all other regions. Those living in the North East and South West regions visited urban open spaces least often.

Finally, woodlands or forests were more popular among those aged 35–64 (compared to both 16–34 year olds and those aged over 65 years

**Table 1**

Odds ratios (OR) and 95% confidence intervals (CI) predicting the odds that a visit was to a coastal or comparator environment regressed on a series of demographic and visit characteristics (base n = 83,223).

Where	Coastal environments						Inland comparator environments								
	Beach (Yes = 6256) (Cox & Snell = 0.038) (Nagelkerke = 0.092)		Other coastline (Yes = 3124) (Cox & Snell = 0.025) (Nagelkerke = 0.093)		A river, lake or canal (Yes = 7443) (Cox & Snell = 0.021) (Nagelkerke = 0.047)		Urban open spaces (Yes = 25,158) (Cox & Snell = 0.101) (Nagelkerke = 0.143)		Woodland or forest (n = 8347) (Cox & Snell = 0.025) (Nagelkerke = 0.053)						
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI					
<b>Who</b>															
Male = ref	–	–	–	–	–	–	–	–	–	–					
Female	1.07**	1.02	1.13	0.95	0.89	1.02	0.88***	0.84	0.92	1.11***	1.08	1.15	1.00	0.96	1.05
Aged 35–64 = ref	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Aged 16–34	0.91**	0.85	0.96	0.56***	0.50	0.62	0.87***	0.82	0.92	1.56***	1.51	1.62	0.84***	0.80	0.89
Aged 65 and over	0.94	0.88	1.01	1.68***	1.54	1.82	1.01	0.95	1.07	0.71***	0.68	0.75	0.74***	0.70	0.79
AB classification = ref	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
C1 classification	1.11**	1.03	1.19	1.02	0.93	1.12	0.90**	0.84	0.96	1.22***	1.16	1.27	0.90***	0.85	0.96
C2 classification	1.15***	1.06	1.25	0.92	0.82	1.02	0.94	0.87	1.01	1.29***	1.23	1.35	0.86***	0.80	0.91
DE classification	1.05	0.97	1.13	0.85**	0.77	0.94	0.85***	0.79	0.91	1.62***	1.55	1.69	0.68***	0.63	0.72
<b>Why</b>															
Health motivation	0.67***	0.63	0.71	0.96	0.89	1.03	1.33***	1.27	1.40	0.97	0.94	1.01	1.63***	1.55	1.71
Relaxation motivation	1.71***	1.62	1.81	1.88***	1.74	2.03	1.68***	1.59	1.76	0.95**	0.92	0.98	1.37***	1.31	1.44
Social motivation	1.55***	1.47	1.63	1.42***	1.32	1.54	1.03	0.98	1.09	1.07***	1.03	1.10	0.87***	0.83	0.92
<b>When</b>															
Weekday = ref	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Weekend	1.09**	1.03	1.16	1.10*	1.02	1.19	1.05*	1.00	1.11	0.97	0.94	1.00	1.02	0.97	1.07
Winter = ref	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Spring	1.35***	1.24	1.47	1.12*	1.01	1.25	1.15***	1.07	1.23	1.07**	1.02	1.12	0.92**	0.86	0.98
Summer	1.79***	1.65	1.93	1.17**	1.05	1.30	1.12**	1.05	1.20	1.12***	1.07	1.17	0.79***	0.74	0.84
Autumn	1.23***	1.13	1.34	1.11	1.00	1.24	0.96	0.89	1.03	1.10***	1.05	1.16	0.91**	0.85	0.97
2009–2010 = ref	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2010–2011	0.94	0.80	1.11	0.90	0.72	1.12	0.94	0.80	1.10	1.08	0.98	1.20	1.28***	1.11	1.49
2011–2012	0.97	0.83	1.14	0.89	0.72	1.10	0.94	0.81	1.09	1.05	0.95	1.16	1.17*	1.02	1.36
2012–2013	0.96	0.85	1.09	0.93	0.79	1.10	0.89	0.80	1.00	1.05	0.97	1.14	1.11	0.99	1.24
2013–2014	0.87**	0.79	0.98	0.78**	0.66	0.92	0.96	0.86	1.08	1.15***	1.07	1.24	1.13	1.01	1.27
2014–2015	0.92	0.82	1.04	0.86	0.73	1.02	0.97	0.87	1.09	1.20***	1.12	1.30	1.13*	1.01	1.27
2015–2016	1.02	0.90	1.15	0.84*	0.72	1.00	1.04	0.92	1.16	1.34***	1.24	1.44	1.30***	1.16	1.45
<b>Where</b>															
London = ref	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
East Midlands	1.62***	1.35	1.93	1.54**	1.14	2.09	3.34***	2.95	3.79	0.20***	0.19	0.21	3.35***	2.94	3.81
East of England	3.00***	2.59	3.48	3.42***	2.67	4.38	2.30***	2.03	2.61	0.28***	0.26	0.30	3.60***	3.18	4.07
North East	7.87***	6.80	9.11	9.11***	7.15	11.62	2.41***	2.08	2.78	0.14***	0.13	0.15	3.50***	3.05	4.03
North West	3.38***	2.94	3.90	5.05***	4.00	6.39	3.05***	2.71	3.44	0.30***	0.28	0.31	2.44***	2.15	2.76
South East	5.79***	5.08	6.61	7.63***	6.09	9.56	2.14***	1.90	2.41	0.21***	0.20	0.22	3.94***	3.51	4.42
South West	5.98***	5.22	6.85	8.23***	6.55	10.35	2.38***	2.10	2.69	0.14***	0.13	0.15	3.77***	3.34	4.26
West Midlands	0.97	0.81	1.17	1.39*	1.04	1.87	4.66***	4.15	5.24	0.33***	0.31	0.35	3.72***	3.29	4.21
Yorkshire and The Humber	4.08***	3.53	4.72	4.33***	3.39	5.53	3.17***	2.80	3.59	0.20***	0.19	0.22	3.69***	3.26	4.18

Notes: Reference categories for motivations represent respondents who reported that they were not motivated by the corresponding motivation.

\*\*\*  $p < 0.001$ .

\*\*  $p < 0.01$ .

\*  $p < 0.05$ .

old), and by those categorised as being in the highest socioeconomic classification (compared to all other socioeconomic classifications). Such visits were more often made for reasons of health and relaxation, and less often for social reasons. They were predominantly made in winter (compared to all other seasons), in most later survey years (compared to 2009–2010), and by individuals living in all regions of England compared to London.

### 3.3. Who undertakes water-based recreational activities in coastal environments; why, when, and in which regions?

Fishing in coastal environments was more popular among males, those aged 35–64 (compared to 16–34 year olds), and those categorised as being in the two lowest socioeconomic classifications (compared to the highest socioeconomic classification; see Table 2). Fishing was more often undertaken for relaxation and social reasons, and less often for health reasons. It was more often undertaken in summer and by individuals living in the East of England, North East, South East, South

West and Yorkshire and the Humber (compared to those living in London).

Water sports in coastal environments were more popular among males, those aged 35–64 (compared to those aged 65 and over), and by those categorised as being in the highest socioeconomic classification (compared to the two lowest socioeconomic classifications). They were more often undertaken for relaxation and social reasons and in warmer seasons. Only individuals living in the South West undertook water sports on a visit to a coastal environment more often than those living in the London region.

Swimming in marine and coastal environments was more popular among 16–34 year olds, and less popular among those aged 65 and over (compared to those aged 35–64). It was more often undertaken for relaxation and social reasons and less often for health reasons and in all seasons compared to winter. It was also more popular among individuals living in the South East and South West, and less popular among individuals living in the North West (compared to those living in London). Readers should be cautious in interpreting the large odds

**Table 2**

Odds ratios (OR) and 95% confidence intervals (CI) predicting the odds that a leisure visit to a coastal environment involved a water-based activity regressed on a series of demographic and visit characteristics (base n = 83,223).

What	Fishing (Yes = 118) (Cox & Snell = 0.003) (Nagelkerke = 0.121)		Water sports (Yes = 159) (Cox & Snell = 0.002) (Nagelkerke = 0.077)		Swimming outdoors (Yes = 257) (Cox & Snell = 0.006) (Nagelkerke = 0.146)		Sunbathing or paddling (Yes = 1930) (Cox & Snell = 0.022) (Nagelkerke = 0.110)					
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI				
<b>Who</b>												
Male = ref	–	–	–	–	–	–	–	–	–			
Female	0.22 <sup>***</sup>	0.14	0.35	0.43 <sup>***</sup>	0.31	0.59	0.90	0.70	1.16	1.22 <sup>***</sup>	1.11	1.34
Aged 35–64 = ref	–	–	–	–	–	–	–	–	–	–	–	–
Aged 16–34	0.59 <sup>*</sup>	0.37	0.92	1.27	0.90	1.79	1.56 <sup>***</sup>	1.20	2.03	0.96	0.86	1.06
Aged 65 and over	0.78	0.49	1.25	0.49 <sup>**</sup>	0.29	0.84	0.35 <sup>***</sup>	0.21	0.59	0.82 <sup>**</sup>	0.72	0.93
AB classification = ref	–	–	–	–	–	–	–	–	–	–	–	–
C1 classification	1.30	0.72	2.36	0.82	0.57	1.20	1.07	0.75	1.51	1.11	0.98	1.27
C2 classification	1.84 <sup>*</sup>	1.01	3.33	0.47 <sup>**</sup>	0.29	0.76	1.04	0.71	1.53	1.27 <sup>***</sup>	1.11	1.46
DE classification	2.59 <sup>***</sup>	1.48	4.47	0.42 <sup>***</sup>	0.26	0.69	1.18	0.82	1.69	1.00	0.87	1.14
<b>Why</b>												
Health motivation	0.26 <sup>***</sup>	0.16	0.43	0.97	0.70	1.35	0.71 <sup>*</sup>	0.53	0.93	0.51 <sup>***</sup>	0.46	0.57
Relaxation motivation	4.24 <sup>***</sup>	2.91	6.20	1.79 <sup>***</sup>	1.30	2.47	2.15 <sup>***</sup>	1.67	2.77	2.29 <sup>***</sup>	2.08	2.51
Social motivation	1.79 <sup>**</sup>	1.24	2.59	2.12 <sup>***</sup>	1.54	2.92	2.98 <sup>***</sup>	2.29	3.87	2.60 <sup>***</sup>	2.37	2.86
<b>When</b>												
Weekday = ref	–	–	–	–	–	–	–	–	–	–	–	–
Weekend	1.08	0.74	1.58	1.29	0.94	1.79	1.01	0.78	1.31	1.25 <sup>***</sup>	1.13	1.37
Winter = ref	–	–	–	–	–	–	–	–	–	–	–	–
Spring	1.19	0.62	2.27	1.81 <sup>*</sup>	1.00	3.27	9.31 <sup>***</sup>	2.87	30.24	2.22 <sup>***</sup>	1.85	2.66
Summer	1.98 <sup>*</sup>	1.10	3.55	2.82 <sup>***</sup>	1.63	4.88	35.65 <sup>***</sup>	11.37	111.74	3.59 <sup>***</sup>	3.03	4.25
Autumn	1.62	0.87	3.00	2.27 <sup>***</sup>	1.27	4.04	13.31 <sup>***</sup>	4.14	42.79	1.97 <sup>***</sup>	1.63	2.37
2009–2010 = ref	–	–	–	–	–	–	–	–	–	–	–	–
2010–2011	1.20	0.37	3.97	0.93	0.35	2.46	1.52	0.68	3.41	0.93	0.70	1.23
2011–2012	1.64	0.58	4.62	0.60	0.22	1.66	1.50	0.71	3.17	1.03	0.80	1.32
2012–2013	1.51	0.62	3.67	1.04	0.51	2.09	1.10	0.58	2.08	0.84	0.68	1.03
2013–2014	1.08	0.44	2.64	0.85	0.42	1.72	1.50	0.81	2.77	0.73 <sup>**</sup>	0.60	0.90
2014–2015	0.89	0.35	2.23	0.80	0.39	1.63	0.67	0.34	1.30	0.84	0.69	1.03
2015–2016	1.26	0.51	3.09	0.83	0.41	1.71	1.15	0.61	2.15	0.88	0.72	1.08
<b>Where</b>												
London = ref	–	–	–	–	–	–	–	–	–	–	–	–
East Midlands	2.01	0.64	6.26	0.56	0.21	1.53	0.47	0.21	1.07	2.26 <sup>***</sup>	1.72	2.97
East of England	4.75 <sup>**</sup>	1.87	12.05	1.29	0.66	2.55	1.37	0.81	2.30	3.15 <sup>***</sup>	2.47	4.02
North East	4.56 <sup>**</sup>	1.61	12.91	1.48	0.66	3.31	1.11	0.56	2.20	4.50 <sup>***</sup>	3.47	5.84
North West	2.44	0.91	6.53	0.77	0.36	1.63	0.39 <sup>*</sup>	0.19	0.81	2.24 <sup>***</sup>	1.74	2.87
South East	4.38 <sup>**</sup>	1.78	10.74	1.62	0.90	2.90	2.42 <sup>***</sup>	1.59	3.68	5.37 <sup>***</sup>	4.32	6.68
South West	6.06 <sup>***</sup>	2.46	14.92	3.69 <sup>***</sup>	2.12	6.41	3.56 <sup>***</sup>	2.33	5.42	5.06 <sup>***</sup>	4.03	6.36
West Midlands	0.76	0.19	3.06	0.60	0.25	1.45	0.74	0.40	1.36	1.41 <sup>*</sup>	1.06	1.87
Yorkshire and The Humber	4.15 <sup>**</sup>	1.58	10.86	1.37	0.68	2.76	0.73	0.38	1.42	3.55 <sup>***</sup>	2.77	4.53

Notes: Reference categories for motivations represent respondents who reported that they were not motivated by the corresponding motivation.

Readers should interpret large odds ratios and confidence intervals with caution (e.g. those for the different seasons in relation to coastal outdoor swimming, which appear spurious). These are likely the result of an over-fitted model owing to small cell counts of 'yes' responses in some two-way comparison tables; this is evidenced by lower z values for such predictors compared to predictors with smaller odds ratios (e.g. social motivation for swimming outdoors). Nonetheless, such instances are maintained in the model for comparability with other models in this article.

\*\*\*  $p < 0.001$ .

\*\*  $p < 0.01$ .

\*  $p < 0.05$ .

ratios here as they may be the result of overfitting the model (see note in Table 2).

Sunbathing or paddling in coastal environments was more popular among females, those aged 35–64 (compared to those aged 65 and over), and by those categorised as being in the second-lowest socioeconomic classification (compared to the highest socioeconomic classification). It was more often undertaken for relaxation and social reasons (less often for health reasons), more commonly undertaken at weekends, less often in winter, and less often in 2013–2014 compared to 2009–2010. Compared to the London region, individuals in all other regions reported higher participation in these activities.

### 3.4. Who undertakes recreational walking in coastal settings; why, when, and in which regions?

Recreational walking (with or without a dog) was the most popular

activity in all environments. In coastal environments, it was more popular among females, older adults, and those in the second-highest socioeconomic classification (compared to the highest socioeconomic classification; Table 3). It was more often undertaken for relaxation and social reasons and at weekends. Londoners reported less recreational walking than individuals in all other regions.

Recreational walking at rivers, lakes, or canals was more popular among females, those aged 35–64 (compared to those aged 16–34), and by those categorised as being in the highest socioeconomic classification (compared to all other socioeconomic classifications). It was more often undertaken for reasons of health and relaxation, and in spring (compared to winter), and less often in autumn (compared to winter). Individuals living in all regions reported more of such walking than individuals living in London.

Recreational walking in urban open spaces was more popular among females, younger adults, and those categorised as being in lower

**Table 3**

Odds ratios (OR) and 95% confidence intervals (CI) predicting the odds that a leisure visit involved walking in a coastal or comparator environment regressed on a series of demographic and visit characteristics (base n = 83,223).

What	Walking (with or without a dog)											
	...in a coastal location (Yes = 5676) (Cox & Snell = 0.039) (Nagelkerke = 0.100)		...at a river, lake or canal (Yes = 5596) (Cox & Snell = 0.021) (Nagelkerke = 0.055)		...in an urban open space (Yes = 16,187) (Cox & Snell = 0.044) (Nagelkerke = 0.70)		...in a woodland or forest (Yes = 7074) (Cox & Snell = 0.024) (Nagelkerke = 0.055)					
Where	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
<b>Who</b>												
<i>Male = ref</i>	–	–	–	–	–	–	–	–	–	–	–	–
Female	1.11***	1.05	1.17	1.08**	1.02	1.14	1.17***	1.13	1.21	1.08**	1.03	1.13
<i>Aged 35–64 = ref</i>	–	–	–	–	–	–	–	–	–	–	–	–
Aged 16–34	0.68***	0.63	0.73	0.80***	0.75	0.86	1.17***	1.13	1.22	0.79***	0.74	0.84
Aged 65 and over	1.30***	1.22	1.39	1.04	0.97	1.12	0.90***	0.86	0.94	0.78***	0.73	0.83
<i>AB classification = ref</i>	–	–	–	–	–	–	–	–	–	–	–	–
C1 classification	1.10**	1.02	1.19	0.89**	0.82	0.95	1.19***	1.13	1.25	0.91***	0.86	0.97
C2 classification	1.03	0.95	1.12	0.89**	0.82	0.97	1.23***	1.16	1.30	0.87***	0.81	0.93
DE classification	0.94	0.87	1.02	0.83***	0.77	0.90	1.49***	1.42	1.57	0.69***	0.64	0.74
<b>Why</b>												
Health motivation	0.98	0.92	1.03	1.58***	1.50	1.68	1.10***	1.06	1.15	1.61***	1.53	1.70
Relaxation motivation	1.71***	1.61	1.81	1.66***	1.57	1.76	1.25***	1.20	1.29	1.42***	1.35	1.50
Social motivation	1.24***	1.17	1.31	0.98	0.93	1.05	0.80***	0.77	0.83	0.80***	0.76	0.85
<b>When</b>												
<i>Weekday = ref</i>	–	–	–	–	–	–	–	–	–	–	–	–
Weekend	1.08**	1.02	1.15	1.04	0.98	1.10	0.91***	0.88	0.95	0.99	0.94	1.04
<i>Winter = ref</i>	–	–	–	–	–	–	–	–	–	–	–	–
Spring	1.07	0.98	1.16	1.09*	1.00	1.18	0.96	0.92	1.02	0.87***	0.81	0.93
Summer	1.06	0.98	1.15	0.95	0.88	1.03	0.94*	0.90	0.99	0.74***	0.69	0.79
Autumn	0.97	0.89	1.05	0.89**	0.81	0.96	0.98	0.93	1.03	0.87***	0.81	0.93
<i>2009–2010 = ref</i>	–	–	–	–	–	–	–	–	–	–	–	–
2010–2011	0.94	0.78	1.12	1.05	0.88	1.26	1.18**	1.05	1.33	1.38***	1.17	1.61
2011–2012	0.97	0.82	1.15	1.01	0.85	1.19	1.12	1.00	1.25	1.26**	1.08	1.47
2012–2013	1.06	0.93	1.21	0.97	0.85	1.11	1.17***	1.07	1.28	1.13	0.99	1.28
2013–2014	0.91	0.80	1.03	1.05	0.92	1.20	1.31***	1.20	1.43	1.18**	1.04	1.34
2014–2015	1.01	0.89	1.15	1.05	0.92	1.20	1.32***	1.21	1.44	1.17*	1.03	1.33
2015–2016	1.02	0.89	1.16	1.14	1.00	1.30	1.37***	1.25	1.50	1.31***	1.16	1.49
<b>Where</b>												
<i>London = ref</i>	–	–	–	–	–	–	–	–	–	–	–	–
East Midlands	2.49***	1.96	3.16	3.90***	3.32	4.58	0.31***	0.29	0.34	3.59***	3.10	4.16
East of England	4.87***	3.96	5.99	2.95***	2.51	3.46	0.43***	0.40	0.46	3.86***	3.36	4.43
North East	16.94***	13.85	20.71	3.30***	2.77	3.94	0.24***	0.22	0.27	4.05***	3.47	4.73
North West	7.35***	6.03	8.97	3.93***	3.38	4.57	0.48***	0.45	0.50	2.60***	2.26	3.00
South East	11.10***	9.16	13.45	2.73***	2.35	3.18	0.32***	0.30	0.34	4.29***	3.77	4.90
South West	10.91***	8.97	13.25	3.02***	2.58	3.53	0.22***	0.20	0.23	4.14***	3.61	4.74
West Midlands	1.62***	1.27	2.07	6.12***	5.27	7.10	0.55***	0.52	0.59	4.08***	3.55	4.69
Yorkshire and The Humber	7.92***	6.47	9.69	4.27***	3.66	4.99	0.34***	0.31	0.36	4.11***	3.57	4.73

Notes: Reference categories for motivations represent respondents who reported that they were not motivated by the corresponding motivation.

\*\*\*  $p < 0.001$ .

\*\*  $p < 0.01$ .

\*  $p < 0.05$ .

socioeconomic classifications. It was more often undertaken for reasons of health and relaxation, and less often taken for social reasons. It was also more often undertaken on weekdays, in winter (compared to summer), and in all survey years since 2009–2010, except 2011–2012. In contrast to many other activities explored here, individuals living London took more recreational walks in urban open spaces than those living in any other region.

Finally, recreational walking in woodlands or forests was more popular among females, those aged 35–64 (compared to both younger and older adults), and those categorised as being in the highest socioeconomic classification (compared to all other socioeconomic classifications). It was more often undertaken for health and relaxation reasons and less often for social reasons. It was also more often undertaken in winter (compared to all other seasons), in all survey years since 2009–2010, except 2012–2013, and by individuals living in all regions of England compared to individuals living in London.

#### 4. Discussion

This study analysed a representative sample of the English population to serve as a reference for decision makers on visits to marine and coastal environments for recreation. Our first research question was: Annually, how many leisure visits were made to coastal environments in England between 2009 and 2016? Approximately 171.7 million such visits were made to beaches and a further 99.3 million to other coast-line environments, together meaning that 9.5% of all leisure visits to natural environments involved these locations (notably less than the numbers of leisure visits taken annually to rivers, lakes or canals, urban open spaces and woodlands or forests). Our second research question was: Annually, how many leisure visits involve water-based recreational activities in coastal environments? Approximately 2.9 million involved fishing, 5.6 million involved water sports, 6.1 million involved swimming outdoors and 44.7 million involved sunbathing or paddling. While fishing was more popular at river, lake or canal environments, this clearly demonstrates the importance of marine and coastal

environments for supporting water-based recreational activities in England.

Our third research question was: What demographic, motivational and temporal factors predict such visits and activities? Visits to both coastal environments showed similar motivational patterns (both were associated with relaxation and social motivations), temporal patterns (both were associated with weekend visits and visits in warmer seasons), and regional patterns (individuals living in the North East and South West visited most often). They did however show distinct demographic patterns: beaches were more popular with females in particular with no such sex differences for other coastline environments; beaches were more popular with middle-aged adults, while other coastline environments were more popular among older adults; and beaches were more popular for people categorised as being in lower socioeconomic classifications, with the reverse pattern in other coastline environments. Comparator environments showed clearer socioeconomic patterns: rivers, lakes or canals, and woodlands or forests more popular among people categorised as being in higher socioeconomic classifications, and urban open spaces showing the reverse pattern. Rivers, lakes or canals, and woodlands or forests were associated with health motivations, unlike coastal environments. Woodlands and forests were also more popular in winter, while the other comparator environments showed similar seasonality effects to those of coastal environments. Of note, individuals in London visited urban open spaces more often than individuals living in any other region of England.

All water-based recreational activities in coastal environments appeared to be positively associated with relaxation and social motivations, negatively associated with health motivations (apart from water sports), and be conducted in warmer seasons. 'Sunbathing or paddling' was the only activity undertaken more often at weekends; and the South West was the only region where all such activities were undertaken significantly more often than in London. However, all four showed distinct demographic profiles: fishing popular with older men in lower socioeconomic classifications; water sports popular with younger men in higher socioeconomic classifications; swimming outdoors popular with younger people from all socioeconomic classifications; and sunbathing or paddling popular with middle-aged females in particular with unclear effects for socioeconomic classification.

The profiles of visitors who walked in coastal environments were distinct from those who walked in the comparator environments. While walking visits to all environments were more popular with females, such visits to coastal environments were more popular with older people (compared to other environments), and were more uniform across socioeconomic classifications, which was not observed for comparator environments. Walking in all environments was positively associated with relaxation motivations, but coastal environments were the only ones positively associated with social motivations; all comparator environments showing positive associations with health motivations. Walking in a coastal environment was more often undertaken at weekends, unlike comparators; and walking in all environments was equal across seasons apart from woodlands or forests which were more often visited for walking in winter. While coastal, river, lake, or canal, and woodland or forest environments were more popular with walkers in all regions of England compared to London, urban open spaces were far more popular for walking amongst people from London.

#### 4.1. Implications for public health and well-being

In previous UK statistics, an estimated 4.7 million *individuals* annually visited the coast to undertake walking [11]. In our analysis, approximately 181.5 million such *visits* take place annually in England (where multiple visits can be made by any given individual). This popularity could give rise to significant public health benefits. Recreational walking, independent of other types of physical activity, is known to have substantial physical health benefits [27] and mental

health benefits [28]. It is also established that recreational visits to coastal environments in England typically last longer than visits to other environments [5], meaning that these walking visits could lead to a greater total amount of physical activity being undertaken. Moreover, these visits were popular among demographic groups such as females and older adults who are typically less physically active than their male or younger counterparts [29]. Although age is sometimes contested as a consistent correlate of physical activity attainment [30], this nonetheless shows that coastal environments could have a role to play in relieving some of the demographic imbalances in physical activity attainment.

Furthermore, such visits were more uniformly distributed across socioeconomic classifications (Table 3), unlike walking visits to rivers, lakes, or canals and woodlands or forests (which favoured higher socioeconomic classifications), and urban parks (which favoured lower socioeconomic classifications). Such equitable use of coastal environments, also demonstrated through the more uniform access to beaches amongst socioeconomic classifications (Table 1), may assist in relieving some of the socioeconomic-related health inequalities which have previously been associated with natural environment access [31]. While less popular activities in coastal environments, swimming and water sports were still undertaken on around 11.7 million visits to coastal environments annually. As many of these activities are classed as approaching high-intensity physical activity [5,12], they may confer even greater improvements on cardiorespiratory fitness than moderate-intensity activities [32]. Separately, from these physical health benefits, swimming in coastal waters has also been shown to accrete therapeutic benefits through repeated encounters [33].

In spite of these potential benefits, recreational visits to coastal environments were inversely related with health motivations in the case of beaches, and unrelated to health motivations in the case of other coastline environments. This lack of association is repeated even when looking only at walking visits (Table 3). In comparison, river, lake, or canal environments, and woodland or forest environments, consistently demonstrate reported positive associations with health motivations (Tables 1, 3). It could be concluded therefore, that people are not visiting coastal environments for health promotion motives to the extent we see them in some inland settings. Rather, any health benefits, though in fact substantial, may be perceived as only subsidiary or incidental, implying that there could be co-benefits to be acquired from such visits. This could be seen as a positive, as promoting physical activity indirectly, rather than as a goal in and of itself, is currently a popular idea in behavioural economics [34].

These positive health implications should be balanced with the fact that other popular recreational activities in coastal environments (compared to the other environments) included picnicking and eating or drinking out, which may adversely affect physical health. The analysis also cannot account for the potentially negative health impacts that could arise from, for example, swimming outdoors or undertaking water sports, e.g. illness [35] or drowning [36].

#### 4.2. Implications for marine policy

The results of this study should be used as a reference for identifying the current demographic, motivational, temporal, and regional predictors of recreational visits to coastal environments in England, and the types of recreation (marine recreation or otherwise) undertaken there. As an illustration, a marine planner may wish to know how different socioeconomic groups currently use coastal environments for recreation. They would see that, despite numeric differences between the highest and lowest socioeconomic classifications on beach visits, once other predictors have been controlled for, both groups appear equally likely to visit beaches. However, other coastline environments are visited significantly less frequently by people in the lowest socioeconomic classification compared to the highest socioeconomic classification (around 20 million fewer visits per year). Perhaps because of



financial constraints, people in the lowest socioeconomic classification do not undertake water sports activities as often as people in the highest socioeconomic classification. If the aim were to increase visits to coastal environments for more socioeconomically deprived populations, a decision maker could thus decide to invest fewer resources in beach accessibility, and instead focus more efforts into promoting and facilitating visits to other coastline environments and associated recreational activities for this group.

Of course, recreational activities are just one of many sectoral interests taking place in the marine environment that has a specific spatial requirement. The Marine and Coastal Access Act 2009 [13] established a process for the development of Marine Plans across the UK. The UK Marine Policy Statement set the framework for the preparation of Marine Plans to coordinate sectoral interests with guiding high-level marine objectives to: (a) promote sustainable economic development; (b) enable the UK's move towards a low-carbon economy, in order to mitigate the causes of climate change and ocean acidification and adapt to their effects; (c) ensure a sustainable marine environment which promotes healthy, functioning marine ecosystems and protects marine habitats, species and our heritage assets; and, crucially with respect to the current study, (d) contribute to the societal benefits of the marine area, including the sustainable use of marine resources to address local social and economic issues [37].

More specific to recreational use of marine and coastal environments, a key aim for marine policymakers is to integrate Marine Planning with terrestrial planning and coastal communities to promote economic growth and sustain local jobs [37]. The marine policy statement states that: “These considerations must be integrated with social considerations on equality, community cohesion, wellbeing and health, as well as implications for the marine environment” [37] (p. 16). That the current findings demonstrate that compared to key inland natural environments, coastal environments: a) encourage visits from all sectors of society; and b) may be particularly important for promoting social cohesion, suggests that visits to marine and coastal environments may be particularly good at helping to address these key social issues.

To date, concerted moves have been made to spatially map and value (in economic terms) marine leisure and recreation in order to inform the development of Marine Plans in England [2]. The benefits to health and well-being associated with marine leisure and recreation and their spatial distribution have, however, been neglected in this process. From the perspective of developing marine plans, a descriptive analysis of marine and coastal recreation in terms of “where, what, who, why and when” as presented here is essential. Recreational activities that are most frequently undertaken by the sample, such as walking, confer potential benefits to health and well-being that are (at this stage) unquantified in economic terms. The fact that many members of the public do not intentionally seek out marine and coastal environments for health benefits and yet enjoy leisure and recreational activities in those environments nonetheless further signals a distinct potential undervaluation of the benefits (e.g. they seem to be acting as key locations for relaxation and enhancing social bonds). Care must therefore be taken in the marine planning process to consider the trade-offs between the very direct benefits to human well-being that leisure and recreation activities provide and broader sectoral interests in the marine environment which have tended to dominate to date (e.g. ports, shipping etc.). As well as these co-benefits, planners should further recognise that providing access to leisure and recreation in marine and coastal environments impacts positively not only on the lives of a distinct sectoral group, but rather provides many broader and longer-term societal benefits.

In terms of benefits to health and well-being specifically, there are opportunities to better align Marine Plans with terrestrial planning and regional/local health strategies to ensure that access to the marine and coastal environment for recreation is prioritised for those communities most in need of the benefits (e.g. areas of deprivation). Additionally, where recreation activities in the marine environment are closely

associated with the quality of the natural environment, management plans must ensure that recreational activity does not exceed the carrying capacity of the natural resource and external pressures that could impact upon the quality of the recreation experience (e.g. litter, sewerage) are fully integrated into the planning process in line with the principles of integrated coastal zone management (ICZM) [38].

#### 4.3. Strengths, limitations and future research

The current research is, to our knowledge, the first population-level study to estimate the frequency of recreational visits to coastal environments in England and provide a contextual backdrop by comparing this information with profiles of key inland natural environment recreational destinations. This comparison clearly shows that the demographic profiles and motives of visits to coastal environments are different from those visits to inland natural environment sites in several potentially important ways.

Despite considerable research on the health benefits of visiting or living near to aquatic environments in general [39,40], descriptive national data on the recreational use of marine and coastal environments had so far been restricted to water-based recreational activity participation rates from health surveys [16]. Notwithstanding the simplicity of the analyses presented here, the results provide a base for considering the impact of, for example, ICZM decisions on recreational visits, or the impact of wider political strategies (e.g. the European Commission's Blue Growth agenda or Water Framework Directive) on recreational visits to marine and coastal environments more generally. The results can also form the evidence base for informing more international collaborative research efforts on the effects of contact with aquatic environments [20].

A limited set of predictor variables were used in analyses. As expected, the model fit statistics demonstrated that such predictors explained little of the variance in these outcome variables suggesting a range of other important determinants that can be explored in further research. However, the choice of these predictors was based on what have been deemed important demographic, motivational and temporal predictors of similar outcomes in previous research [5,24,25], as well as what may be most useful for policymakers in making population-level planning decisions, and the variables available in the MENE survey data set. The distance travelled to the visit location could have been used in analysis and may have explained some of the regional variation in the outcome variables, but this variable in particular has been extensively analysed previously [5]. In future research, more localised decisions could be facilitated by local authority-level analysis of the same dataset, to which more locally relevant predictors could be incorporated and more detailed investigation of people's precise motivations beyond the simple categories explored here.

## 5. Conclusions

Marine and coastal environments in England draw a considerable number of recreational visits every year. The profiles of these visits, in terms of what people do, who goes, why they go, and when they go, are markedly different to that of other natural environments. Thus, marine and coastal environments should be recognised for their uniqueness, especially in supporting visits for demographic groups who may stand to benefit the most from the recreational activities conducted in them, such as women, older people and those in lower socioeconomic classifications. At the same time, the analysis allows policymakers to identify the kinds of people that currently engage with marine and coastal environments less often, such as younger adults; and address other potential concerns, such as why people in certain regions visit such environments less often. This study provides a basic reference for framing of these issues both within future research and in national policies.

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## Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at <http://dx.doi.org/10.1016/j.marpol.2018.03.013>.

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