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The impact of information, value-deliberation and group-based decision-making on values for ecosystem services: Integrating deliberative monetary valuation and storytelling

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ABSTRACT

Monetary valuation quantifies exchange values, but broader approaches are needed to understand the meaning of those monetary values and the shared, plural and cultural values that underpin them. In this study, we integrated deliberative monetary valuation, storytelling, subjective well-being and psychometric approaches to comprehensively elicit cultural ecosystem service values for proposed UK marine protected areas. We elicit and compare five valuation stages: individual values from an online survey; individual and group values following deliberation on information in workshops; and individual and group values following storytelling and a 'transcendental values compass' deliberation. Deliberated group values significantly differed from non-deliberated individual values, with reduced willingness to pay and increased convergence with subjective wellbeing; deliberated individual values fell between the two. Storytelling played an important role in revealing values that were previously implicit. Participants were more confident about values elicited in the workshops than the online survey and felt that deliberated values should be used in decision-making. The results of this study (albeit with a limited sample size) suggest that shared values may be a better reflection of welfare implications than non-deliberated individual values, while at the same time more reflective of participants' transcendental values: their broader life goals and principles.

1. Introduction

Ecosystem service (ES) assessments have traditionally focused on identifying individual monetary values for ecosystem services (TEEB, 2010; UK National Ecosystem Assessment [UK NEA], 2011). Such approaches, however, have limited capability to uncover the underlying meaning of these values, and generally fail to account for broader shared, plural and cultural values (Fish et al., 2011; Kenter et al., 2015; Scholte et al., 2015; UK NEA, 2014). The integration of deliberative and non-monetary valuation approaches to the valuation of ES is increasingly being advocated as a way of uncovering these wider value concepts. Such methods, however, have had limited application in practice, mostly focused on localised case studies (Bunse et al., 2015; Hattam et al., 2015; Kenter, 2016a; Martín-López et al., 2013; Raymond et al., 2014; Spash, 2008; Turner, 2016). There is also only a limited understanding of the impact that deliberation may have on people's values, how the impacts of deliberation on information differ from those of interventions focusing on transcendental values, and how shared values resulting from deliberative processes compare to individual values. Using a large scale case study of the value of cultural ES delivered by potential marine protected areas (MPAs) in the UK, which was undertaken as part of the UK NEA follow-on (Kenter et al., 2013; 2014b; UK NEA, 2014), we investigate the potential of a range of deliberative and non-monetary approaches for uncovering shared, plural and cultural values. We directly compare individual and deliberated group preferences and the effects of different deliberative 'treatments' on values, and investigate what new insights deliberating through storytelling might bring to the understanding of people's

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values for ES.

1.1. Approaches to understanding shared and plural values

To date, almost all environmental valuation studies, including deliberative valuations (Bunse et al., 2015), have focused on eliciting individual values. However, this focus ignores that the physical interconnectedness inherent to ecosystems generates a social interconnectedness that challenges individual preferences as the most suitable vector for social choice (Vatn, 2009). The UK NEA (2014, 2011) also recognised that individual willingness to pay (WTP) does not fully reflect the collective meanings and significance ascribed to natural environments, and potentially omits important, shared dimensions of value (Fish et al., 2011; Kenter et al., 2014b).

Kenter et al. (2015) considered that the values that we share are often expressed as transcendental values, defined as the guiding principles and life goals that transcend specific situations (also see Raymond and Kenter, 2016). Transcendental values stand in contrast to contextual values, which are dependent on a specific context, and their indicators such as willingness to pay (WTP). Transcendental values refer back to common cultural understandings and experiences albeit expressed by individuals in ways unique to their own life histories. Deliberative processes can offer a mechanism to make shared transcendental values explicit, a process that Lo and Spash (2012) refer to as 'moralisation', which they contrast with information-based deliberative interventions that focus on 'economising' preferences.

There is some evidence that individuals' or groups' preferences and contextual values are not pre-formed, but need to be generated through some kind of transformative process of deliberation and learning (Christie et al., 2012; Irvine et al., 2016; Kenter et al., 2011; Parks and Gowdy, 2013; Schlapfer, 2009; Spash, 2008). Thus far, deliberative valuation has focused on better informing preferences, recognising that participants need time to think and become familiar with ecosystem services, which are often unfamiliar goods (Bunse et al., 2015; Lienhoop et al., 2015; Spash, 2008). Although not usually discussed explicitly, the driving motivation is the expectation that improved understanding will help participants state their preferences in hypothetical scenarios in a way that is more likely to approximate the welfare implications if the situation would become reality.

However, following Lo and Spash (2012), deliberative valuation may involve not just deliberating on information but also moralisation. Kenter et al. (2016b) argue that explicit pathways for reflecting on transcendental values and translating them into contextual values is an essential component of robust deliberative value formation processes. Given that values for environmental goods are often expressive of transcendental values (Chan et al., 2012a; Daniel et al., 2012; Fish et al., 2016; Niemeyer, 2004; Raymond and Kenter, 2016; Spash, 2006; Spash et al., 2009), it makes sense that valuation processes should aim to establish shared values in the sense of group-deliberated values, rather than individual values, as this better aligns to the way in which value indicators are captured with how they are established. Despite increasing interest in shared and social values in relation to ES (Everard et al., 2016; Fish et al., 2011; Ives and Kendal, 2014; Kenter et al., 2015; Raymond et al., 2014; Scholte et al., 2015; TEEB, 2010), and indeed some authors arguing that social valuation is one of the greatest challenges in this field (Parks and Gowdy, 2013), we are not aware of any prior studies that have applied experimental designs comparing the effects of different deliberation treatments on the formation of individual-deliberated and group-deliberated values.

There has also been an increased interest in methods that can understand the plural values of ES in a broader way than is possible using monetary valuation alone (Chan et al., 2016; Christie et al., 2012; Satterfield et al., 2013; TEEB, 2010; UK National Ecosystem Assessment, 2014, 2011). Kenter (2016a) divides non-monetary methods into deliberative, analytical-deliberative, interpretive, and psychometric categories, noting that certain interpretive and psychometric methods can also be used in a deliberative format. In this study we provide a novel integration of deliberative monetary valuation (DMV), storytelling, and psychometric testing of transcendental values and other constructs that could influence monetary values, as well as psychometric subjective well-being (SWB) indicators.

Deliberative monetary valuation (DMV) represents a group of analytical-deliberative methods that seek to embed deliberation into the valuation process. Kenter (2017) describes how DMV studies can be situated between two archetypes: *deliberated preferences* and *deliberative democratic monetary valuation* (DDMV). Deliberated preferences approaches are an adaptation of stated preferences methods (e.g. contingent valuation [CV] and choice experiments) that incorporate group deliberation with the primary aim of informing preferences, which are expressed through individual WTP. These methods express 'weak value plurality' participants can express ethically and ontologically plural values in the deliberation, but preferences are still assumed to be individual, self-regarding and utilitarian. DDMV, on the other hand, uses deliberation not just for informing but also moralising and democratising preferences. Preference democratisation, as defined by Lo and Spash (2012), allows participants to decide on the terms for bringing together information and transcendental values to establish their contextual values and indicators. While deliberated preferences are generally expressed as individual WTP, democratic deliberative exercises may establish value indicators as fair prices (i.e. 'how much should we pay' as opposed to 'how much am I willing to pay') or by negotiating a social willingness to pay (i.e. 'how much should society pay'; Orchard-Webb et al., 2016 in this issue; Spash, 2008).

Storytelling, considered here as a deliberative-interpretive method, focuses on the elicitation of personal stories to form narrative accounts of meaning and value, as conceived by O'Neill et al. (2008). Narratives mix descriptive and normative statements in an organised and engaging manner. The typical format of a beginning, middle and end provides a familiar structure; the ending usually engenders an overall unity (Velleman, 2003). Stories often indirectly, rather than explicitly, communicate value judgements of all kinds (McShane, 2012). As such, they provide an avenue for meaning and value formation to extend beyond the self-regarding, utility-maximising values assumed by neoclassical economic valuation. As an expression of values, stories can provide affirmation of what is important, thus linking to a sense of identity (Shnabel et al., 2013) and self-control (Burson et al., 2012). Narratives play a prominent role in the symbolic representation and construction of places, reflecting cultural and place identities (Church et al., 2014; Cooper et al., 2016, Edwards et al., 2016; Coates et al., 2014; Fish et al. 2016) that are often latent or implicit (Kenter et al., 2011; 2016b; Niemeyer, 2004), and thus require explicit elicitation if they are to be fully reflected in ES valuations. The narratives associated with storytelling are particularly suited as a means to bring transcendental values into deliberation, providing an approachable way to consider them as well as revealing values that are not necessarily expressed through more abstract deliberations on utility, duties or virtues (Chan et al., 2016; O'Neill et al., 2008). The process of eliciting narratives and transcendental values and deliberating on them then becomes an important part of a process of forming contextual values which may then be expressed through monetary or non-monetary indicators.

Psychometric approaches provide another dimension to the understanding of value. They can inform pluralistic conceptions of subjective well-being (SWB; e.g. Ryan and Deci, 2001) as it might be experienced through interaction with the natural environment (Church et al., 2014; Irvine et al., 2013), provide a means for measuring transcendental values, and help inform how transcendental values relate to various types of beliefs and norms (Dietz et al., 2005; Raymond and Kenter, 2016), which may in turn underpin contextual values and value

indicators such as WTP. Psychological models have considerable potential for explaining monetary values (López-Mosquera and Sánchez, 2012; Spash et al., 2009). In deliberative valuation, they may have particular use in illustrating how different psychological constructs arise in the deliberative process and how they affect contextual values and monetary outcomes (Kenter et al., 2011).

1.2. Objectives

We have argued that values in relation to the natural environment are often shared and plural and that deliberation and integration of monetary and non-monetary approaches provide an opportunity to explore these values. The objectives of this research were: (1) To provide an exemplar of integrating monetary and non-monetary valuation and deliberation to deliver a more comprehensive valuation, reflecting a broader suite of shared, plural and cultural values; (2) To understand the impacts of different types of deliberation, focused on either information or transcendental values; and (3) To assess whether shared values, expressed as deliberated group values, differed from deliberated individual values.

2. Methods

The study reported here draws from a larger case study, undertaken as part of the UK NEA follow-on phase (Kenter et al., 2014b, 2013; UK NEA, 2014), about the value of cultural ES associated with potential MPAs across the UK. To address Objective 1, we integrated monetary valuation, storytelling, SWB indicators, psychometric indicators of values, beliefs and norms and an innovative values compass to deliberate on transcendental values. Objectives 2 and 3 were addressed through a staged valuation process, in which we compared the results of a 'conventional', questionnaire-based stated preference elicitation stage with workshop-based deliberated preferences (Objective 2), and further workshop-based stages that move some way in the direction of DDMV (Objective 3).

2.1. Case study

The UK is a signatory to international agreements including the Convention on Biological Diversity and the OSPAR Convention that set the task of establishing an 'ecologically coherent network' of MPAs by 2010, that is 'well-managed' by 2016, implemented through the EU Marine Strategy Framework Directive. At the time of data gathering (2013), 127 recommended Marine Conservation Zones (a new type of MPA designation) had been identified in England and 33 new MPA proposals had been recommended in Scotland.

The UK MPAs case study was carried out in collaboration with the Marine Conservation Society, the Angling Trust (AT) and British Sub-Aqua Club (BSAC). Anglers and divers are amongst the UK's largest marine user groups; an estimated 1.1–2 million people go sea angling every year and there are around 200,000 UK divers and snorkelers (Armstrong et al., 2013; Kenter et al., 2013). While evidence suggests that both user groups attain considerable non-market value from marine ecosystems (Beaumont et al., 2008; Scottish Government, 2009), to our knowledge there have been no prior studies assessing values of sea anglers, divers and snorkelers for the sites they visit and might want to protect in the UK. Further detail on the policy background and context related to the study is discussed by Kenter et al. (2013).

2.2. Data collection

Data collection consisted of two main phases: an online survey with 1683 divers and sea anglers across the UK; and 11 DMV workshops with 130 participants in total across England and Scotland. Workshop participants were primarily recruited from survey participants, and the 95 individuals who participated in both phases form the focus of this study. This sample comprised of 67% divers (of which 28% female) and 33% anglers (0% female[1]). These proportions were similar to those in the online survey, and demographics of the diver and angler groups were broadly representative of the membership of BSAC and AT (Jobstvogt et al., 2014b). The online survey was advertised via the BSAC and AT member mailing lists, advertisements in relevant magazines and social media. Data collection for the online survey took place from December 2012 to January 2013, followed by the workshop period from April to May 2013. Divers and anglers took part as mixed workshop groups.

The online survey elicited: (1) non-use and option values using a CV; (2) non-monetary values through SWB indicators; (3) and psychometric indicators associated with the Values-Beliefs-Norms (VBN) theory and Theory of Planned Behaviour (TPB) in relation to the MPAs context. It also considered the use value of 151 potential MPAs using a travel-cost based choice experiment and mapping exercise, but this component is not discussed in this paper (see Kenter et al., 2013). Design of the survey was informed by four preliminary qualitative focus groups, and a meeting with BSAC and AT representatives. The purpose of the large scale survey was to inform decision-making around MPAs in the UK, and details of the design, testing, sampling and analysis in light of this purpose is discussed in detail in Kenter et al. (2013), Jobstvogt et al. (2014b) and Bryce et al. (2016).

The DMV workshops elicited two deliberated *individual* CVs and two deliberated *group* CVs following the same design as the online survey. The workshops started with a deliberative intervention around basic information on the marine ecosystem, followed by the first individual and group CVs. Next, a second deliberative intervention focused on transcendental values, followed by the second individual and group CVs. Across the two phases we thus staged five different CVs (Fig. 1).

2.2.1. Phase 1: online survey

In Phase 1, we asked online survey respondents a set of CV questions about their WTP to conserve potential, hypothetical MPA sites for the future. The CV design was innovative in the way that sites were characterised by attributes, which allowed us to value the specific site aspects, as is typically done in choice experiments. The survey included eight attributes: marine 'landscape' and habitats, presence of large fish and other charismatic species, wrecks and rock formations, the number of vulnerable species protected, access options, management restrictions, size, and travel distance (Table 1). A D-efficient design generated by NGene 1.1.1 (Choice Metric software) established 64 cards in 16 blocks. Thus each survey respondent answered CV questions for four different hypothetical marine sites; an example as presented to participants is given in Fig. 2. The way attributes and their levels were specified specifically matched the way sites were characterised in the UK MPA policy context. The large number of attributes in the CV survey was balanced by the marine experience that survey participants brought with them; 26% of divers had completed 200–500 dives in their lifetime, 42% more than 500 dives. Similarly, anglers had, on average, 32 years of experience.

WTP was elicited as a one-off voluntary donation to a proposed local management trust; this payment vehicle was identified by the pre-survey focus groups as most intuitive, and any compulsory payments were seen as political and likely to increase protesting (see Kenter et al., 2013 for further explanation). The payment vehicle was operationalised through a single-bounded payment card CV format from £0–£40. Before answering the WTP question, participants were asked to consider a short script reminding them of their budget constraints

[1] One female angler participated who had not taken part in the survey; the sea angler population only has about 3% female members (Drew Associates, 2004).

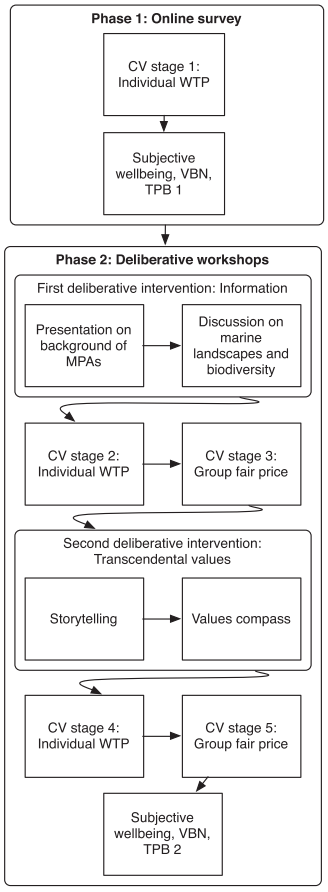


Fig. 1. Outline of main data collection stages. The data was collected in two phases, an online survey and a series of deliberative workshops. The workshop phase included four monetary valuations, two elicited as individual willingness to pay (WTP) and two elicited from groups as a fair price. Thus, in total there were five contingent valuation (CV) stages. Each phase also included elicitation of subjective wellbeing indicators and psychometric items based on the Value-Belief-Norm (VBN) theory and the Theory of Planned Behaviour (TPB).

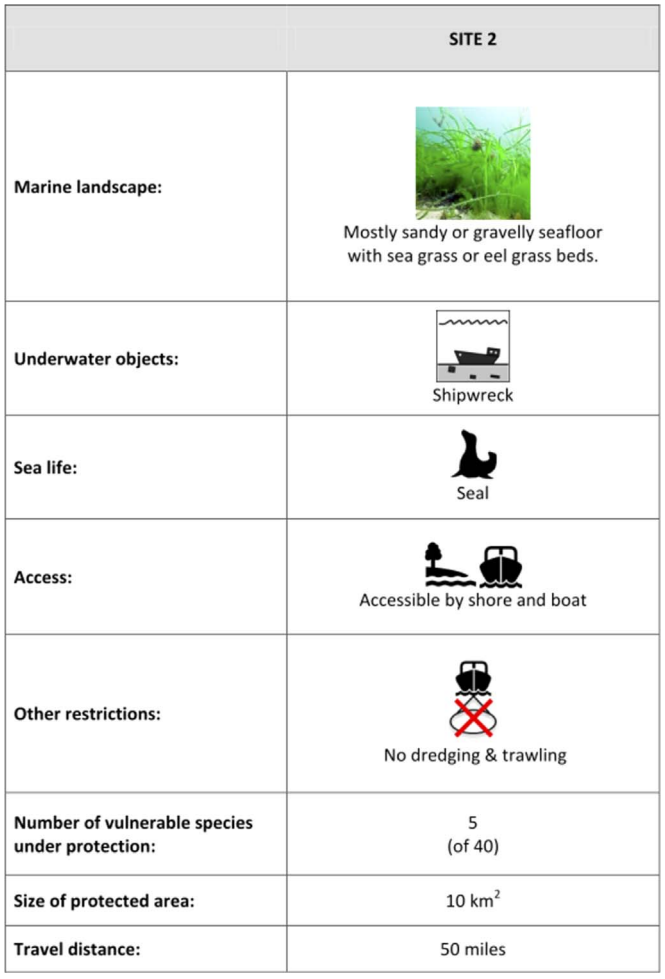


Fig. 2. Example of a contingent valuation hypothetical site as presented to participants (from Jobstvogt et al., 2014b).

Table 1
Contingent valuation attributes.

Attribute	*Description presented*
Marine landscape and habitats	The type of sea floor and marine landscape, including features that scientists have indicated are of conservation importance. The attribute consisted of 16 levels describing different types of underwater 'landscape' and habitats.
Underwater objects	Potential underwater objects that could be found at the dive site: (1) rock formation (for example: a vertical wall, gully or archway), (2) shipwreck, or (3) neither.
Sea life	Animals potentially encountered at the site: (1) seal (grey or common); (2) sea bird colony (e.g. puffins, cormorants, kittiwakes); (3) octopus; (4) large fish such as ray, dogfish, cod, ling or (5) other large fish over 50 cm/20 in.).
Vulnerable species protected	Four levels of species protection: 0, 5, 10, 15 out of the 40 marine species identified as endangered or vulnerable and protected by the new marine protected areas. We indicated that chances of encounter/catch at the site were very unlikely.
Access	Site access options included: (1) by shore and boat; (2) by shore only, boat use prohibited; (3) by shore, boat, and pier; (4) Site out at sea, can only be reached by boat.
Other restrictions	Some activities are not allowed in the area. These could include: (1) no dredging and trawling; (2) no potting and gillnetting; (3) no anchoring and mooring
Size of protected area	The size of the protected site in square kilometres: 1, 10, 100, 1000 km^2
Travel distance	The distance to travel to get to the site from the participant's home (all sites are within the UK). Six levels of one-way travel distances: 5, 20, 50, 100, 200, 400 miles.

(Table 2: Column 1). We also included a series of follow-on questions to determine how participants' made decisions about their payments. These were used to determine who would be excluded from the sample if their bids were strategically motivated, meant as protest to MPA policies, or reduced because they thought others should pay.

In addition to the monetary valuation questionnaire, the online survey also included psychometric questions on SWB, VBN and TPB, which are detailed in Sections 2.2.3–2.2.4.

2.2.2. Phase 2: deliberative workshops

The DMV workshops, lasting around four hours, used CV tasks drawn from the same block design as used in the online survey, but with two deliberative interventions: the first focused on discussing information and the second on eliciting transcendental values (Fig. 1). Both interventions took around 40 min. Following the first intervention, deliberated individual values were elicited by asking participants to individually state their WTP for the four sites using the same

Table 2
Contingent valuation questions for individual and group choices; in the Phase 1 online survey, respondents were only asked about individual willingness to pay.

Individual willingness to pay: individual decisions	*Fair price: group decisions*
On the following pages you will be presented with four different dive/angling sites. If any of the four sites was a real protected area, do you think you could afford to, and would be willing to give a one-off donation? Your donation would be used to set up a local management trust to maintain this site as it is shown above, and protect its natural features against the risk of future harm and degradation. In this question and questions that follow, it is really important for our analysis that you consider travel distances and financial amounts as if they were real. Thus, you need to consider your household income and expenditures, and what you might need to give up to be able to afford a donation, or the cost of travelling to a site. Please have a look at SITE 1. If you were asked to make a one-off donation to support protection of SITE 1 into the future, how much would you be willing to donate? Please carefully consider the characteristics of SITE 1 according to site shown.	What would be a fair donation to ask anglers and divers? You are asked to discuss this with the others in your group and come to a joint decision. If there is no consensus, you will vote. Please base your vote on, and discuss in particular: ● Do you feel that the benefits to divers & anglers of protecting sites are worth the cost? ● What amount of voluntary donation would be a fair price to ask divers & anglers for the protection of each site, given their particular characteristics and benefits? Again, donations would be used to set up a local management trust to maintain the sites as they are shown, and to protect their natural features against the risk of future harm and degradation. Please record your own vote, not the outcome of the group vote. What was your vote for SITE 1?

framing as in the online survey. Deliberated group values for the same block were elicited as a 'fair price' (Spash, 2008; Kenter, 2016c). Here participants were asked to act on behalf of the interest group they represented and to discuss together, and then reach agreement or vote on what would be a fair donation to ask divers and anglers to contribute to protecting the site under consideration (Table 2). Individuals then either recorded the agreed upon 'fair price' or their votes as group representatives in the questionnaire. As far as we are aware, DMV with the use of a 'fair price' payment term is limited to only three other studies (Kenter et al., 2011; Kenter, 2016c; Szabó, 2011). Following the second intervention the process was repeated, this time for a different block of four sites to reduce respondent fatigue and anchoring bias.

The first deliberative intervention focused on exchange of information. It included a short presentation on MPAs with emphasis on the governmental plans to implement a network of sites in UK waters. Then facilitators asked participants to discuss marine habitats and species of conservation interest based on a hand-out and photos, and to discuss the importance of marine biodiversity in general. This was followed by CV stage 2 that elicited individual WTP and CV stage 3 that elicited group valuation.

The second deliberative intervention focused on exchange of experiences and values through storytelling and a discussion of personal and shared transcendental values on the basis of a 'values compass'. Participants were first asked to think about their favourite marine sites in the UK and were given a minute to reflect on the experiences they had there in the past. To facilitate subsequent discussion, participants were then asked to indicate, individually, on a sheet if any of the following related to their experiences:

- engagement with nature, getting to know nature, feeling connected to nature;
- place identity: feeling like these places are part of your personal identity, feeling a sense of belonging when you have gone there and missing them when you cannot go there;
- therapeutic value: feeling free, feeling healthy and clearing your head;
- spiritual value: feeling connected to something larger than yourself;
- social bonding: bonding with other people;
- transformative value: memorable experiences that have a lasting impact on your life.

This list corresponds to six dimensions of SWB that were derived from the online survey, which will be discussed in detail in Section

Table 3
Transcendental values presented to participants in the 'values compass' exercise, structured in categories (italics) along self-transcendence vs self-enhancement and openness-vs tradition axes (bold); adapted from Schwartz (1994).

Self-transcendence	**Self-enhancement**	**Openness**	**Tradition**
Universalism	*Power*	*Self-direction*	*Tradition*
Protecting the environment	Social power	Creativity	Devout
A world of beauty	Authority	Curious	Respect for tradition
Unity with nature	Wealth	Freedom	Humble
Broad-minded	Preserving my public image	Choosing own goals	Moderate
Social justice	Social recognition	Independent	Accepting portion in life
Wisdom			Detachment
Equality	*Achievement*	*Stimulation*	
A world at peace	Successful	Daring	*Conformity*
Inner harmony	Capable	A varied life	Politeness
	Ambitious	An exciting life	Honouring parents and elders
Benevolence	Influential		Obedient
Helpful	Intelligent	*Hedonism*	Self-discipline
Honest	Self-respect	Pleasure	
Forgiving		Enjoying life	*Security*
Loyal			Clean
Responsible			National security
True-friendship			Social order
A spiritual life			Family security
Mature love			Sense of belonging
Meaning in life			Reciprocation of favours
Healthy			

2.2.3. Participants could also add to the list.

Participants were then asked to share a story of an important experience for them at one of the sites with the group. Sharing then often led to discussion of common themes around why different sites were important to them. In this interpretive-deliberative approach, stories and discussion around them were highly interspersed and thus analysed as one, using a six item coding structure on the basis of the six dimensions of SWB to organise the data, allowing further themes grounded in the data to arise. Stories were also coded for associations with transcendental values according to the 56 value items developed by Schwartz (1992, 1994) and Schwartz and Bilsky (1987), the items are shown in Table 3 and include virtuous and normative elements (e.g. honesty, obedience), and a wide range of aspirations that are not necessarily normative (e.g. wisdom, enjoying life).

Next, participants engaged in a transcendental values compass, where they were presented with the values listed in Table 3. Our interest here was in presenting a broad spectrum of diverse values for potential inclusion in deliberation. Participants first considered the values for themselves, individually, marking five of the values they felt were most important to them and then were asked if they wished to share any of the values they picked. Pre-testing in focus groups suggested this was not too challenging cognitively. These values were then discussed with others in relation to their stories and experiences, the MPA context and diving and angling as a whole. They were also asked to discuss with the group whether these values had contributed to their CV responses in the workshop to that point. We use the term 'compass' to denote this method both in reference to the two axes (self-transcendence vs self-enhancement and openness vs tradition) that structure Schwartz' conception of these values, and because it aimed to help participants orient their later contextual valuations in terms of their transcendental values. To our knowledge the Schwartz value system has previously only been used as a means to help understand values but not as a deliberative tool in ES valuation.

The second deliberative intervention was followed by CV stage 4 that again elicited individual WTP and CV stage 5 that elicited group valuations again using a fair price value indicator. We also asked individuals in workshops to state their motivations behind donating money towards protecting marine sites after stages 2 and 4 on a conventional 5-point Likert scale. These were: 1) protect for the option of future visits (option value); 2) protect for other users' benefit (altruistic value); 3) protect for future generations (bequest value); and 4) protection for the sake of other species, irrespective of personal benefits (existence value). We also repeated questions from the online survey on participants' ways of making decisions about their payments after stages 2 and 4 (rather than at every stage, because of time/fatigue considerations).

Finally, we asked participants to state where they felt more confident about their choices: in the online survey or the workshops, and which values they thought should be used in decision-making.

2.2.3. Subjective well-being indicators

SWB measures were used to consider the contribution of the marine environment to participants' quality of life. We developed a new instrument to specifically reflect the place-based approach to cultural ecosystem services taken by the UK NEA (Church et al., 2014, 2011; Fish et al., 2016; Jobstvogt et al., 2014b; Bryce et al., 2016), highlighting that environmental spaces and practices interact to generate benefits in terms of identities (e.g. through memories, place identity), experiences (e.g. inspiration, freedom), and capabilities (e.g. health, knowledge). To reflect these different aspects of cultural ES, we developed a set of 15 non-monetary indicators on the basis of a wide range of literature sources and implemented through conventional 5-point Likert scale statements in both the online survey and the workshops (Table 4). The indicators reflect an eudaimonic conception of well-being (Ryan and Deci, 2001), and considered subjective in terms of being self-reported (rather than assessed through objective indicators).

Indicators were refined using stakeholder input from an online public survey on attitudes towards designation of marine protected areas (www.yourseasyourvoice.com) and four focus groups with divers and sea anglers but not quantitatively piloted due to time constraints. Kenter et al. (2013, 2014a) and Bryce et al. (2016) discuss how indicators were mapped to six SWB dimensions using a non-orthogonal exploratory factor analysis (principle axis factoring with oblique rotation). The analysis yielded three principal factors. Four indicators did not load onto these factors; three of these were taken forward as single item indicators as they represented distinct SWB dimensions referred to in the literature, one was dropped. The resulting six dimensions with their indicators, loadings, Cronbach's alpha values and associated *a priori* constructs from the literature are listed in Table 4. These dimensions were then considered in terms of their spatial associations across potential MPAs across the UK (see Kenter

Table 4
Overview of subjective wellbeing indicators associated with six dimensions (adapted from Kenter et al., 2014b; Bryce et al., 2016).

Factor	*Dimension theme*	*Cronbach's alpha*	*Indicator*	*Loading*
1	Engagement and interaction with nature	0.88	1. Visiting these sites has made me learn more about nature	0.86
			2. Visiting these sites makes me feel more connected to nature	0.71
			3. I have felt touched by the beauty of these sites	0.60
			4. I feel like I can contribute to taking care of these sites	0.49
			5. These sites inspire me	0.48
2	Place identity	0.83	6. These sites feel almost like a part of me	0.92
			7. I feel a sense of belonging in these sites	0.68
			8. I miss these sites when I have been away from them for a long time	0.46
3	Therapeutic value	0.83	9. Visiting these sites clears my head	0.84
			10. Visiting these sites gives me a sense of freedom	0.58
			11. Visiting these sites leaves me feeling more healthy	0.52
Single item indicators	Spiritual value	NA	12. At these sites I feel part of something that is greater than myself	NA
	Social bonds	NA	13. I have made or strengthened bonds with others through visiting these sites	NA
	Memory/transformative value	NA	14. I've had a lot of memorable experiences in these sites	NA

A priori constructs with links to literature & prior instruments: 1: Knowledge (NEA; MENE); 2,9,12: Reflection and sense of wholeness (Dallimer et al., 2012; Fuller et al., 2007; Irvine et al., 2010); 2: Connection to nature (MENE); 3: Aesthetics (NEA), Appreciation (MENE); 4: Participation (NEME; HSDM); 5: Inspiration (Chan et al., 2012a, 2012b); 10: Freedom (HSDM); 11: Health (NEA; MENE); 12: Spiritual value (NEA; Chan et al., 2012a, 2012b); 6-8,14: Sense of place: place identity and continuity with past (Dallimer et al., 2012; Fuller et al., 2007; Tengberg et al., 2012); 6: Identity (MENE); 13: Social bonds (HSDM); 14: Transformative values (Chan et al., 2012b). NEA: UK National Ecosystem Assessment: Cultural Services (Church et al., 2011); MENE: Monitor of Engagement with the Natural Environment (Natural England, 2012); HDSM: Human Scale Development Matrix (Cruz et al., 2009; Max-Neef, 1989). For mean scores, variation explained, and eigenvalues see Kenter et al. (2014b) and Bryce et al. (2016). Confirmatory factor analysis confirmed that fit of six dimension model (3 factors +3 single indicators) was superior to a 3 factor only model in explaining the data (GFI 0.97 vs 0.77; RMSEA 0.05 vs 0.20).

et al., 2013) and their associations with biodiversity and other physical site features (see Bryce et al., 2016).

Here our interest is not in this analysis but in potential convergence between SWB and monetary values. To explore this, in subsequent analysis we took forward the mean of the 14 indicators because of covariance between the six dimensions. There were no significant differences between the online survey and workshop SWB indicator scores (Kenter et al., 2014b); thus the online survey scores were used throughout the analysis.

Notably, SWB indicators and dimensions also directly link to key transcendental values as inventorised in Table 3. For example, engagement and interaction with nature indicators can be linked to curiosity, beauty and responsibility. Place identity indicators can be linked to unity with nature, sense of belonging and meaning in life. Therapeutic value indicators can be linked to freedom and health. Spiritual value links to a spiritual life, social bonding to friendship and sense of belonging, and memory/transformative value to a varied life and an exciting life.

2.2.4. Values-beliefs norms and Theory of Planned Behaviour items

We also elicited sets of psychometric questions based on the Value-Belief-Norm theory, which is specific to environmental values and behaviour, and on the more general Theory of Planned Behaviour. The VBN theory theorises that transcendental values shape *environmental worldview*, which in turn influences beliefs around *awareness of the consequences* (AC) of actions and *ascription of responsibility* (AR). These in turn shape one's *personal norms*, which determine behaviour. Three sets of transcendental values are conceptualised to influence environmental worldview: self-interest (or *egoistic values*), humanistic altruism (or *altruistic values*) and biospheric altruism (or *biospheric values*) (Dietz et al., 2005; Snelgar, 2006; Stern and Dietz, 1994; Stern et al., 1993).

The TPB was originally devised by Ajzen (1991, 1985), linking the theory of reasoned action (Ajzen and Fishbein, 1980) with considerations around control that people believe they have over volitional behaviour. Behaviour is seen to be associated with intentions, which are in turn influenced by *attitudes* (positive or negative evaluations of options); *perceived behavioural control* (PBC) in relation to options, i.e. perception of personal difficulty or ease to realise an option; and *subjective norms*, which reflect the way others evaluate options. In relation to the environment, this means that behaving pro-environmentally depends on having a positive attitude to the behaviour, feeling moral support from others, and believing that one can make a difference. The TPB, like VBN, has been well used in a wide range of environmental behaviour studies (Fielding et al., 2008a, 2008b; Kaiser et al., 2005; Spash et al., 2009).

The VBN/TPB questionnaire included a list of three egoistic, three altruistic and three biospheric transcendental value indicator statements drawn from a short version (Stern et al., 1998) of the Schwartz (1992, 1994) values scale on a −1 to 8 Likert scale where −1 indicated 'opposition' to the value, which is a common format for assessing these indicators (Steg et al., 2005). We included two items for AC and AR beliefs and Norms, adapted from Steg et al. (2005) to our context, using a conventional 5-point Likert scale. We developed a 10 item version of the New Ecological Paradigm (NEP) scale (Dunlap et al., 2000), based on recommendations by Hawcroft and Milfont (2010), to measure ecological worldview (VBN) and attitudes (TPB). We adapted two items each for subjective norms and PBC from Wilson and Irvine (2012). Items and their constructs are listed in Table 5.

We analysed the efficacy of the scales and models through a Confirmatory Factor Analysis (CFA) of the two-item VBN/TPB constructs, a Structural Equation Model (SEM) of the VBN constructs, and estimation of Cronbach's alpha. CFAs are used to determine whether measures of a construct, or factor, are consistent with an *a priori* understanding of that construct. SEMs combine a measurement part of the model, similar to a CFA, and a structural part, which consists of assumed causal relations between factors, e.g. whether factor A influences B. Each relationship has an associated regression equation and these are all simultaneously estimated. We applied the CFA and SEM to the online survey data. For further detail on model specification see Kenter et al. (2014b; annex 3) and Raymond and Kenter (2016). We then compared results between pre-deliberation scores from the online survey and post-deliberation scores from the workshop, using Bonferroni-corrected *t*-tests to establish significance at the $p < 0.1$ level or lower.

2.3. Hypotheses and data analysis

The focus of this study was to highlight *if* and *where* changes in the valuation of the hypothetical sites and attributes appeared over the course of the five valuation stages. We tested three central hypotheses on how participants might change their stated preferences:

H1. : The *information* intervention would change participants' stated preferences.

H2. : The *transcendental values* intervention would change participants' stated preferences.

H3. : Participants would form different preferences in *group valuation* tasks compared to their *individual valuation* tasks, i.e. their *shared values* would be different from their mean individual values.

In our analysis, we included only those respondents who completed both the online survey and DMV workshop and who were not identified as a 'protester' or as placing bids strategically in all of the five valuation stages.

Responses to the five valuation stages were analysed in two ways. First, a simple estimate of mean WTP was calculated from the responses to each stage using the mid-point of the payment card interval as the measure of a respondents' individual or group WTP.[2] We compared these estimates across the five valuation stages using Analysis of Variance (ANOVA). Second, responses to all five valuation stages were analysed jointly with a random effects interval regression model (*xtintreg* command in Stata/SE 12.0) with the log-transformed WTP interval as the response variable (Cameron and Huppert, 1989):

$$\ln(WTP_{CVM} + 1) = \beta_0 + \beta_1 X_1 + \cdots + \beta_n X_n + v_i + u_i \quad (1)$$

β_0 is the intercept, β_n the regression coefficient for X_n which is a site attribute or respondent characteristic, and u_i is the error term. Each respondent provided four valuations in each round and thus errors will have an individual idiosyncratic component, therefore we included a random-effect v_i to control for this correlation. A limitation of the model specification was that it did not account for further structure in the errors resulting from consensus votes, which accounted for approximately a third of the data in the group-based stages.

We also included the valuation stage as a regressor to test if monetary values differed across the five stages and used a step-wise general to specific approach to determine our final model specification, where all respondent characteristics were included at the start of the model specification exercise and excluded one by one if they were not statistically significantly different from zero at the 10% level (Hosmer and Lemeslow, 2000; Jobstvogt et al., 2014b). We also tested if the valuation stage affected specific CV attributes and psychometric parameters, using a Wald-test adjusted for multiple hypotheses.

The resulting model at this stage was then used as the basis for three final models. The first (Model A) was developed to specifically look at differences between how marine landscape was evaluated in the online survey vs the workshop valuations as a whole. We implemented

[2] The payment card asked respondents to tick amounts they would be willing to pay in a table that contains x monetary amounts between £0 and £20 or £0 and £40. If a respondent ticked that they would be WTP £10 but they would not be WTP £15, we assumed a WTP of the mid-point at £12.50.

Table 5
Psychometric constructs associated with the values-beliefs norms (VBN) theory and Theory of Planned Behaviour (TPB) used in the study. Italicised indicator statements are reverse coded.

Construct	*Theory*	*Parameter*	*Indicator statements: MPAs*
Egoistic values	VBN	EGO1	Authority, the right to lead or command.
		EGO2	Wealth, material possessions, money.
		EGO3	Influence, having an impact on people and events.
Altruistic values	VBN	ALT1	Social justice, correcting injustice, care for the weak.
		ALT2	Equality, equal opportunity for all.
		ALT3	A world at peace, free of war and conflict.
Biospheric values	VBN	BIO1	Protecting the environment, preserving nature.
		BIO2	Respecting the earth, harmony with other species.
		BIO3	Unity with nature, fitting into nature.
New ecological paradigm (NEP)	VBN, TPB	NEP1	*Humans have the right to modify the natural environment to suit their needs.*
		NEP2	When humans interfere with nature it often produces disastrous consequences.
		NEP3	Humans are severely abusing the environment.
		NEP4	*The earth has plenty of natural resources if we just learn how to develop them.*
		NEP5	Plants and animals have as much right as humans to exist.
		NEP6	*The balance of nature is strong enough to cope with the impacts of modern industrial nations.*
		NEP7	Despite our special abilities humans are still subject to the laws of nature.
		NEP8	*The so-called "ecological crisis" facing humankind has been greatly exaggerated.*
		NEP9	The earth is like a spaceship with very limited room and resources.
		NEP10	*Humans will eventually learn enough about how nature works to be able to control it.*
Awareness of consequences (AC)	VBN	AC1	Many forms of life in our seas are under a real threat from human activities.
		AC2	*If the diversity of life in the seas would be diminished, it would not significantly impact on our economy.*
Ascription of responsibility (AR)	VBN	AR1	I feel responsible for the plight of rare or endangered species of plants and animals.
		AR2	*I don't feel personally responsible for environmental issues, as they are the responsibility of government and industry.*
Norms	VBN	NOR1	We should protect spaces for other species to live and thrive in our marine environment.
		NOR2	*We should think about the economic importance of the seas first, and only then about environment and conservation issues.*
Subjective norms	TPB	SUB1	Most people important to me support taking action to protect the marine environment.
		SUB2	Most people important to me think I should support conservation of sea life.
Perceived behavioural control (PBC)	TPB	PBC1	It is easy to take action to support protection of the marine environment.
		PBC2	It is difficult for me to do anything significant that would help conservation of sea life.

this separately from the other models as the attribute had 16 levels, which was too high to include interactions in other models or to look at interactions between this attribute and the five stages, considering the sample size. Our experimental design for the multi-attribute CV meant that the marine landscape attribute was not correlated with the other attributes that varied in the CV task. The second model (B) incorporated the mean of the 14 psychometric indicators associated with one of the six SWB factors. A third model (C) included psychometric parameters: biospheric, altruistic and egoistic values; New Ecological Paradigm (NEP) as a measure of environmental worldview; AC and AR beliefs; personal norms; subjective norms; and PBC. We used psychometric parameters based on the online survey data and included a second parameter constituted of the difference between the survey and workshop results where means differed significantly between them. Insignificant interactions and parameters were dropped as described above.

3. Results

3.1. Storytelling and values compass

Storytelling brought up a range of themes that expressed how communal transcendental values, shared experiences and identity interrelated for both divers and anglers. Table 6 presents representative quotes by different individuals organised across themes and with associated transcendental values. Some of these are also introduced in the following paragraphs.

The majority of diver stories related to connection with the environment and in particular their immersion in this environment, so as to feel part of it. Stories shared related to interaction with marine animals and the connection they felt as a result.

"[I had this] magic moment with cuttlefish..., they come up and pull away, you realise there's intelligence there, and there's a connection, it's fascinating".

Divers' experiences were often conveyed as spiritual, magical and imbibed with colour. The diving experience itself was also social and divers referred in their stories to bonding with their dive mates and building trust as a result of their dives.

"I ticked all of these [types of well-being] and more, I added religious which is strange really because I am an atheist. I was in one place and visibility opened up and it was like a cathedral, with jewel anemones lighting up everywhere. I felt like I was in the presence of God, if there is such a thing. I was crying when I came out of the water. It was a Sunday as well, oddly enough".
"I freedive, we have such trust in each other. There is bonding. We know each other so well now".

Stories were often related to the exploratory, adventurous aspect of diving and the feeling of freedom felt as a result of taking part in this activity. Divers tended to emphasise this exploration or adventure aspect as a positive for diving in UK waters, which were described as more challenging but much more biodiverse and interesting than more commonly dived sites abroad.

The anglers involved in this study also shared the way they experienced and valued marine sites. The stories told by anglers tended to present this activity as a more solitary, reflective and therapeutic activity than diving, where a strong connection with place was fostered.

"There is perhaps a difference between diving and angling, you do not have to go with a buddy for angling. Often you just wanna be on your own".
"[This area is a] really important place to me.... going there helped me with pressures at work...I always feel a bit rejuvenated after I went there".

Although connection with nature remained a significant theme,

Table 6
Selected quotes from stories that related to well-being themes and emergent transcendental values. 'D' indicates Diver and 'A' indicates Angler; where uncertain we have used 'U'. Key words associated with the themes are highlighted in bold. Transcendental values are listed per Schwartz (1994) value category.

Well-being theme	*Quotes*	*Associated values*	*Comment*
Engagement with nature: getting to know nature, feeling connected to nature.	**D:** I went for just a little dive under a pier. It was **covered in life**, the sun was shining, clear green blue, little bits of kelp, then two huge rays came past, it was **like paradise**. It was just a silly little shallow dive but it was **magic**. The most **beautiful** were the anemones and the plants. It was **exquisite**. **A:** When we go out 9 out of 10 times we do a beach comb, recycling stuff for our own use and clearing rubbish. **D:** I go on my own to take marine photos from a nearby pier on the Clyde. Visibility is usually bad but sometimes it opens up, it did one time and became really clear, all the anemones and marine life on this chain of posts lit up, such a diversity. **I felt the beauty but also felt sadness**, because where had all the fish gone? They were there in the past but not there anymore. **D:** We **rescued a seal pup** wrapped in nylons (diver talking about an experience where he disentangled a pup from a fishing net, which could have caused him serious bite injuries). **D:** It was **on par with any tropical dive**. In Egypt you expect more than you get. Here I expected murk and just got all this **colour, diversity**. Chalk arches, **fantastic** stuff just on my doorstep. **D:** It was November, in the Farns. I went out with Seal Diver 'B' [a well-known figure around the Farn Islands], 16 of us in the boat. In November the seals are more playful, they're outside of their rivalry point. ' **B' taught us this trick** to get them to come, find some kelp, sit there and do that [makes a waving hand movement]. **They came, really close!** You make your hand into a fist, and then they put their nose against it. **D:** [I had this] **magic** moment with cuttlefish, they have strange [...], they come up and pull away, you **realise there's intelligence** there, and there's a **connection**, it's fascinating. **A:** I wouldn't go anywhere without my binoculars...[I like to] watch the terns diving.... It is that **relation to nature** that gets me... you don't have to catch a fish on a good day." **D:** We came across a seal. There was a **real interaction**. It was the way it approaches... [it was] **a sentient being**. **A:** You see more above (the water) than below. **We [anglers] are the eyes and ears**, you divers see what's under there.	**Universalism**: protecting the environment, a world of beauty, unity with nature, social justice. **Benevolence**: helpful, responsible. **Stimulation**: a varied life, an exciting life.	The most common theme to emerge related to engagement with nature. Differences emerged in how divers and anglers connected with nature in their activities. For divers it was the experience of being surrounded by and coming face-face with nature. For anglers, it was the species they saw above water, which they felt a connection to. Both divers and anglers spoke of rescuing nature and clearing refuse.
Place identity: Feeling like these places are part of your personal identity, feeling a sense of belonging when you have gone there and missing them when you can't go there.	**D:** It's **surprising** how many people you take diving that haven't dived in the UK. **D:** A lovely dive, close to the shore, a lovely wreck, **not many people know about it** **D:** "**Wow, we have got this in British waters**?! ... I think this can be easily lost when we don't do anything" **U:** I was brought up near the sea, had not seen it for 20 years and **rediscovered it.** **D:** I love wrecks... **[I'm] always looking to come back**.	**Universalism**: lworld of beauty, wisdom. **Achievement**: influential. **Self-direction**: curious, freedom, independent. **Stimulation:** daring, a varied life. **Security:** Sense of belonging.	Both anglers and divers talked about feeling like they were part of a place thorough carrying out their activities. A number of participants spoke about the connection they felt with the wider area through travelling to carry out their activity. The connection with place was associated with both land features and with diving, where divers felt a greater connection with UK waters and surprise at the diversity of underwater landscape.
Therapeutic value: Feeling free, feeling healthy and clearing your head.	**U: Your worries** are the last things you're thinking of. U: It clears my mind, it's meditative. **A:** I was night fishing, east wind, snowing, one of those nights when **your wife says you're a crackhead**. I heard scraping, a seal pulled itself on the gravel and then two foxes came scavenging along the tide line. These places become part of your **identity**. They make me feel **free**." **A:** [this area is a] really important place to me.... going there **helped me** with pressures at work...I always feel a bit r**ejuvenated** after I went there. **U:** [I] let go... **being free**...It's like **flying.**	**Universalism**: inner harmony. **Benevolence**: a spiritual life, healthy. **Self-direction**: freedom. **Pleasure**: enjoying life.	Both anglers and divers derived therapeutic value from their experiences and 'feeling free' was a common theme from both groups.
Spiritual value: Feeling connected to something larger than yourself.	**D: [it was] like a cathedral** I ticked all of these (values) and more, I added religious which is strange really because I am an atheist. I was in one place and visibility opened up and it was like a cathedral, with jewel anemones lighting up everywhere. I felt like I was in the presence of God, if there is such a thing. I was crying when I came out of the water. It was a Sunday as well, oddly enough. **U:** It clears my mind, **it's meditative**. D: Some wrecks feel like a cathedral. There is so much life on them. **D:** [I had this] **magic** moment with cuttlefish, they have strange [...], they come up and pull away, you **realise there's intelligence** there, and there's a **connection**, it's fascinating.	**Universalism**: unity with nature, social justice. **Benevolence**: meaning in life, a spiritual life. **Tradition**: humble.	A sense of connection to something larger featured in many stories. Divers were more likely to relate diving to more explicitly spiritual experiences, mentioning how some dive areas were like 'cathedrals' and 'magical.'
Social bonding: Bonding with other people.	**D:** One diver told us about a dive at a very poor site with low visibility which he would normally not even mention, but he remembered it for the **atmosphere** and **being with a couple of friends**; sharing the experience and having managed the **challenge of that low visibility dive**.	**Universalism**: protecting the environment, social justice, wisdom, equality.	Divers and anglers differed in their experiences relating to bonding with others. For

(continued on next page)

Table 6 *(continued)*

Well-being theme	*Quotes*	*Associated values*	*Comment*
	A: I go **catch fish to eat**, it's so **rewarding** to feed your family and then **share the experience** you had. **D:** Meeting with friends and going out the night before the dive. Going diving despite hangover for the sake of wreck diving. (Diver explains that you tend to forget about it until you surface again.) **D:** I freedive, we have such trust in each other. **There is bonding**. We know each other so well now. **D:** I felt **very secure** with him (female diver talking about a dive with her son). **D:** If you're out and **nature goes against you**, and everyone gets back in one piece. That **bonds** you.	**Benevolence**: helpful, loyal, responsible, true friendship. **Achievement**: capable. **Security**: social order, sense of belonging, reciprocation of favours.	divers the process was a shared experience and one that may start the night before the dive. Divers spoke about looking out for one another and the growing trust that occurs as a result. Anglers tended to speak more of introducing others to the activity, and of sharing experiences and watching each other's backs on dangerous shorelines.
Transformative value: Memorable experiences that have a lasting impact on your life.	**D:** I only knew seaweed as this crispy stuff on the beach … [I] went diving for the first time in a seagrass bed and found it "**beautiful**… [I] will never forget this first dive. **A:** I actually have a **fear of water**. I can swim but only just. Groups of kids, taking them out fishing, Walker Bank, it's a vast stretch of sand, nothing there. It was low tide. It was the 1st time they went to fish. There was a little Asian lad who landed a flatfish, it was **fantastic**, he'd **never seen something like that**, [and] he'd hardly ever seen it at Morrison's. They were 7-17 year old and they all landed with something. Then one of them landed a weaver fish, it was a 17 year old who had **only been to the beach twice** in his life, his parents couldn't afford it. A big feeling of **pride. Passing knowledge on** to them, they were fascinated when I said watch the seagulls. There was a school of bass forcing the white bait to the surface, that was what the seagulls went for, getting to **know that, how marine biodiversity all links together**. As soon as one of them catches their first fish, it **stays with you forever**. **A:** It's about **introducing someone else**. We had **so many fish** in one go that day. He was hooked for life. Pardon the pun!	**Universalism**: a world of beauty, equality. **Benevolence**: helpful. **Achievement**: influential.	Divers talked about lasting impressions that sites and interactions with other species made on them. Anglers spoke about introducing others to angling and the impact this has had for the individual who was introduced and for themselves.
Emergent theme: Exploration, adventure and challenge.	**A:** I was with my dad, the sea was like a millpond, [and] then **suddenly** out of nowhere 100s and 100s of salmon and trout started jumping! **D:** I get a **buzz** from it [diving] … I love to **see things** others haven't seen … You are in your **own world**… [I] love to see the **diversity.** **D:** Every time I send down a shot line I feel **excitement**. **D:** It's about the marine life and the **adventure**, for me the marine life is a bonus.	**Power**: ambitious. **Self-direction**: curious, choosing own goals, independent. **Stimulation**: daring, a varied life, an exciting life.	Divers were most likely to share stories relating their experience to exploration and adventure.

anglers referred to themselves as observers rather than the participants that the divers saw themselves to be.

> *"I wouldn't go anywhere without my binoculars… [I like to] watch the terns diving…. It is that relation to nature that gets me….you don't have to catch a fish on a good day".*

Anglers also tended to share stories about introducing angling to others and the influence that this has had for someone else. In particular these stories were about passing on knowledge or experience to a younger person, and these experiences were often transformative for all the parties involved.

> *"Then one of them landed a weaver fish, it was a 17 year old who had only been to the beach twice in his life, his parents couldn't afford it. A big feeling of pride. … Passing knowledge on to them, they were fascinated when I said 'watch the seagulls'. There was a school of bass forcing the white bait to the surface, that was what the seagulls went for, getting to know that, how marine biodiversity all links together. As soon as one of them catches their first fish, it stays with you forever".*

The transcendental values circled by anglers and divers in the values compass following storytelling (Fig. 3) matched those arising through it (Table 6) in terms of the categories of values that were mostly strongly expressed, particularly universalism, benevolence, stimulation, self-direction, and pleasure. This suggests these types of values strongly underpin motivations for going diving and sea-angling, as much as the range of well-being benefits identified, which also clearly came through in the stories. The highest scoring values by far were enjoying life and protecting the environment, followed by honest, self-respect, freedom, and a varied life.

Notably, particular values in the universalism, benevolence and self-direction categories scored strongly, even when they were not explicitly brought out by the stories, e.g. honest, creative and choosing own goals, as might be expected from Schwartz (1994) value structure. Sometimes discussions brought out relations that were not immediately obvious. For example, discussions around social justice might relate to the importance of open access to the environment. Here anglers often strongly expressed the psychological importance of their activity and that those on low incomes did not necessarily have alternatives if areas would be closed off or some kind of licensing were introduced,[3] the idea of which was felt as genuinely upsetting and deeply unfair. Justice was also an issue in terms of bringing justice to commercial fisheries (particularly mobile gear), who should not be allowed to 'get away with' destroying the environment.

In discussions around transcendental values, participants were often struck by how many of their core values they could associate with diving or angling. As such, this often led to strong realisations that these activities and the marine environment were a fundamental part of their core identity. Here, values and identity were seen as co-emergent over time:

> *"When you start diving you do it for the buzz, but over time you learn things and become more respectful. Most people just seem to*

[3] Sea angling is unlicensed in the UK. However, codes of conduct and voluntary catch and release practices are common.

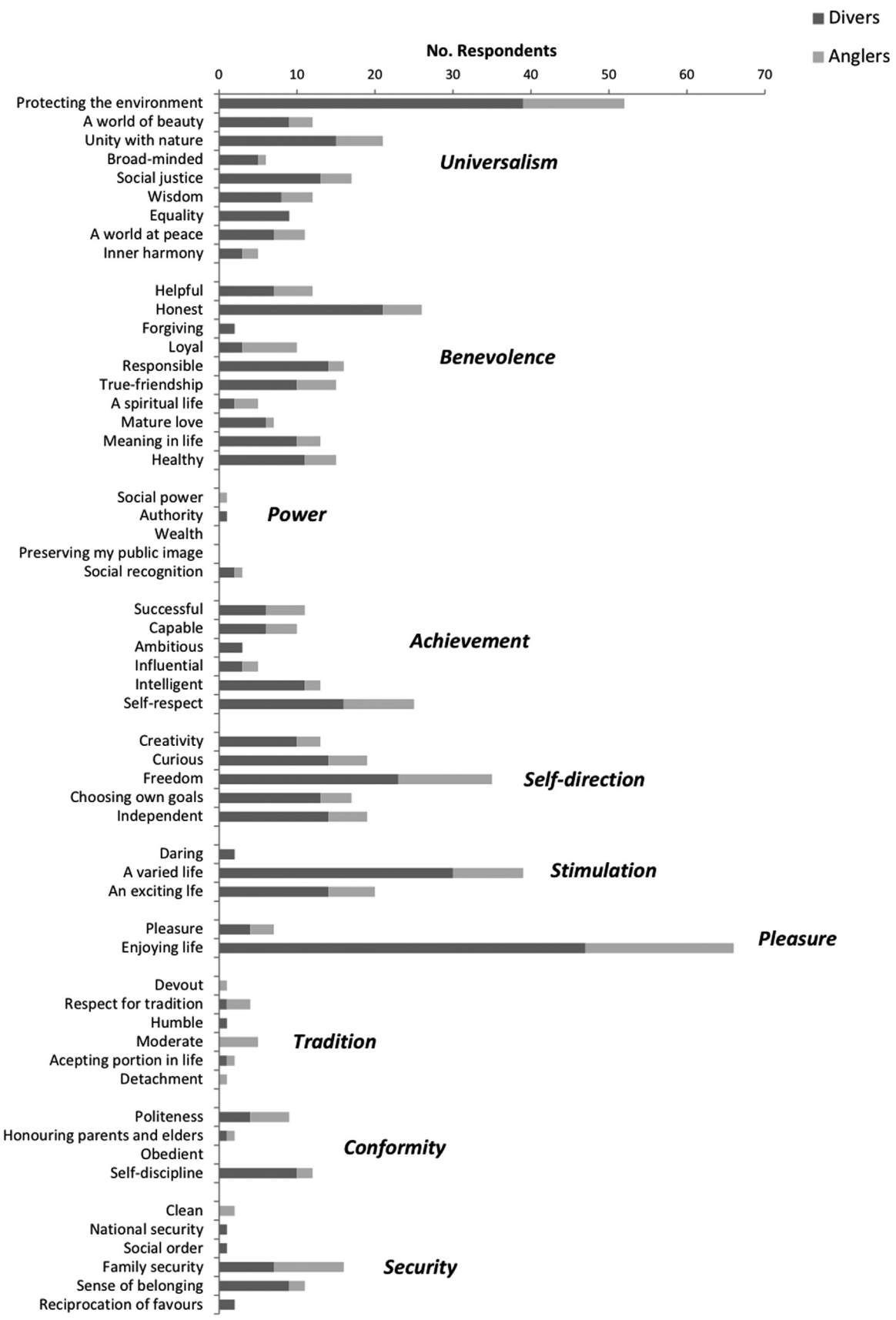


Fig. 3. Values circled by participants after storytelling in the transcendental values compass exercise.

Table 7
Individual/non-deliberated vs group/deliberated willingness to pay.

Stage	*Online or workshop*	*Individual or group values*	*Deliberative intervention 'treatments'*	*Mean WTP*	*Change vs Stage 1*
1	Online	Individual	None	£8.86	
2	Workshop	Individual	Information	£9.22	4%
3	Workshop	Group	Information	£5.72	−35%
4	Workshop	Individual	Information +transcendental values	£7.28	−18%
5	Workshop	Group	Information +transcendental values	£4.30	−51%

WTP based on mid-points for payment scale interval. One-way analysis of variance of natural log of mid-point of WTP interval indicates significant variance between stages (p=0.004).

see the sea as a dump. If more people would dive or fish they would feel more connection".

3.2. Monetary valuation

A high proportion (45%) of the 95 respondents who participated in both the survey and workshops provided protest responses to the CV questions at one or more stages of the monetary valuation, and were excluded, leaving a sample of 52 respondents for analysis albeit with 1040 observations.

The results of the ANOVA comparing monetary values across the five stages are presented in Table 7, indicating significant variation (p=0.004). There was little difference between individual WTP in stages 1 (online survey) and 2 (post-information intervention). Individual WTP elicited in stage 4, post-transcendental values intervention, was 18% lower than in stage 1. The group valuation elicited in valuation stage 3 (group values) was lower than valuations at stages 1 or 2. Fair prices in stages 3 and 5 were 35% and 51% lower than individual WTP in Stage 1.

Interval regression models are presented in Table 8. Because monetary value was estimated as the natural log of the parameters, coefficients (β) in Table 8 provide an indication of their value but cannot be converted into monetary values directly (their sum, including the constant, represents the log of values). Across models A-C, the most important attributes were large fish, octopus and wrecks. Distance to the site, as expected, had a significant negative effect; i.e. individuals were willing to donate less to preserve geographically distant sites. Presence of bird colonies or the size of the protected area did not significantly affect individuals' monetary values for a site, nor did income, age or sex.

Because of the large amount of habitats under consideration, it was not possible to tease out stage-specific effects for different marine habitats, but it was possible to compare overall online survey with workshop results. In the survey results for both the subgroup of workshop participants and the sample of all survey participants (Kenter et al., 2013; Jobstvogt et al., 2014b), WTP for conservation was independent of the specific habitat that participants were asked about. While habitats were not a significant predictor for WTP in the online survey, the interaction effect between workshop participation and how participants valued habitats (Table 8, Model A) showed nine habitats that significantly contributed to monetary values; thus, in the workshops, participants formed clearer preferences about the underwater landscape attribute and most habitats significantly influenced their monetary values for protecting a site (Table 9).

Wald multiple hypothesis tests presented in Table 10 showed that the changes found between the valuation stages in the ANOVA were also evident in the interval regression analysis, indicating significant impacts of the three deliberation treatments (information; transcendental values; and group values). The support for management restrictions on dredging and trawling, represented mainly by the commercial fishing sector, increased after both the information and transcendental values interventions. Deliberation on transcendental values and group decision-making in stage 5 reduced support for restrictive access options, i.e. those access options that would have affected the recreational users themselves, with discussions in the workshops suggesting an arising sense of solidarity between the users about access rights.

In both group discussion stages, the presence of large fish became a significantly less important feature of potential MPA sites compared to the online survey. In contrast, the value of charismatic species, protection of vulnerable species and wrecks were stable across the different stages, suggesting that these were well-defined preferences. Respondents preferred geographically closer sites and this preference was also stable across valuation stages and unaffected by deliberation.

In terms of convergence between monetary and non-monetary values, the SWB parameter representing the mean of the 14 SWB indicators predicted monetary values in the group valuation stages, but not the individual valuation stages (Table 8, Model B, and Table 10).

3.3. Value-Belief Norm and Theory of Planned Behaviour items

CFA model fit was very good across multiple indicators (RMSEA and SRMR < 0.5; CFI, TLI and CD at least 0.95; see Kenter et al. (2014b), annex 3; and Raymond and Kenter (2016) for detail. All items loaded onto their expected factors, except for AC2 with a loading of < 0.32 (following Costello and Osborne, 2005). The VBN SEM model would not converge; considering CFA model results we excluded AC which led to specification of well-fitting model (following the same criteria as for the CFA). All indicators loaded strongly onto their hypothesised factors, apart from NEP4 and NEP10, although Cronbach's alpha scores were low for AR, NOR and PBC. Alpha scores and differences between pre- and post-deliberation means and variance are given in Table 11.

Biospheric values (mean 4.98 for pre-deliberation scores on a −1 to 8 scale) and altruistic values (4.88) scored substantially higher than egoistic values (3.18). Participants expressed mostly pro-environmental worldviews (NEP mean 3.95 on a 1–5 scale) and personal norms (4.37). Subjective norm scores (3.79) indicated that participants perceived their social environment to favour contributing to marine conservation. PBC scores were moderate (mean 3.12) with the high standard deviation (0.95) suggesting that participants had divergent feelings about the degree to which they could effectively help protect the marine environment.

Two factors changed significantly in mean scores after deliberation. Egoistic values declined substantially (from 2.86 to 2.25), while altruistic values declined to a lesser extent (from 4.85 to 4.46). Thus while biospheric value scores did not change significantly, they increased in relative importance.

Table 8, Model C, and Table 10 indicate how VBN/TPB psychometric variables affected monetary values. Participants with stronger altruistic and biospheric values had a tendency for higher WTP in the survey. This effect then disappeared in stages two and three of the valuation. However, after the transcendental values intervention, altruistic and biospheric values again became influential.

Egoistic values also followed a complex pattern. In the survey, they negatively influenced WTP to the same degree that biospheric/altruistic values influenced WTP positively. In the first valuation stage of the workshop, following the information intervention this effect disappeared and egoistic values had a positive impact on WTP. In the group valuation stages, however, egoistic values again negatively influenced monetary values. During the course of the workshop, the egoistic value mean decreased significantly. In stage 5, the degree to which participants' egoistic values had decreased substantially and positively

Table 8
Contingent valuation interval regression models.

Model A				*Model B*				*Model C*			
Parameter (unit)	*β*	*SE*		*Parameter (unit)*	*β*	*SE*		*Parameter (unit)*	*β*	*SE*	
Distance (10 miles)	−0.022	0.002	***	Distance (10 miles)	−0.022	0.002	***	Distance (10 miles)	−0.019	0.002	***
Vulnerable species (1 sp)	0.015	0.006	**	Vulnerable species (1 sp)	0.017	0.006	**	Vulnerable species (1 sp)	0.020	0.007	***
Seal	0.145	0.074	*	Seal	0.142	0.073	*	Seal	0.213	0.076	***
Octopus	0.268	0.081	***	Octopus	0.190	0.080	**	Octopus	0.269	0.083	***
Shipwreck	0.226	0.064	***	Shipwreck	0.223	0.063	***	Shipwreck	0.203	0.065	***
Large fish	0.347	0.064	***	Stage 1	Base			Stage 1	Base		
Access 1	Base			Stage 2	0.065	0.492	NS	Stage 2	1.059	0.683	NS
Access 2	−0.038	0.135	NS	Stage 3	−1.568	0.495	***	Stage 3	1.614	0.684	***
Access 3	0.187	0.084	**	Stage 4	−0.971	0.488	**	Stage 4	0.483	0.687	NS
Access 4	−0.261	0.083	***	Stage 5	−1.715	0.490	***	Stage 5	0.492	0.689	NS
Restrictions 1	Base			Access 1	Base			Access 1	Base		
Restrictions 2	0.461	0.090	***	Access 2	0.062	0.251	NS	Access 2	0.103	0.265	NS
Restrictions 3	0.602	0.093	***	Access 3	0.247	0.159	NS	Access 3	0.383	0.165	**
Restrictions 4	0.402	0.099	***	Access 4	−0.169	0.156	NS	Access 4	−0.055	0.160	NS
Workshop	−1.107	0.205	***	Stage 1* Access 1	Base			Stage 1* Access 1	Base		
Habitat 1	Base			Stage 2* Access 2	−0.339	0.415	NS	Stage 2* Access 2	−0.380	0.427	NS
Habitat 2	0.207	0.372	NS	Stage 3* Access 2	0.671	0.415	NS	Stage 3* Access 2	0.609	0.427	NS
Habitat 3	−0.308	0.289	NS	Stage 4* Access 2	−0.128	0.398	NS	Stage 4* Access 2	−0.133	0.415	NS
Habitat 4	−0.103	0.286	NS	Stage 5* Access 2	−0.785	0.399	**	Stage 5* Access 2	−0.856	0.415	**
Habitat 5	0.196	0.286	NS	Stage 2* Access 3	−0.053	0.249	NS	Stage 2* Access 3	−0.100	0.262	NS
Habitat 6	0.461	0.286	NS	Stage 3* Access 3	0.077	0.250	NS	Stage 3* Access 3	−0.243	0.262	NS
Habitat 7	0.246	0.305	NS	Stage 4* Access 3	−0.173	0.237	NS	Stage 4* Access 3	−0.266	0.246	NS
Habitat 8	−0.130	0.306	NS	Stage 5* Access 3	−0.376	0.238	NS	Stage 5* Access 3	−0.509	0.247	***
Habitat 9	0.203	0.310	NS	Stage 2* Access 4	−0.055	0.258	NS	Stage 2* Access 4	−0.149	0.267	NS
Habitat 10	0.170	0.304	NS	Stage 3* Access 4	0.180	0.259	NS	Stage 3* Access 4	−0.081	0.268	NS
Habitat 11	−0.494	0.284	*	Stage 4* Access 4	−0.036	0.243	NS	Stage 4* Access 4	−0.159	0.251	NS
Habitat 12	0.619	0.309	**	Stage 5* Access 4	−0.691	0.243	***	Stage 5* Access 4	−0.800	0.251	***
Habitat 13	−0.065	0.373	NS	Restrictions 1	Base			Restrictions 1	Base		
Habitat 14	0.515	0.336	NS	Restrictions 2	−0.063	0.174	NS	Restrictions 2	−0.160	0.179	NS
Habitat 15	−0.526	0.339	NS	Restrictions 3	0.280	0.178	NS	Restrictions 3	0.232	0.184	NS
Habitat 16	−0.173	0.315	NS	Restrictions 4	0.026	0.193	NS	Restrictions 4	−0.124	0.199	NS
Habitat 1* workshop	Base			Stage 1* Restrictions 1	Base			Stage 1* Restrictions 1	Base		
Habitat 2* workshop	0.399	0.418	NS	Stage 2* Restrictions 2	0.357	0.258	NS	Stage 2* Restrictions 2	0.321	0.267	NS
Habitat 3* workshop	1.437	0.346	***	Stage 3* Restrictions 2	0.547	0.258	**	Stage 3* Restrictions 2	0.700	0.268	***
Habitat 4* workshop	0.919	0.345	***	Stage 4* Restrictions 2	0.998	0.264	***	Stage 4* Restrictions 2	1.187	0.272	***
Habitat 5* workshop	0.863	0.334	**	Stage 5* Restrictions 2	0.788	0.264	***	Stage 5* Restrictions 2	0.911	0.273	***
Habitat 6* workshop	0.470	0.341	NS	Stage 2* Restrictions 3	−0.027	0.258	NS	Stage 2* Restrictions 3	−0.023	0.266	NS
Habitat 7* workshop	0.740	0.354	**	Stage 3* Restrictions 3	0.380	0.258	NS	Stage 3* Restrictions 3	0.429	0.266	NS
Habitat 8* workshop	0.519	0.357	NS	Stage 4* Restrictions 3	0.705	0.256	***	Stage 4* Restrictions 3	0.958	0.268	***
Habitat 9* workshop	0.843	0.367	**	Stage 5* Restrictions 3	0.337	0.257	NS	Stage 5* Restrictions 3	0.356	0.268	NS
Habitat 10* workshop	0.915	0.355	**	Stage 2* Restrictions 4	0.246	0.322	NS	Stage 2* Restrictions 4	0.365	0.330	NS
Habitat 11* workshop	1.341	0.337	***	Stage 3* Restrictions 4	−0.126	0.322	NS	Stage 3* Restrictions 4	0.005	0.331	NS
Habitat 12* workshop	0.344	0.365	NS	Stage 4* Restrictions 4	0.746	0.280	***	Stage 4* Restrictions 4	1.043	0.291	***
Habitat 13* workshop	0.857	0.423	**	Stage 5* Restrictions 4	0.906	0.280	***	Stage 5* Restrictions 4	1.056	0.292	***
Habitat 14* workshop	0.541	0.389	NS	Large fish	0.255	0.125	**	Large fish	0.245	0.131	**
Habitat 15* workshop	1.261	0.389	***	Stage 1* Large fish	Base			Stage 1* Large fish	Base		
Habitat 16* workshop	0.506	0.364	NS	Stage 2* Large fish	0.179	0.234	NS	Stage 2* Large fish	0.173	0.245	NS
Angler	−0.327	0.121	***	Stage 3* Large fish	−0.328	0.234	NS	Stage 3* Large fish	−0.259	0.246	NS
Well-being	0.123	0.070	*	Stage 4* Large fish	0.191	0.202	NS	Stage 4* Large fish	0.140	0.207	NS
Constant	1.396	0.336	***	Stage 5* Large fish	−0.313	0.202	NS	Stage 5* Large fish	−0.406	0.208	*
Log-likelihood	−2105			Habitat 1	Base			Habitat 1	Base		
χ^2 (45 d.f.)	364		***	Habitat 2	0.332	0.184	*	Habitat 2	0.166	0.195	NS
Pseudo R^2	0.08			Habitat 3	0.587	0.159	***	Habitat 3	0.527	0.164	***
Observations	1040			Habitat 4	0.483	0.160	***	Habitat 4	0.454	0.165	***
				Habitat 5	0.698	0.144	***	Habitat 5	0.722	0.148	***
				Habitat 6	0.605	0.163	***	Habitat 6	0.576	0.169	***
				Habitat 7	0.653	0.154	***	Habitat 7	0.661	0.155	***
				Habitat 8	0.085	0.166	NS	Habitat 8	0.035	0.174	NS
				Habitat 9	0.681	0.175	***	Habitat 9	0.677	0.181	***
				Habitat 10	0.690	0.157	***	Habitat 10	0.743	0.161	***
				Habitat 11	0.402	0.161	**	Habitat 11	0.349	0.166	**
				Habitat 12	0.656	0.165	***	Habitat 12	0.574	0.170	***
				Habitat 13	0.326	0.172	*	Habitat 13	0.371	0.183	**
				Habitat 14	0.761	0.168	***	Habitat 14	0.901	0.170	***
				Habitat 15	0.247	0.165	NS	Habitat 15	0.248	0.170	NS
				Habitat 16	−0.001	0.179	NS	Habitat 16	0.091	0.187	NS
				Angler	0.081	0.170	NS	Angler	0.109	0.184	NS
				Stage 1*Angler	Base			Stage 1*Angler	Base		
				Stage 2*Angler	−0.394	0.185	**	Stage 2*Angler	−0.495	0.197	**
				Stage 3*Angler	−0.597	0.185	***	Stage 3*Angler	−0.797	0.198	***
				Stage 4*Angler	−0.419	0.186	**	Stage 4*Angler	−0.469	0.198	**
				Stage 5*Angler	−0.603	0.186	***	Stage 5*Angler	−0.919	0.199	***

(continued on next page)

Table 8 *(continued)*

Model A			*Model B*				*Model C*			
Parameter (unit)	*β*	*SE*	*Parameter (unit)*	*β*	*SE*		*Parameter (unit)*	*β*	*SE*	
			Well-being	0.013	0.097	NS	Altruistic & Biospheric†	0.153	0.080	*
			Stage 1* Well-being	Base			Stage 1* Altruistic & Biospheric	Base		
			Stage 2* Well-being	−0.064	0.106	NS	Stage 2* Altruistic & Biospheric	−0.205	0.086	**
			Stage 3* Well-being	0.266	0.107	**	Stage 3* Altruistic & Biospheric	−0.277	0.086	***
			Stage 4* Well-being	0.068	0.106	NS	Stage 4* Altruistic & Biospheric	−0.110	0.086	NS
			Stage 5* Well-being	0.309	0.107	***	Stage 5* Altruistic & Biospheric	−0.005	0.086	NS
			Constant	1.651	0.441	***	Egoistic	−0.153	0.088	*
			Log-likelihood	−2047			Stage 1* Egoistic	Base		
			χ^2 (69 d.f.)	478		***	Stage 2* Egoistic	0.274	0.095	***
			Pseudo R^2	0.10			Stage 3* Egoistic	0.123	0.095	NS
			Observations	1040			Stage 4* Egoistic	0.221	0.095	**
							Stage 5* Egoistic	0.025	0.095	NS
							Egoistic change	0.030	0.060	NS
							Stage 1* Egoistic change			
							Stage 2* Egoistic change	−0.003	0.065	NS
							Stage 3* Egoistic change	0.053	0.065	NS
							Stage 4* Egoistic change	−0.054	0.065	NS
							Stage 5* Egoistic change	0.132	0.065	**
							Subjective norms	0.197	0.124	NS
							Stage 1* Subjective norms			
							Stage 2* Subjective norms	−0.260	0.133	*
							Stage 3* Subjective norms	−0.287	0.133	**
							Stage 4* Subjective norms	−0.344	0.133	**
							Stage 5* Subjective norms	−0.254	0.133	*
							Constant	0.534	0.620	NS
							Log-likelihood	−1830		
							χ^2 (84 d.f.)	482		***
							Pseudo R^2	0.12		
							Observations	1040		

NS: not significant; SE: standard error; d.f.: degrees of freedom; sp: species.
*** $p < 0.01$.
** $p < 0.05$.
* $p < 0.1$.

influenced their WTP expressed in their group votes, but not in other stages.

Subjective norms did not impact on WTP in the survey while in the workshops they decreased monetary values across the different stages. Thus, those who believed their social connections had pro-environmental norms stated lower monetary values themselves in the group setting. Environmental worldview did not significantly influence monetary values and the other psychometric items did not adequately load onto hypothesised factors (Raymond and Kenter, 2016) and were thus not included in the model.

3.4. Participant confidence, preferences for ways of eliciting values, motivations and ways of decision-making

Participants felt substantially more confident about their answers in the workshops than in the online survey (Fig. 4). Asking participants for their opinion on which approach should be used to assess their values in decision-making around marine sites, the majority of participants indicated they preferred the workshop format and most of those preferred group to individual choices (Fig. 5).

Key value motivations were bequest and option value, which were judged by 53% and 47% of participants as of very high importance after stage 4. Existence value scored 41% and altruistic value 36%. Participants did not significantly change their answers for motivational aspects during the course of the workshop.

In terms of the way participants made decisions on their payments, there were some clear differences between the survey and workshops (Fig. 6). In the survey, 26% indicated "I picked an amount depending on what I thought protecting a specific site was worth", which increased to 60–64% in the different stages of the workshop. The number of participants who focused on their ability to pay also increased, from 27% to 37–38%. At the same time, protest bids resulting from the view that money should come from another source, such as taxes, increased from 15% in the survey to 26% in the first part of the workshop and 22% after the transcendental values intervention. Strategic bidding was minimal throughout the stages.

4. Discussion

The results supported each of our three hypotheses: (1) that deliberating on information would change preferences; (2) that deliberating on transcendental values would change preferences; (3) that participants would form different preferences in group valuation compared to individual valuation tasks, i.e. their shared values would be different from their mean individual values. We will discuss the impacts of each of these three deliberative 'treatments' in turn, supported by verbatim from participants' deliberations (all quotes are from different individuals unless otherwise indicated), before widening our discussion to the broader implications for deliberative value formation and the benefits of integrated mixed methodologies for valuing ES.

4.1. Deliberating on information

Despite pre-existing familiarity of participants with the types of sites presented to them, online survey respondents expressed only very limited preferences for protecting particular marine habitats with no difference in WTP for almost all habitat types. Familiarity of the underwater 'landscape' was not restricted to divers; one angler noted that "*you can **feel** the ground when you are fishing*" for him, he did not have to see the habitat to know it. While the information intervention did not affect the overall level of WTP, it supported the formation of more specific contextual values and preferences resulting from making participants' sense of value around different habitats, and

Table 9
Variables used in the contingent valuation models in Table 8.

Parameter	*Description*
Distance	Distance from the participant's home to the MPA in 10 mile increments
Vulnerable species	Vulnerable species protected within the MPA; coefficient per increment of 1 species
Seal	Grey or common seal present in the MPA (base level=not present)
Octopus	Octopus present in the MPA (base level=not present)
Shipwreck	Shipwreck present in the MPA (base level=not present)
Large fish	Large/specimen fish present in the MPA (base level=only small fish present)
Stage 1	Online survey (valuation stage 1; base level)
Stage 2	First individual valuation in workshop (valuation stage 1)
Stage 3	First group valuation in workshop (valuation stage 3)
Stage 4	Second individual valuation in workshop (valuation stage 4)
Stage 5	Second group valuation in workshop (valuation stage 5)
Workshop	All workshop stages combined i.e. valuation stages 2–5 (base level=online survey)
Access 1	Access by shore and boat (base level)
Access 2	Access by shore only
Access 3	Access by shore, boat and pier
Access 4	Access by boat only
Restrictions 1	None of the restrictions (base level)
Restrictions 2	No dredging and trawling
Restrictions 3	No dredging, trawling, potting and gillnetting
Restrictions 4	No dredging, trawling, anchoring and mooring
Habitat 1	Mostly muddy seafloor, no particular features (base level)
Habitat 2	Mostly sandy or gravelly seafloor with horse mussels, blue mussels, oysters, or flame shells
Habitat 3	Mostly muddy seafloor with horse mussels, blue mussels, oysters, or flame shells
Habitat 4	Mostly rocky seafloor with horse mussels, blue mussels, oysters, or flame shells
Habitat 5	Mostly rocky seafloor with large kelp and seaweeds
Habitat 6	Mostly rocky seafloor with anemones, soft corals, and sponges
Habitat 7	Mostly muddy seafloor with sea-pens, burrowing animals and firework anemones
Habitat 8	Mostly sandy or gravelly seafloor with honeycomb or Ross worm colonies
Habitat 9	Mostly rocky seafloor with honeycomb or Ross worm colonies
Habitat 10	Mostly sandy or gravelly seafloor with sea grass or eel grass beds
Habitat 11	Mostly muddy seafloor with burrowing sea urchins and brittle stars
Habitat 12	Mostly sandy or gravelly seafloor with scallops and sea urchins
Habitat 13	Mostly sandy or gravelly seafloor in tide swept channel
Habitat 14	Mostly rocky seafloor in tide swept channel
Habitat 15	Mostly rocky seafloor with rocky habitats in estuary
Habitat 16	Mostly muddy seafloor with intertidal boulders
Well-being	Mean of 14 subjective well-being indicator items; workshop data. Coefficient per point on 5 point Likert scale.
Altruistic & Biospheric	Mean of 3 biospheric and 3 altruistic transcendental value indicator items; survey data; combined given strong covariance between altruistic and biospheric factors. Coefficient per point on 9 point Likert scale.
Egoistic	Mean of 3 egoistic transcendental value indicator items; survey data. Coefficient per point on 9 point Likert scale.
Egoistic change	Difference in means of egoistic transcendental value indicator items between survey data and workshop data. Coefficients per point difference on Likert-scale.
Subjective norms	Mean of 2 subjective norms indicator items post-deliberation. Coefficient per point on 5 point Likert scale.

consequently the importance of management restrictions, explicit. It also affected the way participants made decisions about their payments, considering sites more closely.

In the workshops, habitats that had the highest values such as kelp and tide-swept channels (Table 8, Model A) were some of the most discussed. However, in discussing habitats and species in detail, the notion of interdependence of different parts of marine life, and that damaging parts would be risking the whole was a theme that recurred in each workshop. Diver 1: "*All species are important, because they're all interlinked*". Angler: *"Yes, through food webs"*. Diver 1: *"so one thing affects everything else"*. Diver 2: *"And it's unpredictable, we don't know what would happen [if some species were not there]"*. There were also discussions about the broader significance of specific marine ecosystems, such as the degree to which particular habitats were important as spawning habitats. Deliberation regularly tied together the topics of restrictions and biodiversity: For example, one diver noted that *"species don't do well without other species, it's all interdependent. That means that if something like scallop dredging happens, it doesn't regenerate so easily"*. These discussions carried over into the group deliberation during the valuation itself, e.g. *"in the future there might be more to see [at this site] because of all these restrictions"*, according to one diver. Divers and anglers also discussed that some habitats were more fragile than others, or more at risk. They sometimes also exchanged their experiences of what happened after an area had been trawled. *"You often notice what's absent. There's no diversity, an absence of everything after trawling. We have to be in a position to protect that diversity"* (diver). Thus, the information intervention helped participants form contextual values that expressed more understanding of the systemic relations between marine habitats and species, reflected in increased importance assigned to restrictions on dredging and trawling.

Perhaps counter-intuitively, protesting increased following the information intervention. This can be explained in various ways. First, at the start of the workshop, participants received a detailed presentation on how MPA policies across the UK might be implemented. This appeared to reduce support for the policies amongst anglers, though not divers, and agreement with the need for marine conservation in general did not change with either group (Kenter et al., 2014b). Second, participants spent more time considering what was asked of them in the four-hour workshop than in the online survey, which took participants on average around 20 min to complete. This may have led to more clearly formed beliefs around not willing to pay because the money should come from elsewhere. Thirdly, there were some vocal protestors who had already announced their position in the question round after the initial presentation, i.e. before the first individual valuation stage in the workshop (stage 2). Although facilitators did not allow for discussion of these issues until after stage 2 was completed, it is conceivable that the surfacing of these concerns encouraged others to

Table 10
Wald analysis of effects of deliberative interventions and group-based (vs individual) valuation on different contingent valuation attributes in interval regression models. Arrows indicate increases or decreases in monetary values in response to treatments. Blank cells indicate no significant interaction.

Interaction with stage	*Information*	*Transcendental values*	*Group valuation*
(Model B)			
Access by shore and boat	(base)	(base)	(base)
Access by shore only		↓***	↓**
Access by shore, boat and pier			
Access by boat only		↓***	↓**
No restrictions	(base)	(base)	(base)
Restrictions on dredging and trawling	↑***	↑*	
Restrictions on dredging and trawling+potting and gillnetting	↑***	↑**	↑*
Restrictions on dredging and trawling +anchoring and mooring	↑**	↑***	
Small fish only	(base)	(base)	(base)
Large/specimen fish			↓***
Diver	(base)	(base)	(base)
Angler	↓**		
Mean subjective well-being score			↑***
(Model C)			
Altruistic and biospheric TVs	↓**	↑**	
Egoistic TVs	↑***		↓**
Decrease in egoistic TVs in workshop vs survey		↑**,a	
Subjective norms	(↓)[b]	↓*,c	↓↑*,d

Results based on Wald contrast tests for information (stage 2 vs 1), transcendental values (stage 4 vs 2 & 5 vs 3) and group treatments (stage 3 vs 2 & 5 vs 4); results need to be read in conjunction with effect sizes in Table 8.
TVs: transcendental values; (base): attribute base level;
↑: Increase in monetary values in response to treatment; ↓: decrease in response to treatment.
*** $p < 0.01$.
** $p < 0.05$.
* $p < 0.1$.
[a] Effect significant in stage 5 following combined transcendental values/group deliberation treatment; p value shown for stage 5 vs 4.
[b] In regression model, contrast between stage 2 and base indicates negative effect on WTP with p=0.05, but in Wald test stage 2 vs 1: p=0.13.
[c] Effect significant in stage 5 vs 3 but not 4 vs 2.
[d] Negative effect on monetary values arises in stage 2; similar in stage 3; then strengthened in stage 4, and reduced in stage 5 to similar level as 2–3.

also exert protest bids.

4.2. Deliberating on transcendental values

In the transcendental values intervention, a wide array of themes was brought up related to transcendental values, well-being, experiences and emotions. These made implicit values explicit, highlighting for many participants the deeper significance of the marine environment as a central part of their identity and as something that shaped how they lead their lives.

Through sharing narratives and discussions, it became apparent that the two user groups shared strong communal values around protecting the environment and the way that they experienced marine sites. In particular, both groups expressed their relationship with the marine environment in a bidirectional, mutualistic way. As a consequence, in terms of the valuation exercise there were no strong value-conflicts between self-regarding values and other-regarding values, as values such as enjoyment, pleasure and self-direction depended on protecting the environment and being in harmony with it. Thus, the

Table 11
Values-beliefs-norms and Theory of Planned Behaviour means, standard deviations and Cronbach's Alpha scores (adapted from Raymond and Kenter, 2016).

	Alpha[†]		*Pre-deliberation*		*Post-deliberation*		
	Survey	*Workshop*	*Mean*	*SD*	*Mean*	*SD*	
EGO[††]	0.59	0.67	2.86	1.25	2.25	1.51	*
ALT	0.78	0.76	4.85	1.43	4.46	1.48	*
BIO	0.90	0.78	5.02	1.35	5.07	1.35	
NEP	0.70	0.76	3.96	0.56	3.82	0.73	
AC	0.26	0.58	4.46	0.69	4.13	1.16	
AR	0.55	0.32	3.89	0.87	3.74	0.94	
NOR[‡]	0.42	0.42	4.51	0.58	4.22	0.98	
SUB	0.73	0.75	4.07	0.72	3.94	0.90	
PBC	0.38	0.58	3.23	1.01	3.17	1.09	

EGO: egoistic values; ALT: altruistic values; BIO: biospheric values; NEP: New Ecological Paradigm (environmental worldview); AC: awareness of consequences beliefs; AR: ascription of responsibility beliefs; NOR: pro-environmental norms; SUB: pro-environmental subjective norms; PBC: perceived behavioural control. SD: standard deviation. EGO, ALT, BIO on a −1 to 8 continuous scale, others on a 1–5 continuous scale. For item descriptions see Table 5.
* Significant difference between pre-and post-deliberation workshop scores at $p < 0.05$ (Bonferroni correction applied for 18 comparisons).
[†] Alpha scores for survey based on sample with all survey participants (n=1683); for workshop based on all workshop participants who also participated in the survey (n=90).
[††] EGO2 dropped.
[‡] Wilcoxon signed-rank test used to account for skewness; otherwise paired *t*-test used.

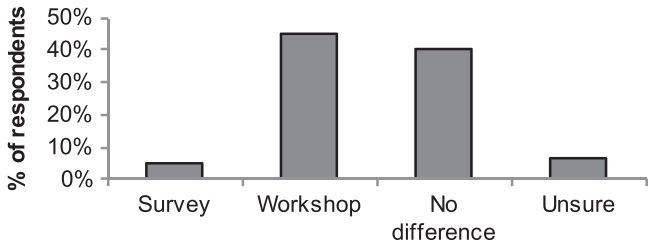


Fig. 4. Participant confidence levels in the workshops vs the online survey; where confidence was felt to be highest.

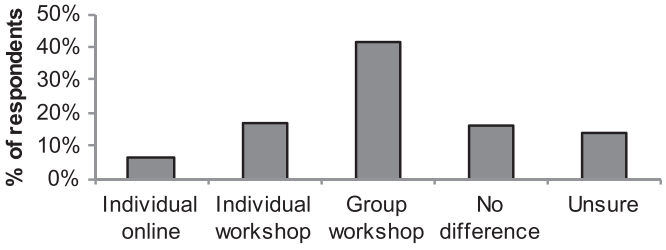
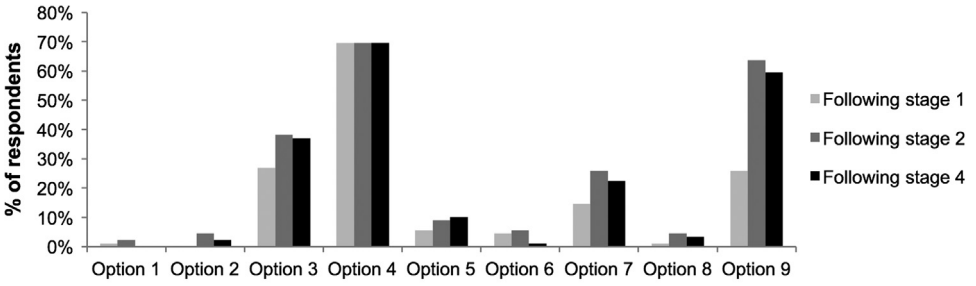


Fig. 5. Participant preferences for which values should be used in decision-making.

way that participants expressed their relationship with marine sites often neither fitted utilitarian nor deontological conceptualisation, being more akin to a sense of 'dwelling' (Ingold, 2000) in the environment (also see Cooper et al., 2016). This resonated in the psychometrics, where both egoistic and altruistic transcendental values decreased in score, raising the relative importance of biospheric values.

However, the transcendental values intervention also lead to more explicit 'moralisation' (Lo and Spash, 2012), bringing out a stronger normative element in relation to how sites ought to be managed. This supported a further push to impose restrictions on dredging and trawling in stages 4–5, building on discussions around their impact that had started in the previous intervention, but bringing in more explicit value judgements: *"Trawling – it's just criminal, basically"* (angler).

The intervention brought out debates around motivations for



Key to options

Option 1	I picked zero or low amounts because I wanted the average that comes out of the survey to go down.
Option 2	I picked high amounts because I wanted the average that comes out of the survey to go up.
Option 3	I considered my household budget, and how much I could spare.
Option 4	I considered how much I would pay, if I was really asked to donate.
Option 5	I thought about what others would donate.
Option 6	I picked high amounts because I thought it was the right thing to do.
Option 7	I picked zero or low amounts because I thought money needed for managing this site should come from another source, such as taxes.
Option 8	I picked zero or low amounts because I do not agree with proposed policies around marine protected areas.
Option 9	I picked an amount depending on what I thought protecting a specific site was worth.

Fig. 6. Ways participants decided on their payments. If participants ticked italicised options they were excluded from further analysis as a 'protestor' or 'strategic bidder'.

monetary values and how those might depend on transcendental values. Angler: *"Social justice was important for me. It also comes into this. If you make a donation, then some clown from out of town might come and make a mess of it, and then your tenner's gone down the drain"*. Diver [responding]: *"I would give even if it wouldn't make me feel good; it's because it's what's right"*.

Questions around access, fairness and social concern were reiterated during discussions around sites, where participants became more critical of sites with restricted access, driving average monetary values down. Concerns expressed in the workshops reflected broader fears within the sea angling community (e.g. in online discussion groups and social media) around the potential to use MPAs as a vehicle to introduce license fees, excluding people from lower income backgrounds.

Participants also saw restriction of their own activities as unjust because they considered angling and diving to have only minimal impact on the environment, and participants often saw themselves as virtuous, particularly in comparison to mobile gear fishers.[4] However, rather than leading to 'warm glow' issues where participants increased bids to reflect their moral high ground, it appeared to reinforce the effects of the information intervention to more closely scrutinise sites for measures limiting commercial fishers, bringing monetary values on average down.

4.3. Expressing group vs individual values

The impact of shifting from individual (workshop stages 2 and 4) to group deliberation (stages 3 and 5) led to substantial decrease in overall monetary values (Table 7), further rejection of restrictive access, convergence between monetary values and SWB (Table 10), and a negative association between egoistic values and fair prices.

In the group valuation sessions, participants would often evaluate the site systematically, briefly summarising and discussing attributes one by one. The relative importance of different attributes was also used as arguments in the debate, in a process of negotiation that often took place to reach consensus: *"Ok, You've talked me up to £20 but I'm not going up to £40!"* (angler). Participants also regularly raised the notion that every pound could only be spent once, so it should be spent wisely: on the right sites, achieving most value for money. The decline in monetary values was thus not the result of participants valuing marine conservation less, but of more intense, critical scrutiny of sites.

Part of the decrease in the shift from individual to group values may have also resulted from seeing the same block of sites twice, and thus having more time to think. However, there were also specific changes in particular parameters (e.g. large fish less important and access options more important in the final group valuation) that suggest a shift in value priorities. The 'fair price' framing, orientated participants more towards questions of justice, leading to other-regarding values becoming more explicit in discussions; reinforcing themes arising in the transcendental values intervention. For example, fairness became important in relation to access options, where participants deemed it inappropriate to agree high payments when some recreational users would be excluded from a site.

While it may be pre-supposed that pro-environmental values and norms of others might encourage participants, out of social desirability, to demonstrate altruism, and increase their monetary values. Indeed, psychometric testing measured a decrease in participants' expression of egoistic values, and in the final stage of the workshop, although monetary values overall decreased, decreases in egoism corresponded to voting for relatively higher fair prices. However, psychometric testing also showed that the degree to which subjective norms supported contributing to conservation did not impact on monetary values in the survey while in the workshops they decreased monetary values across the different stages. This suggests that it wasn't social desirability that shifted participants' values, but rather that following the transcendental values intervention, and particularly in the final deliberated group values stage, through the deliberations participants reflected their transcendental values more in their monetary values.

This is confirmed by the convergence between SWB indicators and monetary values in stage 5 (Tables 8 and 9). The eudaimonic nature of the SWB indicators meant they related to a broad range of transcendental values pertinent to conservation of MPAs, such as health, freedom, sense of belonging, responsibility and an exciting and varied life, and these values also came through clearly in the storytelling exercise (Table 6). Given that a significant convergence between SWB

[4] This is not an inaccurate perception. In contrast to significant issues elsewhere (e.g. shark fishing, mass dive tourism), environmental impacts from sea angling and diving in the UK are deemed very low by the regulators, to the degree that only very few MPAs restrict these activities.

and monetary values was only observed in the group-based fair prices following the transcendental values intervention, this again suggests that transcendental values were better reflected in the group-deliberated fair prices.

One might argue that participants were prompted towards the SWB indicators, introducing a bias associated with process design. However, workshop deliberations did not lead to changes in SWB scores and the convergence was based on SWB taken from the online survey. Thus, the group deliberative process did not constitute a manipulation towards externally imposed transcendental values, but rather served to bring a set of transcendental values to the fore that were already important, but might otherwise be missed in the monetary valuation frame.

4.4. Implications for valuing ecosystem services

A striking result of moving from individual valuation to group deliberation was the convergence between monetary values and SWB indicators, which suggests that *shared* monetary values were a better reflection of the *personal* wellbeing felt by participants than individual WTP. In addition, most participants felt more confident about their values in the workshops and felt they were more appropriate for use in decisions than their individual values. The deliberative interventions also stimulated participants to scrutinise sites more closely in terms of key issues such as access and restrictions, and they were better able to form preferences around different habitats. All together this led to reduced monetary values, yet also more specific preferences. These are strong arguments for the use of DMV over survey-based methods, and this suggests that shared values, or deliberated group values, may be a better reflection of welfare implications than non-deliberated individual WTP.

While these are the results of just one case study with a small sample size, a DMV study of the Inner Forth, Scotland (Kenter, 2016c), which combined choice experiments with deliberation on transcendental values and system dynamics, encountered similar results in terms of a downward shift of values resulting from both deliberative interventions and group deliberation, with discussions pointing to more scrutiny of the value of the project under consideration compared to other environmental projects and broader social priorities, with at the same time better reflection of transcendental values through their explicit elicitation. The small number of other studies that have considered the preferences of valuation participants for individual or group-based approaches also seems to suggest that their values were more considered, and could be better expressed, after group deliberation (Spash et al., 2009; Clark et al., 2000; Ryan and Spash, 2011).

Deliberation has been advocated based on critiques of neoclassical economic assumptions, and in particular the narrow view that it takes of value (e.g. Gómez-Baggethun and Ruiz-Pérez, 2011; Kenter et al., 2015; O'Neill, 2007, 1996; Sagoff, 1986; Spash, 2008; Zografos and Howarth, 2010), but the finding that stated monetary values are lower after deliberation suggests that there can also be reasons to support deliberation from a neo-classical economic perspective. From this perspective, a legitimate deliberation is one that improves participants' ability to value the implications of a hypothetical course of action (also see Kenter et al., 2016a), for example by helping respondents to understand complex environmental goods (Aanesen et al., 2015; Brouwer, 2012; Jobstvogt et al., 2014a) and the scope of the changes being valued (Kahneman and Knetsch, 1992; Veisten et al., 2004). Valuations are mostly ex-ante, and based on presentation of counterfactuals that can be hard to grasp. Despite on-going improvements in framing and techniques, the Achilles heel of CV and other stated preferences approaches remains hypothetical bias: the tendency of participants to overstate in surveys what they would be willing to pay in comparison to real life. Exploration of the potential of DMV to reduce hypothetical bias, and for better aligning perceived hypothetical/stated with actual/revealed welfare implications, would be a particularly interesting avenue of research.

When expressing deliberative values as a fair price, links can be made to the concept of 'inferred' WTP (where participants are asked to state what they think others are WTP). Studies that have compared conventional stated WTP and inferred WTP with actual WTP have mostly concluded that inferred WTP provides a better reflection of actual behaviour, because people believe themselves more generous than they actually are, but are less magnanimous about others (Yadav et al., 2012). Asking participants what would be a fair price naturally brings in the question around what would be acceptable to others. However, the fair price approach is fundamentally different to an inferred WTP in that doesn't ask people to reflect on the selfishness of others, but rather on what would be a just balance between self- and other-regarding values. Thus, the evidence from this study and the DMV study by Kenter 2016c provides a starting point to investigate whether the use of DMV and a fair price value indicator can provide a more realistic assessment of value implications than conventional individual WTP approaches.

However, a range of potential issues can be associated with group deliberation that will need to be managed to attain desirable outcomes like social learning and clearer reflection of transcendental values in value outcomes. (Kenter et al. 2016b) identify a wide range of factors of influence, such as the level of social interaction, people's ex-ante capacity to deliberate, the institutional context, group composition, whether transcendental values are made explicit, process intensity and duration, power dynamics and peer pressure. These need to be effectively addressed through best-practice process design and facilitation (Reed, 2008). Here, workshops were actively led by two facilitators, out of which at least one was highly experienced. While participants were generally amicable and respectful, where necessary a range of practical and psychological strategies was used to actively ensure participation, manage potential power dynamics and dominant individuals (e.g. Chambers, 2002; Hogan, 2003). This was also supported by the structured nature of the deliberations.

There are also practical issues that may limit the use of deliberated preferences studies, reflected in an important limitation of this study, in that it is harder to achieve large sample sizes; here the sample size was decimated between the online survey and the workshop stages. Thus, it needs to be considered when the potential added value of deliberative valuation is worth the cost in terms of time and resources required for data gathering to achieve larger samples. There is most likely to be added value when considering complex and/or contested goods and situations, where learning and a consideration of transcendental values are more important. Here deliberative workshops may actually be a more efficient means of data gathering than individual interviews which are conventionally used to administer complex questionnaires.

When confronted with complex and contested issues (as is often the case with ES) and values and benefits to well-being may be subtle and/or psychological (such as in management of MPAs), integration of deliberation and interpretive approaches can be an effective way to better to recognise the multiple value dimensions of ES. The narratives in this study revealed how marine sites provided a range of subtle cultural ES benefits, tied to the places that divers and anglers would visit. The values compass and storytelling interventions, helped bring understanding to experiences and identities that would otherwise be difficult to appreciate: the story expresses the way a place can make someone feel (Chan et al., 2012b). Combining narration and deliberation helps people to better understand what is worthwhile and meaningful to them and others, and empowers them because their voice is heard. Thus, storytelling acted as a component of deliberative value formation, but it also featured as a valuation method in itself, providing a richness to the valuation exercise as a whole. Divers and anglers portrayed profound experiences of beauty, fascination, magic, and connectedness that provided a deep layer of meaning to the places they visited that would have been invisible if the study had only focused on quantitative outcomes. The storytelling exercise also made it explicit

that cultural ES have a strong non-consequentialist component; to consider them solely as 'benefits' masks their true value (Cooper et al., 2016; Edwards et al., 2016; Irvine et al., 2016). The values compass tool helped focus the discussion further on the transcendental values that were already emerging from the storytelling, and were now made fully explicit. It also helped participants to think about how values that were important to them interacted with the marine sites, their activities there, and their management.

While the storytelling component was qualitatively analysed, a limitation of this study is that it did not include a full discourse analysis of the group-decision making, which could have revealed with more precision how the different interventions affected the way people considered their bids.

5. Conclusions

This paper is to our knowledge the first to integrate monetary valuation of ES with a narrative-based approach, and to experimentally consider the effects of different objectives for and approaches to deliberation on monetary values. This is also one of the first studies to use fair price value indicators. Results indicated clearly diverging impacts of the two types of deliberative interventions (information and transcendental values) on monetary values, and clear differences between shared values expressed through group deliberation, and individual deliberated and non-deliberated values. Participants' shared values for ES, established through a structured process of group deliberation, appeared to be a better reflection of welfare implications than non-deliberated individual values, while at the same time more reflective of participants' transcendental values, their broader life goals and principles. Evidence included the results of valuation models themselves, psychometric measures, convergence between SWB and monetary results following group deliberation, and qualitative evidence. Future research is needed that verifies the results of this study, and the accompanying Inner Forth study elsewhere in this issue (Kenter, 2016c), with larger sample sizes and more extensive discourse analysis, in terms of the potential for deliberation to enhance welfare estimates and to address hypothetical bias.

The results of this study have important implications for valuing ES. ES and their management are often complex and contested. They have important dimensions in terms of fairness and ethics, that can be more explicitly recognised through deliberation. ES, and cultural services particularly, are also often subtle and implicit, and social deliberation can play an important role in revealing them. Here, storytelling, combined with a values compass, played an important role in revealing values that were previously implicit, highlighting the importance of an integrated, mixed-method approach to ES valuation. Monetary valuation is limited to quantifying exchange values; methods such as storytelling are needed to understand their meaning or content, and the communal, cultural and transcendental values that underpin them. Deliberation provided an effective means of value formation around complex ES, and psychometrics helped to explain how deliberation impacted on values. Altogether, this provided a far richer value impression both in terms of outputs and process, approximating more closely the ideal of recognising the full value of ES to achieve more sustainable policy and management decisions.

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