



**Upstream solutions:**

**Factors moderating the relationship between place attachment and place-protective in  
the valley of the River Boyne in Ireland**

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### **Abstract**

Place attachment, an affective, cognitive and functional bond a person feels with a meaningful place, is known to be particularly strong if that place is natural (uninfluenced by human development). In modernity, such natural places are often threatened by human-made threats like construction and pollution. Even still, there is a lack of research exploring what motivates local people to protect natural places, to which they are place-attached, from human-made risks. This thesis aims to clarify the relationship between place attachment and place-protective action, both past and future, in relation to a natural place currently threatened by a human-made risk and to explore the influence of risk perception and perceived efficacy on this relationship. The sample ( $N = 199$ ) consisted of group members of various social media pages associated with the local area and the risk in question. A moderated regression analysis indicated that place attachment, risk perception and perceived efficacy were all associated with future-intended place-protective action but no interaction effects were observed for future-intended action. However, place attachment, perceived efficacy and their interaction were all associated with past action while, interestingly, risk perception was not. Implications and future directions are discussed.

## **Upstream solutions:**

### **Factors moderating the relationship between place attachment and place-protective in the valley of the River Boyne in Ireland**

Experts on global biodiversity assert that the protection of intact, natural ecosystems, such as river basins and forests, will be critical in acting as a buffer against planetary ecological collapse (IPCC, 2021; Wilson, 2016). In modern society, however, unspoiled natural environments which are uninfluenced by human beings are becoming more and more rare. Such intact, natural places are confronted with a variety of environmental threats, ranging from pollution to construction projects. Such threats have particularly strong psychological and social implications for the people who live near to, or regularly use, these places (Albrecht et al., 2007; Durkalec, 2015). Indeed, a large volume of research indicates that it is these same local people who are usually the ones most concerned about, and engaged with, such issues (Hu & Chen, 2016; Liu et al., 2020; Venables et al., 2012). Thus, local communities are uniquely placed to effectively combat threats to these places which they so value (Boyd, 2015; Burley et al., 2007; Stedman, 2002). It is, therefore, crucial to gain a better understanding of the factors motivating local people to take action to protect these places. This paper explores the factors influencing the responses of local communities to a specific, human-made threat currently known to be threatening a natural place, the valley of the River Boyne in Ireland.

A primary factor known to influence such place-protective action is whether the individual feels place attachment (Halpenny, 2010; Collins, 2008). Place attachment describes the affective bond a person feels with a meaningful place (Altman & Low, 1992; Hidalgo & Hernandez, 2001). Henceforth, I refer to a place to which one is attached as a 'valued place'. Research has, indeed, linked place attachment with increased environmental concern and place-protective behaviours (Vaske & Kobrin, 2001; Zhang et al., 2014). Moreover, Scannell & Gifford (2010) have found that the relationship between place attachment and place-specific, pro-environmental behaviour is stronger for natural places, like the river valley in this study, than for civic places, like neighbourhoods.

However, the literature is not conclusive on whether being place attached will lead to place-protective action against a threat; this is highly context-dependent (Bernardo, 2013; Gifford et al., 2009; Hatfield & Job, 2001). A key contextual factor is risk perception which here describes whether someone perceives a threat to be likely and severe enough to warrant mitigation action (Bonaiuto et al., 2016). The literature further indicates that, when a valued place is perceived to be at risk from a threat, such place-protective actions are far more likely to happen if the individual has sufficient efficacy beliefs i.e. they believe that they can make a difference with such actions (Bockarjova & Steg, 2014; Wang et al., 2021).

When someone believes that a valued place is at risk (sufficient risk perception) and that they can do something about it (sufficient efficacy beliefs), this fulfils two of the most important criteria promoting place-protective intentions (van Valkengoed & Steg, 2019). However, what form this action takes is influenced by whether the hazard is human-made or natural; human-made hazards, like river and sea pollution, can often be directly targeted in the civic arena, by protests demanding stricter laws, for example (Wakefield et al., 2005). Natural hazards, like flooding and earthquakes, on the other hand, cannot be directly targeted by civic actions. While it is true that civic actions can, and do, make a valuable difference to legislation governing natural hazard defences, such actions do not target the cause of the potential hazard but, rather, the effect (while you can campaign for measures to prevent the worst effects of a hurricane, you cannot stop the hurricane in court). Up until now, much of the research on people's actions to protect valued, natural places from threats has focused on natural hazard risks, such as wildfires and flooding (Collins, 2008; Mishra et al., 2010). To the author's knowledge, however, there is no study assessing the factors motivating local people to perform civic, mitigation actions (e.g. protesting) to combat a *human-made* threat to a valued, *natural* place. This is a key gap as human-made threats and hazards, like construction and pollution, commonly threaten natural places (Krausmann & Necci, 2021) and often it is at least theoretically possible to take action to combat such threats. In addition, as mentioned above, local people are often the ones best-placed to take such actions (Roder et al.,

2015). This study aimed to fill the gap in the literature by conducting an observational, quasi-experimental study measuring the relationship between place attachment to a natural place and place-protective action (both actual and intended behaviour). Furthermore, it also measured how risk perception and perceived efficacy influenced this relationship.

### **Place Attachment and place-protective action**

Place attachment to any place, whether natural or not, is a dynamic concept which describes the emotional, cognitive and functional bond a person shares with a place (Altman & Low, 1992; Jorgensen & Stedman, 2001). Attachment resulting from meaningful person-place interactions is typically accompanied by positive emotions like pride and happiness (Giuliani, 2003; Stokowski 2002). The cognitive element of place attachment is generated by the culture, history and memories associated with that place (Chen et al., 2014; Altman & Low, 1992). The functional aspect describes a practical attachment to the physical characteristics of a place owing to their capacity to facilitate certain activities. Indeed, many respondents for the present study rely on the natural place in question, the valley of the River Boyne, for recreation and drinking water, making it very valuable to them. This describes place dependence, one of four subdimensions of place attachment established by recent research (Ramkissoon et al., 2012), the other three being place affect, place social bonding and place identity.

The subdimension of place identity taps into both cognitive and affective aspects and, in accordance with Breakwell's (1993) Identity Process Model, describes how a valued place provides people with feelings of distinctiveness, continuity, self-efficacy, and self-esteem and is, thus, integrated with their self-schemas. Moreover, Vaske & Kobrin (2001) have elucidated the primacy of the place identity and place dependence dimensions in generating place-protective behavioural intentions. This may be related to the fact that these are the subdimensions which require long term residence in a place before they develop fully (Chen et al., 2014) which in turn contributes to feelings of rootedness and belonging (Hay, 1998). Furthermore, general place attachment, but

particularly the identity and dependence dimensions, have displayed a definite association with pro-environmental behaviour in relation to *natural* places (Halpenny, 2010; Udall et al., 2019). Thus, place attachment in the present study is operationalised as the combination of place identity and place dependence in relation to a natural place, the Boyne Valley.

As mentioned above, valued places can provide self-continuity and restoration and, thus, are very important to those who are attached to them (Korpela et al., 2009). Engaging with natural environments is known to promote a positive sense of self as well as strong, positive emotions (Clayton, 2003). Indeed, when a valued, natural environment is threatened, this has been found to increase place attachment to it as well as sensitivity to issues that threaten it, ranging from global climate change (Burley et al., 2007), to specific, localised issues like littering on a hiking trail (Kyle et al. 2004). This suggests that environmental threats, and the implicit anticipation of loss, can make people value these natural places more and motivate them to act accordingly by protecting them.

### **Risk Perception**

Risk perception is commonly understood to comprise perceptions of both the probability and severity of a risk (Bonaiuto et al., 2016; Breakwell, 2007) and in the present study, it is operationalised as such. When a valued place is threatened with drastic change (e.g. by construction) this can threaten to disrupt a person's emotional bond with it, and the sense of stability and control that it provides (Anton & Lawrence, 2016; Devine-Wright, 2009). There are many possible emotional responses in such situations, ranging from anxiety and despair (Eisenman, 2015) to desire to protect the place against the threat (Collins, 2008; Devine-Wright, 2009). Indeed, the relationship between place attachment and risk perception is complex. Jansen (2019) found that, for communities threatened by earthquakes, more place-attached individuals were both more aware of the risks but also *less* likely to adapt to those risks by relocating; they downplayed the risk to their valued, local area and they were, therefore, more likely to remain in spite of the risk. Similarly, Bickerstaff & Walker (2001) assert that if people have high levels of place attachment, then

they tend to perceive risks threatening it as less severe, a phenomenon they name the 'neighbourhood halo effect'. This was supported by Babicky & Seebauer (2016) who have found that community connectedness, while positive for subjective well-being, can act as a double-edged sword by making people feel 'fearless' and, thus, complacent, in the face of environmental risks. Past research thus suggests that the meaning and emotions associated with a place may play an important role in determining risk perception and, thus, the likelihood of action.

Levels of risk perception also depend on the nature of the threat and the wider context. In the example of the human-made risk of a nuclear power plant, Venables et al. (2012) found that local risk perceptions depended on the severity of potential consequences; while experts in technical risk assessment may have described the risk of a nuclear disaster as negligible, to the local people, that risk, however small, represented a threat to their livelihood or the health of their valued, local environment. Bernardo (2013) provides further evidence that the interaction between place attachment and risk perception varies based on the risk severity and probability dimensions. She found that, for environmental risks already perceived as *less* likely, place attachment further lowered risk perception, whilst for risks perceived as *more* likely, attachment amplified risk perception. Thus, the literature implies that perceptions of risk are inseparable from the context in which they develop (Irwin et al., 1999) meaning they vary from case to case.

Of the very few studies that have targeted a human-made threat to a natural place, to the author's knowledge, none have measured actual action or intended action in response. For instance, Kaltenborn (1998) investigated the effects of oil spills, in Svalbard in the Norwegian Arctic, on the local community's sense of place but not their behavioural responses. Similarly, Bonaiuto et al. (1996) explored how national and local identification affected perceptions of beach pollution on the English coast but, again, did not enquire about how this motivated place-protective action. The literature does suggest that, when a risk is perceived to a valued, natural place, this should trigger intentions to take place-protective action. However, it also suggests that the perception of a risk to a valued place in no way guarantees actions to mitigate that risk (Bubeck et al., 2012; Gifford, 2011).



The likelihood of people taking that action further hinges on the belief that they can do so and that this will make a difference (Kievik & Gutteling, 2011).

### **Perceived Efficacy**

A person's belief in their ability to carry out behaviour that will achieve certain goals describes their efficacy beliefs (Bandura, 1997; 2000). This is another factor past research has identified as being critical in the pathway from place attachment to place-protective action; both self-efficacy (*I know how to take a place-protective action*) and response efficacy (*I believe that taking action will make a difference to the outcome*) are known to be very strong predictors of pro-environmental behaviour (van Valkengoed & Steg, 2019). When self-efficacy and outcome efficacy are combined, they create what Kievik & Gutteling (2011) call perceived efficacy and this is how efficacy beliefs are operationalised in the present study.

There is evidence for a relationship between place attachment and perceived efficacy. Groulx et al. (2014) explored this connection in relation to the rural town of Manitoba in Canada. They contend that identifying with, and feeling attached to, a familiar place in which one feels able to meet any situational demands, can enhance feelings of self-efficacy and, therefore, control. The literature on the concept of home does indeed emphasise a sense of territorial control and efficacy (Easthope, 2004). Thus, when a valued, local place is threatened with disruption, this can also threaten people's self-efficacy in relation to that place. In another study, self-efficacy was found to mediate between place attachment and place-protective measures against the effects of typhoons and mudslides in rural China (Wang et al., 2021). Past literature thus suggests that place attachment and perceived efficacy do interact in motivating action. The literature further suggests that an individual's levels of perceived efficacy in combatting a perceived threat to a valued place has a direct impact on the type of behaviour that follows (Paton et al., 2008) and whether it addresses the cause or the effect of the threat.

### **Place-protective action; forms and functions**

Devine-Wright (2009) frames civic, community resistance against place-disruptive, local building projects, as place-protective action. The types of place-protective actions marking this sort of resistance can include civic, mitigation actions. Civic actions, taken to combat human-made, place-disruptive threats include things like protesting and writing to law-makers. These actions are very different to the types of mitigation and adaptation measures taken to counter natural threats. In the context of natural hazard risks, mitigation actions are ones taken to respond to the cause of the problem and might include, for example, thinning the trees on your property to reduce wildfire risk (McFarlane et al., 2011). On the other hand, adaptation actions are ones which respond to the effect of the problem after it has happened and could include relocation to escape the effects of natural disasters like flooding (Kick et al., 2011; Silver & Grek-Martin, 2015).

When the risk is *human-made*, there are usually practical steps available to offset the effects of the risk (e.g. community beach clean-ups). Yet the risk can often be fought more effectively in the civic arena. Up until now, much of the research on people's actions to protect their valued, natural places from threats has focused on natural hazard risks, such as flooding (Kick et al., 2011; Mishra et al., 2010) and wildfire risk (Nawrotzki et al, 2013). However, as mentioned before, there is a dearth of studies that have explored local people's psychological and behavioural responses when their valued, natural places are threatened by non-natural, *human-made* risks like pollution (Bonaiuto et al. 1996; Kaltenborn, 1998) and construction, threats which can often be combatted with civic actions. Thus, the present study's operationalisation of place-protective action, while it does take into account practical actions, is guided by Wakefield et al.'s (2005) operationalisation of civic actions as individual actions that attempt to change societal processes in order to precipitate environmental change. The present operationalisation is based on six, specific place-protective actions unique to the issue in the present study described below.

## **The Present Study**

This study aims to investigate what motivates the local people to take place-protective, civic action against human-made threats to their valued, natural places to which they feel attachment. It does so in relation to a real, contemporary threat to a natural place in Ireland (see Figure 1). It is hypothesised that individuals with higher levels of place attachment should have a positive relationship with past, place-protective actions and future-intended, place-protective actions. Furthermore, it is hypothesised that higher levels of risk perception and perceived efficacy will strengthen the relationship between place attachment and place-protective action, both past and future. The above leads to my hypotheses.

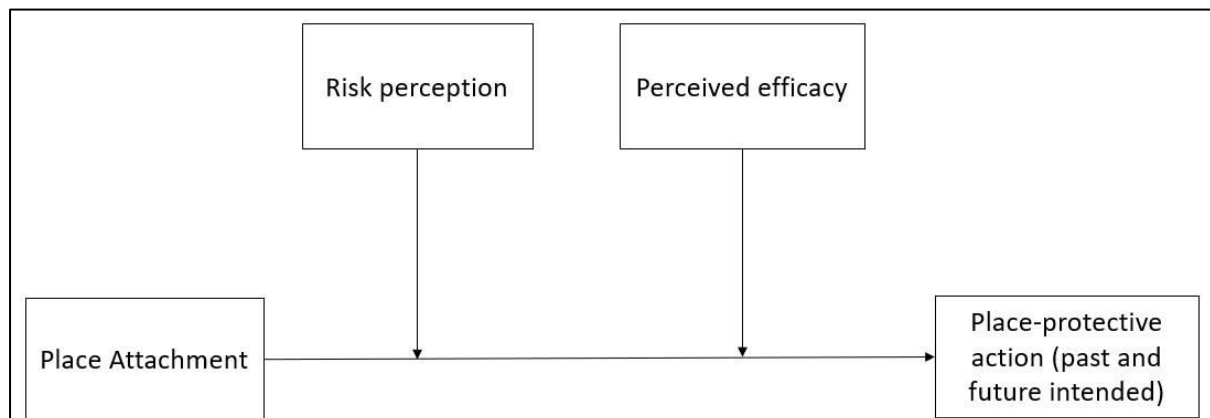
## **Hypotheses**

H1a. Higher levels of place attachment to a natural place are associated with more past place-protective action against a threat to that place

H1b. Higher levels of place attachment to a natural place are associated with greater future-intended place-protective action against a threat to that place

H2a. As perceived efficacy and risk perception increase, the strength of the relationship between place attachment and past place-protective actions increases

H2b. As perceived efficacy and risk perception increase, the strength of the relationship between place attachment and future-intended place-protective actions increases

**Figure 1***Research model*

*Note.* This model was run both with and without the moderators included for both past and future-intended place-protective as the outcome variable

In terms of potential confounds, exposure to messaging about an issue *without* messaging about a solution can result in low issue salience. This means that the issue is not perceived to be close in time and space (Brügger et al., 2015; Moser, 2007) resulting in complacency (Groulx et al., 2014; Pidgeon, 2012). Furthermore, for the generation of place-protective action, citizens need to be engaged with an issue which is more likely if explicit solutions are communicated to them (Scannell & Gifford, 2013). This, in turn, is key to facilitating efficacy beliefs and, thus, responsive action (Kievik & Gutteling, 2011). The pipeline threat is geographically and temporally close (most participants lived within 5km of the Boyne Valley and the planning proposal is currently under review) and it is a prominent local issue as it pertains to drinking water and a recreation area used by many. Moreover, there are civic and practical actions available to combat this risk. This case was, therefore, chosen to attempt to control for the potential confounders of low issue salience, and a lack of known solutions.

## **Methodology**

### **Study Context**

The Boyne is a river which flows through the midlands of Ireland. The environmental risk in this study is an industrial, effluent pipeline for which a planning proposal was made in early 2021 and which, if built, would discharge 500,000 litres of treated effluent a day from a meat factory into the river close to several major population centres. The Boyne is used by tens of thousands of people for recreation, water sports, and drinking water and the Boyne Valley is a designated Natura 2000 site (NPWS, 2021). At the time of writing, there have been over 450 planning objections lodged by local people and groups on various bases (environmental, health-related, social etc.). The proposal is currently under review by the Irish planning board.

### **Design**

The study had a quasi-experimental observational, between-subjects design. After collecting demographic information, participants were asked questions about the Boyne Valley. These questions were related to things known to have an impact on place attachment, risk perception and perceived efficacy and included duration of residency and proximity to the place in question. After this, participants filled out scales for place attachment, risk perception (probability and severity), place-protective action (past and future-intended) and perceived efficacy (response efficacy and self-efficacy).

### **Participants & Procedure**

A G\*Power analysis revealed a required sample size of 245 to detect medium effects. Participants were obtained through facebook pages associated with the Boyne Valley area (see Appendix B for a list of these). The facebook pages of various local groups such as Meath County Council, water sports clubs and heritage pages were targeted. A post used neutral language to request participants for a Masters thesis exploring how people felt about the proposed Dawn Meats

pipeline. This post contained a link which brought participants to the consent page of the Qualtrics survey. This procedure resulted in a total N of 199.

## **Materials**

### ***Place Attachment***

Place attachment was measured using an 8-item scale ( $M = 4.61$ ,  $SD = 0.45$ ,  $\alpha = .83$ ). This was adapted, with permission, from Halpenny (2010). Considerations made when deciding which of Halpenny's original items to use included face validity in relation to the Boyne Valley context as well as factor loadings. A focus was placed on place identity and place dependence as these are the subdimensions of place attachment considered most likely to influence a behavioural response (Vaske & Kobrin, 2001). Some example items were '*I identify strongly with the Boyne Valley*' and '*I feel I can really be myself in the Boyne Valley*'. Answer options were rated on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

### ***Risk Perception***

Risk perception was measured through its two key dimensions, probability and severity. The same 5-item scale was used for both dimensions and participants were asked how likely and severe they considered each of these items. In an approach modelled on that of Bockarjova & Steg (2014), the researcher identified a number of specific threats associated with the relevant threat (the pipeline) which were then used in the questionnaire (see Appendix A). Answer options were rated on a 5-point Likert scale for the risk perception probability scale from 1 (*Very unlikely*) to 5 (*Very likely*) ( $M = 4.57$ ,  $SD = .49$ ,  $\alpha = .73$ ). Answer options for the risk perception severity scale were rated on a 5-point Likert scale from 1 (*Not at all severe*) to 5 (*Very severe*) ( $M = 4.4$ ,  $SD = .53$ ,  $\alpha = .77$ ).

As these probability and severity constructs had a strong, positive correlation with each other ( $.76$ ,  $p < .001$ ), they were aggregated to generate an overall risk perception scale ( $M = 4.49$ ,  $SD$

= .48,  $\alpha = .86$ ). This follows the suggested technique of Wolff, Larsen & Ogaard (2019), whereby scores for both constructs were combined to give an over-all risk score. Participants were asked to rate how likely and severe they found items like *'Negative impacts on the biodiversity of the Boyne Valley causes by the construction and operation of the pipeline'* and *'Diminished overall enjoyment and restoration associated with the Boyne Valley'*.

### ***Place-protective action; future-intended***

Conversation with the campaign team coordinating the local response to the pipeline issue identified six place-protective actions as being the most common and feasible in this context which informed the research instrument. For the future-intended, place-protective action scale the six place-protective actions identified were further subdivided into civic actions (e.g. signing petitions, attending protests), practical mitigation actions (e.g. river clean ups) and resource contribution which could encompass both civic and practical actions (e.g. donating time or money towards the cause). The three condensed place-protective action items pertaining to civic actions, practical actions and resource contribution (see Appendix A) were used to create a 3-item scale ( $M = 4.56$ ,  $SD = .56$ ,  $\alpha = .74$ ). The condensation of variables was designed to reduce survey fatigue and to make the scale different enough to the past place-protective action scale to avoid priming. Participants were asked to rate their level of agreement with the following statements; *'I would take a civic action to protect the Boyne Valley (e.g. signing a petition)'*, *'I would take a practical action to protect the Boyne Valley (e.g. picking up litter and encouraging others to take their litter away with them)'* and *'I would contribute whatever resources I could, such as my time or financial resources, to projects that help to protect the Boyne Valley (e.g. a media campaign)'*. Answer options were rated on a 5-point Likert scale from 1 (*Strongly disagree*) to 5 (*Strongly agree*).

### ***Place-protective action; past***

The original, uncondensed six place-protective actions were used in the past place-protective action scale. Of these, four were civic actions, one was a practical action and one was not specific to either the civic or practical realms. Because reminding people of their past pro-environmental behaviours is known to promote pro-environmental behaviour intentions (Van der Werff et al., 2014), measures were taken to avoid this by placing the past place-protective actions scale after the future place-protective action scale and by condensing the future the items used in the future action scale. Participants were asked if, and how often, they had performed place-protective actions like '*Written correspondence to policy-makers in support of the protection of the Boyne Valley (e.g. a planning objection)*' and '*Participated in a public meeting about managing the Boyne Valley*'. Answer options were rated on a 4-point scale containing 1 (*Never*), 2 (*Once*), 3 (*More than once*) and 4 (*Frequently*) ( $M = 1.88$ ,  $SD = .72$ ,  $\alpha = .82$ ). The data generated from this scale, while theoretically ordinal, was treated as continuous in the data analysis, an approach which is considered statistically sound as it does not produce biased estimates or threaten the assumptions of the normal distribution (Robitzsch, 2020).

### ***Perceived efficacy; Self-efficacy & Response efficacy***

Self-efficacy and response efficacy were measured separately. Using an approach similar to that of Bockarjova & Steg (2014), self-efficacy was measured using the same items as those used in the past, place-protective action scale except that the question was rephrased to ask if participants felt they had the capacity to execute those actions. For example, for the item '*Volunteering your time to projects that help the Boyne Valley (e.g. a media campaign)*', the question was rephrased from asking participants if they had done this in the past to how easy they thought this would be for them to do. Answer options were rated on a 5-point Likert scale from 1 (*Extremely difficult*) to 5 (*Extremely easy*) ( $M = 3.85$ ,  $SD = .67$ ,  $\alpha = .78$ ).

Response efficacy was measured by a single question asking if participants believed that any of the six actions mentioned in the previous two questions would make a difference in



combatting the threat of the proposed pipeline. The answer option was rated on a 5-point Likert scale from 1 (*Strongly disagree*) to 5 (*Strongly agree*) ( $M = 4.08$ ,  $SD = .97$ ). This measure was combined with the self-efficacy scale to generate an overall score for perceived efficacy ( $M = 3.96$ ,  $SD = .63$ ,  $\alpha = .75$ )

## Results

### Descriptive Statistics

The age of the participants ranged from 19 to 75 years old ( $M = 47.27$ ,  $SD = 10.15$ ). 36.5% of the participants identified as male ( $n = 72$ ), 61.9% identified as female participant ( $n = 122$ ), 1.5% preferred not to say ( $n = 3$ ). The only participation requirement was being 18 years of age. As mentioned above, some demographic information was collected on variables known to have an impact on place attachment. The mean length of residence was 15.27 years. 73% of participants lived within 5km of the Boyne Valley, 66.8% visited it at least once per week and 89.4% visited it at least once per month.

### Preliminary analysis

#### *Assumption checking*

Multicollinearity was checked between the three predictor variables using a correlation matrix; none of the pairs shared a correlation stronger than .46 between perceived efficacy and future-intended place protective action (see Table 2). Mean centring of the focal predictor variable (place attachment) and both moderator variables (risk perception and perceived efficacy) was also used in the analysis to control for multicollinearity. In addition, Variance Inflation Factors were all close to 1 with none exceeding 3; they ranged from 1.19 to 1.24. Thus, it was considered safe to assume that multicollinearity was not present. Finally, the assumptions of normality, linearity, homoscedasticity and independence were checked for both the past and future models. The assumptions of normality and linearity were met for both models. The Durban-Watson test revealed

values in the acceptable range, close to 2, for both models, thus meeting the assumption for independence of residuals. In terms of homoscedasticity for past action, there was a relatively even spread of standardised residuals in the scatter plot but the spread for the future-intended action was less even. However, the spread was not heteroscedastic enough to threaten the validity of the regression coefficients and so I proceeded with caution and used a heteroscedasticity-consistent interface to generate robust standard errors in the analysis.

### ***Data Screening***

To screen for outliers, a linear regression was run in SPSS with place attachment, risk perception and perceived efficacy as predictors without interaction effects. This was done for both past and future place-protective action and scores were generated for Mahalanobis distances. There were 8 participants who were outliers in their scores and, thus, were excluded from the analysis. Furthermore, because the SPSS PROCESS plugin used in the study only analyses cases that contain no missing data on any variable and uses listwise deletion to accomplish this (Hayes, 2018), it was deemed statistically acceptable and necessary to use listwise deletion of all cases that did not return a complete survey. To confirm that missing data was missing in a random fashion, meaning that deleting incomplete cases would not threaten homoscedasticity, an MCAR test was run which was not significant ( $p = .082$ ), thereby confirming that it was safe to delete these cases; under MCAR, listwise deletion does not generate bias (Newman, 2014).

### **Main analysis**

To test H1a and H1b, two simple regression analyses were run to ascertain if there was a significant relationship between place attachment and place-protective action (past and future). Accordingly, place attachment was treated as the independent variable; this was done with both past and future place-protective action as the outcome variable. Then, to test H2a and H2b, a moderated regression analysis, with place attachment as the focal predictor variable, and with risk

perception and perceived efficacy placed as two continuous moderators, was run using the SPSS PROCESS Model 2 (v3.5 by Andrew F. Hayes). Again, this analysis was run twice, with first past, and then future-intended, place-protective action treated as the outcome variable. It was hypothesised that both risk perception and perceived efficacy would moderate the relationship between place attachment and place-protective action, both past and future.

### **Correlations**

Table 1 presents the correlations of the focal predictor variable (place attachment), the dependent variables (place-protective action – past *and* future-intended) and the two moderators (risk perception and perceived efficacy) with corresponding mean scores and standard deviations.

**Table 1**

Correlations between independent and dependent variables with corresponding mean scores and standard deviations

	1	2	3	4	5
1. Place attachment	1				
2. Risk perception	.439**	1			
3. Perceived efficacy	.259**	.351**	1		
4. Place-protective action (Past)	.306**	.144*	.221**	1	
5. Place-protective action (Future)	.515**	.499**	.476**	.301**	1
Mean	4.61	4.49	3.96	1.88	4.56
Standard Deviation	.45	.48	.63	.72	.56

\* Correlation significant at the 0.05 level (2-tailed)

\*\* Correlation significant at the 0.01 level (2-tailed)

### **Hypothesis Testing**

H1a, which predicted that higher levels of place attachment to a natural place would be associated with higher levels of past place-protective action, was tested using simple linear regression and was supported,  $R^2 = .09$ ,  $F(1, 197) = 20.36$ ,  $p < .001$ . There was a significant but

small effect size. This indicates that place attachment is associated with past place-protective action but that there are other factors which also have an influence.

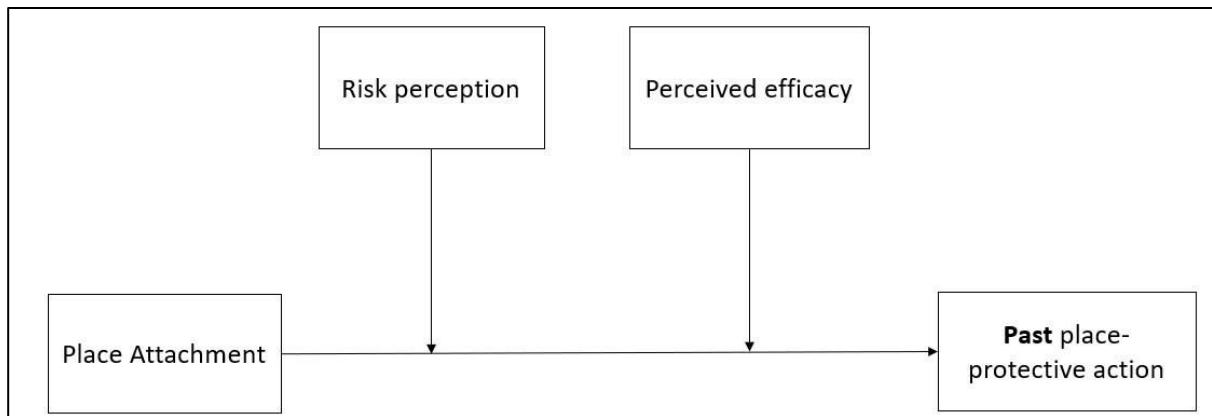
H1b, which predicted that higher levels of place attachment to a natural place would be associated with higher levels of future-intended place-protective action, was also tested using simple linear regression and was also supported  $R^2 = .27$ ,  $F(1, 197) = 71.145$ ,  $p < .001$ . This model indicates that place attachment explains 27% of the variance in future, intended place-protective action.

H2a and H2b were both tested separately with a moderated regression analysis using the SPSS tool PROCESS (Hayes, 2018) with risk perception and perceived efficacy as moderators. In PROCESS, all regression coefficients are estimated using OLS regression and are unstandardised. Model 2 in PROCESS, which tests a moderation with two independent moderators, was used because there was a theoretical reason to believe that both of the moderators, risk perception and perceived efficacy, would interact with place attachment in producing place-protective action.

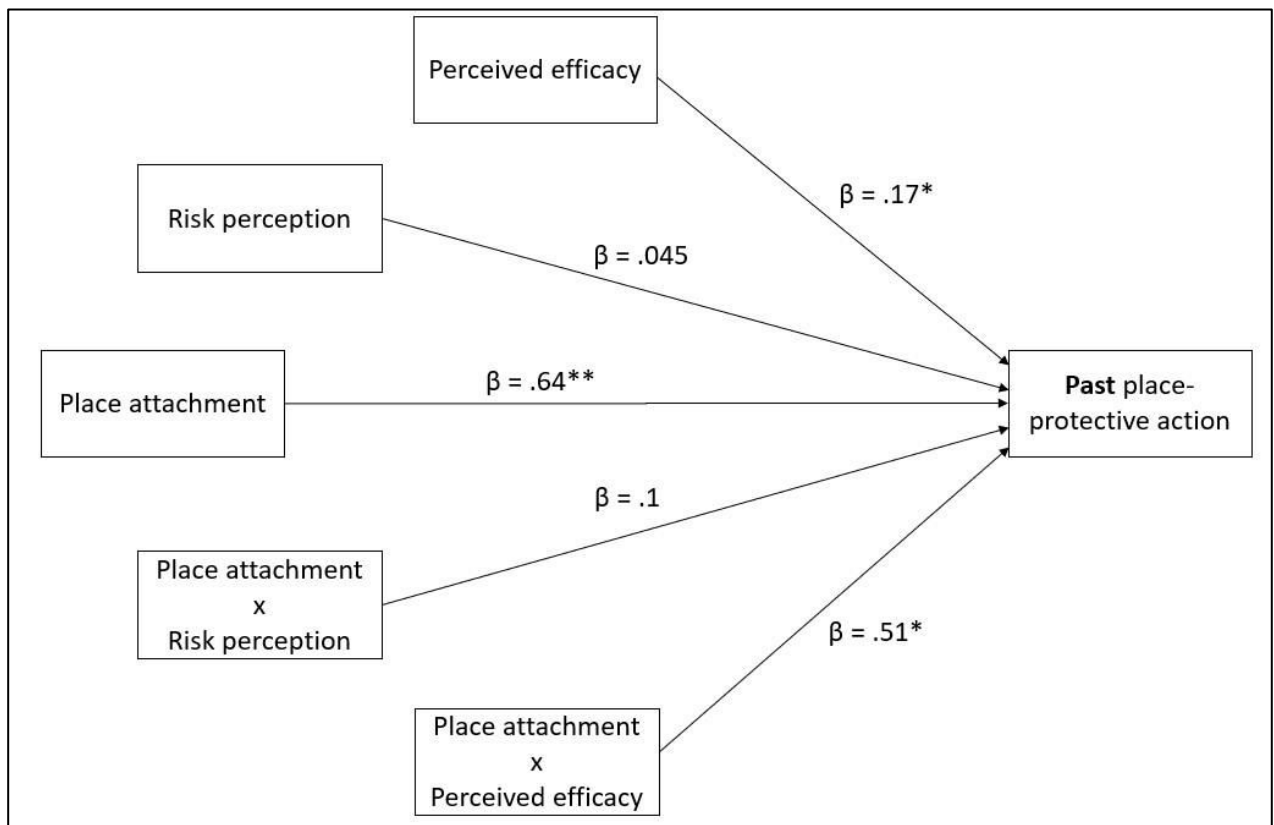
For H2a, the model was significant,  $R^2 = .18$ ,  $F(5, 193) = 6.59$ ,  $p < .001$ . This indicates that 18% of the variance in past place-protective action is explained by the independent variable and the moderators. Significant main effects were detected for place attachment ( $\beta = .64$ ,  $t(193) = 4.44$ ,  $p < .001$ ), and perceived efficacy ( $\beta = .17$ ,  $t(191) = 2.19$ ,  $p = .02$ ) and for the interaction between place attachment and perceived efficacy ( $\beta = .52$ ,  $t(193) = 2.19$ ,  $p = .03$ ) (see Figure 3 and Figure 4). The  $R^2$  change for the interaction was .03, indicating that it accounted for 3% of the variance.

**Figure 3**

Conceptual model for past action

**Figure 4**

Statistical model for past action

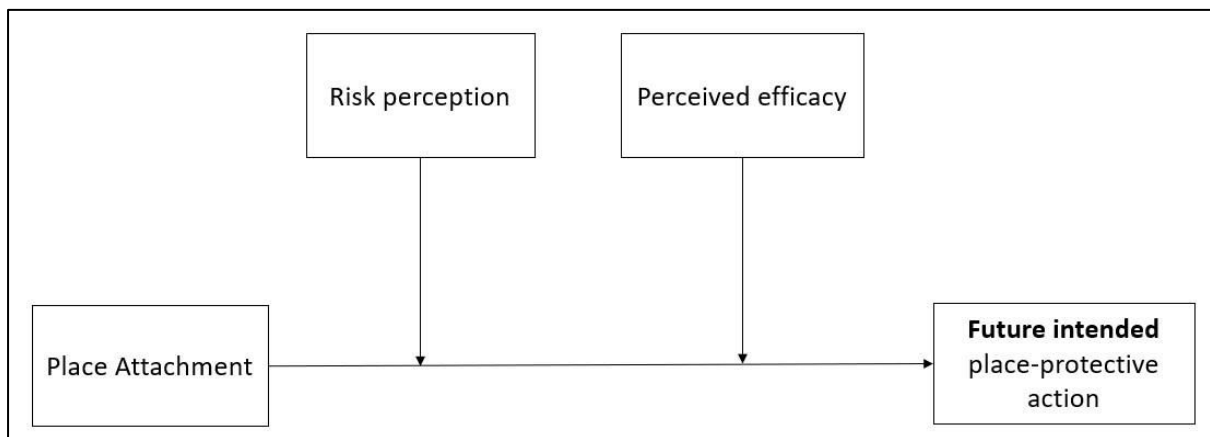


*Note.* Model shows the relationship between place attachment and the moderators risk perception and perceived efficacy, as well as their interactions, for past place-protective action.  $*p < .05$ ,  $**p < .01$ .

For H2b, the model was also significant,  $R^2 = .47$ ,  $F(5, 193) = 14.92$ ,  $p < .05$ . This indicates that 47% of the variance in future intended place-protective action is explained by the independent variable and the moderators. There were significant main effects for place attachment ( $\beta = .3$ ,  $t(193) = 3.37$ ,  $p < .01$ ), risk perception ( $\beta = .22$ ,  $t(193) = 2.41$ ,  $p < .05$ ) and for perceived efficacy ( $\beta = .27$ ,  $t(193) = 4.98$ ,  $p < .01$ ). None of the interaction effects were significant.

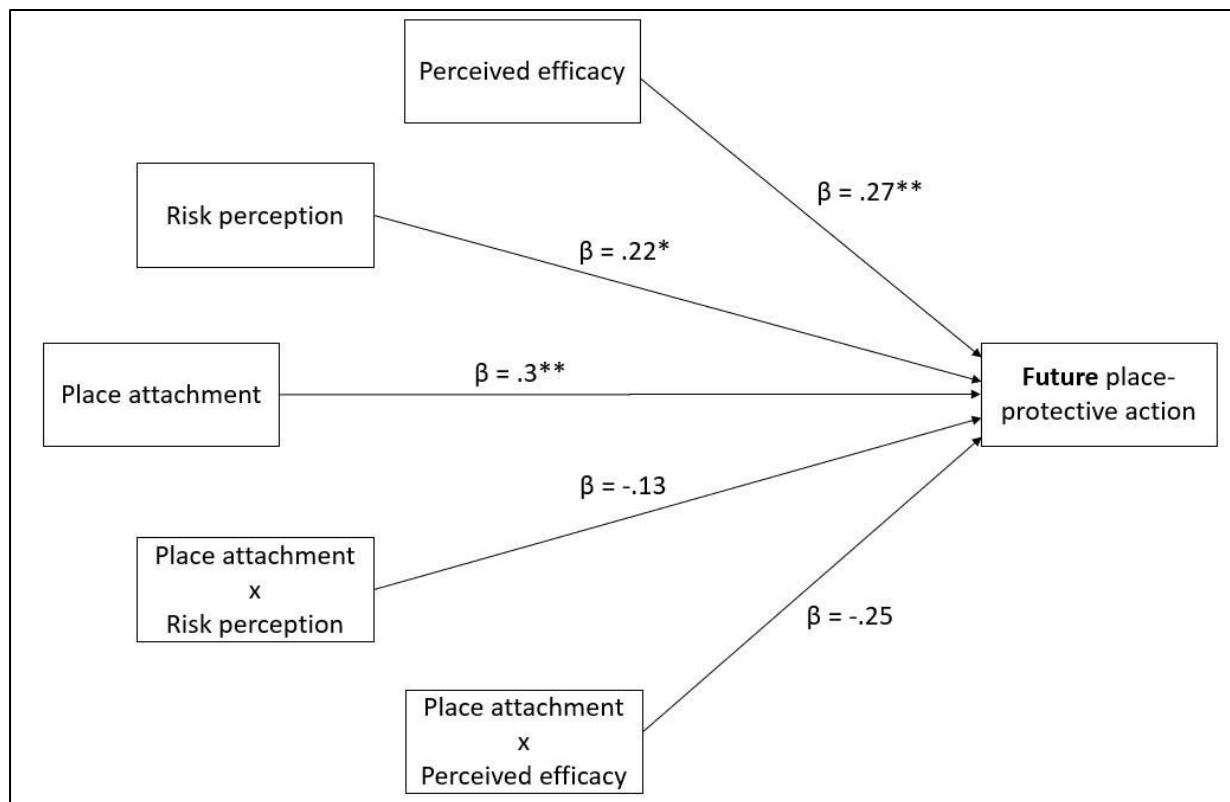
**Figure 5**

Conceptual model for future-intended action



**Figure 6**

Statistical model for future-intended action



*Note.* Model shows the relationship between place attachment and the moderators risk perception and perceived efficacy, as well as their interactions, for future-intended place-protective action.  $*p < .05$ ,  $**p < .01$ .

The largest Beta coefficient for the entire study was for the relationship between place attachment and past place-protective action (.64). Beta coefficients for future, intended action were generally lower than for past action but the effect size of the entire model is much larger.

## Discussion

### Summary of the results

This study aimed to investigate the relationship between participants' place attachment to a natural place and their place-protective action against a perceived threat to that place. It also aimed to explore how participants' levels of risk perception and perceived efficacy influence

this relationship. The exploration of place-protective action against a human-made threat to a valued, natural place was a novel research direction. As hypothesized, place attachment was positively associated with both past (H1a) and future-intended (H1b) place-protective actions. However, according to the widely accepted effect size estimations proposed by Cohen (1988), the effect of place attachment was small on both and past and future actions. This implies that other factors affected past and future-intended place-protective action as well.

The combination of place attachment, risk perception and perceived efficacy was positively related to both past (H2a) and future-intended (H2b) place-protective actions. The findings indicate that past action, and future-intended action, were influenced by place attachment to the Boyne Valley. The size of this effect increased substantially when place attachment was combined with the moderators risk perception and perceived efficacy. This was the case for both past and future action. As for where, specifically, these effects lie, the past action explained in H2a was associated with perceived efficacy, place attachment, and their interaction, while risk perception appeared to have no effect on past action. However, for future-intended action, place attachment, perceived efficacy and risk perception *all* had an effect on generating future-intended action, while none of the interaction effects were significant. This implies that the effects of place attachment, risk perception and perceived efficacy, were independent of each other for future intentions.

Overall, these findings imply that an individual's intentions to protect a valued place are increased when they perceive it to be at risk and believe that they can do something about it. However, they also suggest that an individual's risk perception, while important in generating behavioural intentions, may be less relevant to the actual execution of behaviour. Rather, they suggest that it is the combination of attachment to that place, and the feeling of efficacy in protecting it, that generates actual behaviour. Unsurprisingly, this effect was larger for future-intended action than for past action and this was the case both with and without the moderators (risk perception and perceived efficacy) included, reflecting the general action-intention gap in



social psychology (White et al., 2021). In addition, the amount of variance explained by the overall model echoes other studies on the influence of social psychological concepts, such as perceived risk, on place-protective mitigation behaviour; such factors have typically accounted for less than 20% of the variance in actual behaviour (Collins 2009; McFarlane et al., 2011).

### **Interpretations of the findings**

It is interesting, and against expectations, that risk perception only had an influence on future-intended actions and not past actions. This contrasts with previous studies, such as Wakefield et al. (2005), which have indicated that risk perception does have an influence on generating actual, place-protective, civic actions. One interpretation has been touched on in the meta-analysis of Bubeck et al. (2012) on risk perception. They describe a mechanism by which respondents have lower levels of risk perception if they have already taken a risk mitigation action. Thus, the relationship between risk perception and place-protective action is stronger for future-intended behaviour than past behaviour because the execution of those measures decreases risk perception, thus diminishing the strength of its relationship with past place-protective behaviour. An interesting implication of this is that taking a place-protective action may be an effective way for a concerned, local citizen to allay that concern, and the associated stress. Indeed, past research has shown that environmental concern can be constructive if it motivates individuals to take environmental action and, in so doing, to reduce said negative affect (Coelho et al., 2017; Verplanken et al., 2020). Furthermore, this adds to the wider, societal argument for environmental health being considered in tandem with citizens' physical and psychological health as the two are intimately connected.

Another possible explanation for the lack of a main effect for risk perception on past action comes from previous studies showing that high place attachment scores are linked with underestimation of risk (Bernardo, 2013; Bonaiuto et al., 2016; Han et al., 2020) Indeed, Bickerstaff & Walker (2001) have dubbed this the 'neighbourhood halo effect' whereby people who have strong place attachment to their local area tend to downplay and deny risks which threaten it.

In the present analysis, some combination of the aforementioned factors may have reduced the influence of risk perception meaning that it may be overshadowed by the influence of perceived efficacy for past place-protective action. Evidence for this process comes from the fact that risk perception does, indeed, have a main effect on future-intentions to take place-protective action. This is consistent with literature asserting that before feeling like they can combat a risk, people first need to perceive it as a risk (Ter Huurne & Gutteling, 2009). Furthermore, the fact that there is a significant, moderate correlation between place attachment and risk perception overall (.439) implies that a positive relationship does exist between them. However, it just did not seem sufficient to generate actual behaviour. This corroborates Bubeck et al. (2012) who found that risk perception, on its own, is generally not enough to cause a place-protective response, requiring an appraisal of one's own perceived efficacy as well.

Indeed, perceived efficacy had a strong relationship with place-protective action, both past and future. The strong influence of perceived efficacy may have occurred because the threat in question is a human-made hazard with clear solutions available e.g. lodging a planning objection. This is substantiated by literature which says that people need to know about solutions in order to feel efficacious (Groulx, 2014; Scannell & Gifford, 2013). Furthermore, the significant interaction effect between place attachment and perceived efficacy for past action indicates that, when someone's emotional bond with a place combines with feelings of efficacy in protecting that place, this increases actual, place-protective action. Again, this echoes past studies which have asserted that identifying with a familiar, valued place, in which one feels control over situational outcomes, can enhance feelings of efficacy (Easthope, 2004; Groulx et al., 2014). Based on these findings and past literature (Bubeck et al., 2012), it seems that a useful avenue for public outreach might be to give citizens more information about issues affecting them in order to increase their feelings of efficacy and control. As argued in Kievik & Gutteling (2011), a focus on information about solutions may be more fruitful than simply describing environmental problems and inducing a fear response.

There was, overall, a strong connection between place attachment and both past and future place-protective action. All hypotheses were supported and the study's strongest relationship was between place attachment and past, place-protective action. This is consistent with past research indicating that people who are more place attached are more motivated to protect those places from harm, particularly if they are natural places (Alawadi, 2016; Xu et al., 2017; Scannell & Gifford, 2013).

More specifically, this study, and the survey instrument, operationalized place attachment based on the place identity and place dependence subdimensions, as suggested in Vaske & Kobrin (2001). Previous research contends that threats to one's identity, in this case represented by a place, are felt on a deep, existential level (Udall et al., 2019). As Stedman (2002) has pointed out, people are willing to fight against a threat to a place which forms a central part of their identities. When this is also a natural place which one depends on (this sample depends on the River Boyne for recreation and drinking water), it is logical that this would generate strong emotions, such as fear, and intentions to protect that place (Ramkissoon et al., 2012). Furthermore, unmolested natural spaces, are known to have many physical, psychological and social health benefits for people (see Jimenez et al., 2021, for a review). As these results indicate, many people do depend on such places and have integrated them with their identities. Furthermore, as asserted in Butler et al., (2019), law-makers and public health legislators have a duty to consider identity and place meaning in decisions which will affect these valued environments.

The findings also imply that participants were highly motivated to take civic action to protect the Boyne Valley. As Wakefield et al. (2005) describe them, civic actions are aimed at changing wider societal processes to precipitate environmental change and they are often the most effective measures for this purpose (Stern, 2000). While past research has indicated that people tend to favour lower cost risk responses, such as signing petitions (McFarlane et al., 2011), just under half of participants in this study had completed the high-cost, civic, place-protective action of lodging a planning objection for which there was a small fee. This is supported by previous studies which have

found that place attached people are more politically involved in their communities (Mesch & Manor, 1998). Moreover, these findings suggest a way for environmental campaigners to maximise the effectiveness of local opposition to threats. They could do so by encouraging place-attached citizens, the people most engaged in the civic arena, to conduct civic, place-protective actions, the actions with the widest scope to affect change. In accordance with Leiserowitz (2007), if such campaigns used messaging relevant to the specific context and community under threat, this could also maximise the level of participation.

### **Strengths, limitations & future directions**

A key strength of this study was that it studied a clear human-made threat which is relevant to the sample and is preventable through known solutions. Previous literature has found that, if complex environmental problems, like climate change, are framed in a vague, unclear way which does not resonate with the local community, this can result in inaction (Groulx et al, 2014; Norgaard, 2006; Sun & Yang, 2016). Moreover, other studies have demonstrated that clear communication of a risk makes solutions clearer which is key to generating action (Haer et al., 2016; Marx et al., 2007; Scannell & Gifford, 2013). Thus, by targeting a risk threatening a natural place valued by local people but which has clear, known solutions, this study helps to clarify the mixed results of previous research on how place attachment is linked with risk responses (see Bonaiuto et al., 2016, for an overview). The present results suggest that people will be motivated to take action against a clear threat to a valued, natural place, when solutions are available. This, in turn, implies that information about the causes of, and solutions to, such issues, and what normal citizens can do about them, have a crucial role to play in risk communication strategies in the public domain.

It also warrants mention that this study measured both future, behavioural intentions and actual, past behaviour. This is valuable because, as Scannell & Gifford (2010) have alleged, many of the studies targeting the relationship between place attachment and place-protective

behaviour have only measured intentions. Indeed, this expressed the action-intention gap prevalent throughout social psychology (White et al., 2021). More specifically for this study, pro-environmental action is morally relevant meaning social desirability may cause people to report more pro-environmental intentions than is accurate (Vesely & Klöckner, 2020). Future research would do well to confine analyses to actual behaviour, to observe behaviours rather than relying on self-report measures and to measure behaviour at multiple time points.

A key way in which this study could have been improved is if social network strength was measured. Previous literature has linked stable, social networks with higher levels of all of the variables measured in this study - place attachment (Song et al., 2019), risk perception and preparedness (Xue et al., 2021), efficacy beliefs (Livingstone, Bailey & Kearns; 2008; Peng et al., 2020) and place-protective action (Wakefield et al., 2001). As mentioned above, there was evidence of this sample comprising a stable, social network – the average length of residence was approximately 15 years and the majority of participants lived within 5km of the Boyne Valley. Practically speaking, the inclusion of an extra scale to measure social network strength may have been ill-advised as excessive survey length can cause careless responding which undermines the validity of data acquired (Meade & Craig, 2012). However, it could prove useful for future researchers to unpack the relationship between social networks and place attachment. While this study concerned a natural place, the place's physical features may be inextricable from their social meaning for many participants (Devine-Wright, 2009). For example, kayaking clubs go to the River Boyne for both its physical features and to socialise. This relationship may, in turn, have implications for the motivation of place-protective action for someone who is attached to both the natural and social aspects of a place.

In terms of statistical power, after data screening, the sample size of 199 fell short of that recommended by the G\*Power analysis (245) to detect small interaction effects. Interaction effects tend to be small and require a sensitive test with a large sample size to detect (Faul et al., 2007). Thus, interaction effects between variables may have been present but were just not

picked up by the analysis. This is plausible as there are theoretical reasons for a lot of potential interaction effects. Future studies exploring interaction effects should employ longer periods of data collection or diversify their sampling methods (e.g. online and offline) to ensure that there is enough statistical power to detect all effects that are present.

Another potential, methodological issue was self-selection bias which risks skewing the data. People who participated were the ones most likely to care about, and be engaged with, this issue. This would align with previous research suggesting that the more information someone gathers about solutions to a threat, the more efficacious they feel (Kievik & Gutteling, 2011; Lindell & Perry, 2000). As mentioned before, it is often the people most likely to be affected by an issue who are the most engaged with it (Venables et al., 2012) and it seems that my sample is a reflection of this phenomenon. Future research might use cover stories to alleviate this bias.

Finally the specificity of the pipeline issue was both a strength and a weakness. It was a threat that was very unique to this particular sample, in terms of both its consequences and the types of place-protective action solutions available. This specificity limits the generalisability of my findings. However, it is clear from the literature that place-protective action by local people is more likely if the threat is explicit and has well-defined solutions (Groulx, 2014). Furthermore, Stern (2000) has indicated that, to be useful, theories explaining pro-environmental behaviours must target them as specifically as possible as behaviours are motivated by a range of unique, contextual factors. Thus, my findings have implications for communication with local people about distinct threats to their valued, natural places as well as possible responses. Future research should focus on building perceived efficacy in local communities by using educational messaging relevant to their particular context and values. This is a necessary step in empowering grassroots citizens to respond to environmental threats and take control of their own natural and cultural amenities. This is a crucial mission for society - who better to protect such places for future generations than the people who know and value them just as they are now?

## Conclusion

This study makes an important contribution to the small body of literature exploring responses to human-made risks threatening natural places (i.e. Bonaiuto, 1996; Kaltenborn, 1998). The results reinforce the notion that a positive connection with natural places can, and does, motivate action to protect them from risks (Halpenny, 2010; Roszak, 1992). Indeed, the effectiveness of civic, place-protective actions to combat such risks is becoming more widely acknowledged (Stern, 2000). In fact, in modern times, it seems that a combination of practical and ecological but also civic and legal actions are producing the best outcomes in protecting natural ecosystems (Higgins et al., 2013). The results of this study should be useful to future researchers delving further into responses to human-made risks to natural places. As this research implies, action spurred by attachment to a natural place can inform community outreach, empower place-protective movements and, ultimately, influence the civic arena where its greatest effect is possible. Indeed, as Lewicka (2010) has strongly asserted, place attachment, as a central tenet of environmental psychology, badly needs to advance to achieve its full potential. Hopefully, this study can act as a step in that direction.

## References

- Alawadi, K. (2016). Place attachment as a motivation for community preservation: The demise of an old, bustling, Dubai community. *Urban Studies*, 54(13), 2973-2997.  
<http://doi/10.1177/0042098016664690>
- Albrecht, G., Sartore, G., Connor, L., Higginbotham, N., Freeman, S., & Kelly, B. et al. (2007). Solastalgia: The Distress Caused by Environmental Change. *Australasian Psychiatry*, 15(1), 95-98. <http://doi/10.1080/10398560701701288>
- Altman, I., & Low, S. M. (1992). Place Attachment: A Conceptual Inquiry. In I. Altman & S. M. Low (Eds.), *Place Attachment* (pp. 1-13). New York: Plenum Press.
- Anton, C., & Lawrence, C. (2016). The relationship between place attachment, the theory of planned behaviour and residents' response to place change. *Journal Of Environmental Psychology*, 47, 145-154. <http://doi/10.1016/j.jenvp.2016.05.010>
- Babcicky, P., & Seebauer, S. (2016). The two faces of social capital in private flood mitigation: opposing effects on risk perception, self-efficacy and coping capacity. *Journal Of Risk Research*, 20(8), 1017-1037. <http://doi/10.1080/13669877.2016.1147489>
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: W.H. Freeman.
- Bandura, A. (2000). Exercise of human agency through collective efficacy. *Current Directions in Psychological Science*, 9(3), 75–78.
- Bernardo, F. (2013). Impact of place attachment on risk perception: Exploring the multidimensionality of risk and its magnitude. *Estudios De Psicología*, 34(3), 323-329.  
<http://doi/10.1174/021093913808349253>
- Bickerstaff, K & Walker, G., (2001). Public understandings of air pollution: the localisation of environmental risk. *Global Environmental Change*, 11, 133- 145.
- Bockarjova, M., & Steg, L. (2014). Can Protection Motivation Theory predict pro-environmental behavior? Explaining the adoption of electric vehicles in the Netherlands. *Global Environmental Change*, 28, 276-288.



<http://doi/10.1016/j.gloenvcha.2014.06.010>

Bonaiuto, M., Alves, S., De Dominicis, S., & Petruccelli, I. (2016). Place attachment and natural hazard risk: research review and agenda. *Journal of Environmental Psychology, 48*, 33–53.

<https://doi.org/10.1016/j.jenvp.2016.07.007>

Bonaiuto, M., Breakwell, G., & Cano, I. (1996). Identity Processes and Environmental Threat: the Effects of Nationalism and Local Identity upon Perception of Beach Pollution. *Journal Of Community & Applied Social Psychology, 6*(3), 157-175.

[http://doi/10.1002/\(sici\)1099-1298\(199608\)6:3<157::aid-casp367>3.0.co;2-w](http://doi/10.1002/(sici)1099-1298(199608)6:3<157::aid-casp367>3.0.co;2-w)

Boyd, A. (2015). Examining Community Perceptions of Energy Systems Development: The Role of Communication and Sense of Place. *Environmental Communication, 11*(2), 184-204.

<http://doi/10.1080/17524032.2015.1047886>

Breakwell, G. M. (2007). *The psychology of risk*. Cambridge: Cambridge University Press.

Breakwell, G. M. (1993). Social representations and social identity. *Papers on Social Representations, 2*, 1 – 20.

Brügger, A., Dessai, S., Devine-Wright, P., Morton, T., & Pidgeon, N. (2015). Psychological responses to the proximity of climate change. *Nature Climate Change, 5*(12), 1031-1037.

<http://doi/10.1038/nclimate2760>

Bubeck, P., Botzen, W., & Aerts, J. (2012). A Review of Risk Perceptions and Other Factors that Influence Flood Mitigation Behavior. *Risk Analysis, 32*(9), 1481-1495.

<http://doi/10.1111/j.1539-6924.2011.01783.x>

Burley, D., Jenkins, P., Laska, S., & Davis, T. (2007). Place Attachment and Environmental Change in Coastal Louisiana. *Organization & Environment, 20*(3), 347-366.

<http://doi/10.1177/1086026607305739>

Butler, A., Knez, I., Åkerskog, A., Sarlöv Herlin, I., Ode Sang, Å., & Ångman, E. (2019). Foraging for identity: the relationships between landscape activities and landscape identity after

- catastrophic landscape change. *Landscape Research*, 44(3), 303-319. doi:  
<http://doi/10.1080/01426397.2019.1580352>
- Chen, N., Dwyer, L., & Firth, T. (2014). Conceptualization and Measurement of Dimensionality of Place Attachment. *Tourism Analysis*, 19(3), 323-338.  
<http://doi/10.3727/108354214x14029467968529>
- Coelho, F., Pereira, M., Cruz, L., Simões, P., & Barata, E. (2017). Affect and the adoption of pro-environmental behaviour: A structural model. *Journal Of Environmental Psychology*, 54, 127-138. <http://doi/10.1016/j.jenvp.2017.10.008>
- Collins, T. W. (2008). What influences hazard mitigation? Household decision making about wildfire risks in Arizona's White mountains. *The Professional Geographer*, 60, 508e526.  
<http://dx.doi.org/10.1080/00330120802211737>
- Collins, T. W. (2009). Influences on Wildfire Hazard Exposure in Arizona's High Country. *Society & Natural Resources*, 22(3), 211-229. <http://doi/10.1080/08941920801905336>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, N.J.: L. Erlbaum Associates.
- Clayton, S. (2003). Environmental identity: conceptual and operational definition. In S. Clayton, & S. Opatow (Eds.) *Identity and the natural environment: The psychological significance of nature* (pp. 45–65). Cambridge, MA: MIT Press.
- Devine-Wright, P. (2009). Rethinking NIMBYism: The role of place attachment and place identity in explaining place-protective action. *Journal Of Community & Applied Social Psychology*, 19(6), 426-441. <http://doi/10.1002/casp.1004>
- Durkalec, A., Furgal, C., Skinner, M., & Sheldon, T. (2015). Climate change influences on environment as a determinant of Indigenous health: Relationships to place, sea ice, and health in an Inuit community. *Social Science & Medicine*, 136-137, 17-26.  
<http://doi/10.1016/j.socscimed.2015.04.026>
- Easthope, H. (2004). A place called home. *Housing, Theory And Society*, 21(3), 128-138.

<http://doi/10.1080/14036090410021360>

- Eisenman, D., McCaffrey, S., Donatello, I., & Marshal, G. (2015). An Ecosystems and Vulnerable Populations Perspective on Solastalgia and Psychological Distress After a Wildfire. *Ecohealth*, 12(4), 602-610. <http://doi/10.1007/s10393-015-1052-1>
- Faul, F., Erdfelder, E., Lang, A., & Buchner, A. (2007). G\*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39(2), 175-191. <http://doi/10.3758/bf03193146>
- Gifford, R. (2011). The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. *American Psychologist*, 66(4), 290-302. <http://doi/10.1037/a0023566>
- Gifford, R., Scannell, L., Kormos, C., Smolova, L., Biel, A., & Boncu, S. et al. (2009). Temporal pessimism and spatial optimism in environmental assessments: An 18-nation study. *Journal Of Environmental Psychology*, 29(1), 1-12. <http://doi/10.1016/j.jenvp.2008.06.001>
- Giuliani, M. V. (2003). Theory of attachment and place attachment. In M. Bonnes, T. Lee, & M. Bonaiuto (Eds.), *Psychological theories for environmental issues* (pp.137–170). Aldershot: Ashgate.
- Groulx, M., Lewis, J., Lemieux, C., & Dawson, J. (2014). Place-based climate change adaptation: A critical case study of climate change messaging and collective action in Churchill, Manitoba. *Landscape And Urban Planning*, 132, 136-147. <http://doi/10.1016/j.landurbplan.2014.09.002>
- Haer, T., Botzen, W., & Aerts, J. (2016). The effectiveness of flood risk communication strategies and the influence of social networks—Insights from an agent-based model. *Environmental Science & Policy*, 60, 44-52. <http://doi/10.1016/j.envsci.2016.03.006>
- Halpenny, E. (2010). Pro-environmental behaviours and park visitors: The effect of place attachment. *Journal Of Environmental Psychology*, 30(4), 409-421.

<http://doi/10.1016/j.jenvp.2010.04.006>

- Han, Z., Wang, L., & Cui, K. (2020). Trust in stakeholders and social support: risk perception and preparedness by the Wenchuan earthquake survivors. *Environmental Hazards*, 20(2), 132-145. <http://doi/10.1080/17477891.2020.1725410>
- Hatfield, J., & Soames Job, R. (2001). Optimism Bias about Environmental Degradation: The Role of the Range of Impact of Precautions. *Journal Of Environmental Psychology*, 21(1), 17-30. <http://doi/10.1006/jevp.2000.0190>
- Hay, R. (1998). Sense of place in developmental context. *Journal Of Environmental Psychology*, 18(1), 5-29. <http://doi/10.1006/jevp.1997.0060>
- Hayes, A. (2018). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach* (2nd ed.). New York: Guilford.
- Hidalgo, M., & Hernández, B. (2001). Place Attachment: Conceptual and Empirical Questions. *Journal Of Environmental Psychology*, 21(3), 273-281. <http://doi/10.1006/jevp.2001.0221>
- Higgins, P., Short, D., & South, N. (2013). Protecting the planet: a proposal for a law of ecocide. *Crime, Law And Social Change*, 59(3), 251-266. <http://doi/10.1007/s10611-013-9413-6>
- Hu, S., & Chen, J. (2016). Place-based inter-generational communication on local climate improves adolescents' perceptions and willingness to mitigate climate change. *Climatic Change*, 138(3-4), 425-438. <http://doi/10.1007/s10584-016-1746-6>
- IPCC, 2021: Climate Change 2021: The Physical Science Basis. Contribution of Working Groups II & III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press.
- Irwin, A., Simmons, P., & Walker, G. (1999). Faulty environments and risk reasoning: the local understanding of industrial hazards. *Environment and Planning A*, 31, 1311-1326.

- Jansen, S. (2019). Place attachment, distress, risk perception and coping in a case of earthquakes in the Netherlands. *Journal Of Housing And The Built Environment*, 35(2), 407-427. <http://doi/10.1007/s10901-019-09706-7>
- Jorgensen, B., & Stedman, R. (2001). Sense of place as an attitude: Lakeshow owners attitudes towards their properties. *Journal Of Environmental Psychology*, 21(3), 233-248. <http://doi/10.1006/jevp.2001.0226>
- Jimenez, M., DeVille, N., Elliott, E., Schiff, J., Wilt, G., Hart, J., & James, P. (2021). Associations between Nature Exposure and Health: A Review of the Evidence. *International Journal Of Environmental Research And Public Health*, 18(9), 4790. <http://doi/10.3390/ijerph18094790>
- Kaltenborn, B. (1998). Effects of sense of place on responses to environmental impacts. *Applied Geography*, 18(2), 169-189. [http://doi/10.1016/s0143-6228\(98\)00002-2](http://doi/10.1016/s0143-6228(98)00002-2)
- Kick, E., Fraser, J., Fulkerson, G., McKinney, L., & De Vries, D. (2011). Repetitive flood victims and acceptance of FEMA mitigation offers: an analysis with community-system policy implications. *Disasters*, 35(3), 510-539. <http://doi/10.1111/j.1467-7717.2011.01226.x>
- Kievik, M., & Gutteling, J. (2011). Yes, we can: motivate Dutch citizens to engage in self-protective behavior with regard to flood risks. *Natural Hazards*, 59(3), 1475-1490. <http://doi/10.1007/s11069-011-9845-1>
- Korpela, K., Ylén, M., Tyrväinen, L., & Silvennoinen, H. (2009). Stability of self-reported favourite places and place attachment over a 10-month period. *Journal Of Environmental Psychology*, 29(1), 95-100. <http://doi:10.1016/j.jenvp.2008.05.008>
- Krausmann, E., & Necci, A. (2021). Thinking the unthinkable: A perspective on Natech risks and Black Swans. *Safety Science*, 139, 105255. <http://doi/10.1016/j.ssci.2021.105255>

- Kyle, G., et al., (2004). Predictors of behavioral loyalty among hikers along the Appalachian trail. *Leisure Sciences*, 26 (1), 99–118.
- Leiserowitz, A. (2007). Communicating the risks of global warming: American risk perceptions, affective images, and interpretive communities. In S. C. Moser & L. Dilling (Eds.), *Creating a climate for change: Communicating climate change and facilitating social change* (pp. 44-63). New York, NY: Cambridge University Press.
- Lewicka, M. (2010). Place attachment: How far have we come in the last 40 years?. *Journal Of Environmental Psychology*, 31(3), 207-230. <http://doi/10.1016/j.jenvp.2010.10.001>
- Lindell, M., & Perry, R. (2000). Household Adjustment to Earthquake Hazard. *Environment And Behavior*, 32(4), 461-501. <http://doi/10.1177/00139160021972621>
- Liu, L., Bouman, T., Perlaviciute, G., & Steg, L. (2020). Public participation in decision making, perceived procedural fairness and public acceptability of renewable energy projects. *Energy And Climate Change*, 1, 100013. <http://doi/10.1016/j.egycc.2020.100013>
- Livingstone, M., Bailey, N., & Kearns, A. (2008). *People's attachment to place: The influence of neighbourhood deprivation*. Coventry: Chartered Institute for Housing.
- Marx, S. M., Weber, E. U., Orlove, B. S., Leiserowitz, A., Krantz, D. H., Roncoli, C., et al. (2007). Communication and mental processes: Experiential and analytic processing of uncertain climate information. *Global Environmental Change*, 17, 47–58.
- McFarlane, B., McGee, T., & Faulkner, H. (2011). Complexity of homeowner wildfire risk mitigation: an integration of hazard theories. *International Journal Of Wildland Fire*, 20(8), 921. <http://doi/10.1071/wf10096>
- Meade, A., & Craig, S. (2012). Identifying careless responses in survey data. *Psychological Methods*, 17(3), 437-455. <http://doi/10.1037/a0028085>
- Mesch, G., & Manor, O. (1998). Social Ties, Environmental Perception, And Local Attachment. *Environment And Behavior*, 30(4), 504-519. <http://doi/10.1177/001391659803000405>

- Mishra, S., Mazumdar, S., & Suar, D. (2010). Place attachment and flood preparedness. *Journal Of Environmental Psychology*, 30(2), 187-197. <http://doi/10.1016/j.jenvp.2009.11.005>
- Moser, S. C. (2007). More bad news: The risk of neglecting emotional responses to climate change information. In S. C. Moser & L. Dilling (Eds.), *Creating a climate for change: Communicating climate change and facilitating social change* (pp. 64-80). New York, NY, US: Cambridge University Press.
- Nawrotzki, R., Brenkert-Smith, H., Hunter, L., & Champ, P. (2013). Wildfire-Migration Dynamics: Lessons from Colorado's Fourmile Canyon Fire. *Society & Natural Resources*, 27(2), 215-225 <http://doi/10.1080/08941920.2013.842275>
- Newman, D. (2014). Missing Data. *Organizational Research Methods*, 17(4), 372-411. <http://doi/10.1177/1094428114548590>
- Norgaard, K. (2006). "We Don't Really Want to Know". *Organization & Environment*, 19(3), 347-370.
- NPWS. (2021). *Conservation Objectives: River Boyne and River Blackwater SAC 002299. Version 1*. Dublin: National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.
- Paton, D., Smith, L., Daly, M., & Johnston, D. (2008). Risk perception and volcanic hazard mitigation: Individual and social perspectives. *Journal Of Volcanology And Geothermal Research*, 172(3-4), 179-188. <http://doi/10.1016/j.jvolgeores.2007.12.026>
- Peng, L., Tan, J., Deng, W., & Liu, Y. (2020). Farmers' participation in community-based disaster management: The role of trust, place attachment and self-efficacy. *International Journal Of Disaster Risk Reduction*, 51, 101895. <http://doi/10.1016/j.ijdrr.2020.101895>
- Pidgeon, N. F. (2012). Public understanding of, and attitudes to, climate change: UK and international perspectives and policy. *Climate Policy*, 12, 85–106

- Ramkissoon, H., Weiler, B., & Smith, L. (2012). Place attachment and pro-environmental behaviour in national parks: the development of a conceptual framework. *Journal Of Sustainable Tourism*, 20(2), 257-276.  
<http://doi/10.1080/09669582.2011.602194>
- Robitzsch, A. (2020). Why Ordinal Variables Can (Almost) Always Be Treated as Continuous Variables: Clarifying Assumptions of Robust Continuous and Ordinal Factor Analysis Estimation Methods. *Frontiers In Education*, 5.  
<http://doi/10.3389/feduc.2020.589965>
- Roder, G., Ruljigaljig, T., Lin, C., & Tarolli, P. (2015). Natural hazards knowledge and risk perception of Wujie indigenous community in Taiwan. *Natural Hazards*, 81(1), 641-662. <http://doi/10.1007/s11069-015-2100-4>
- Rozsak, T. (1992). *The voice of the earth*. New York: Simon & Schuster.
- Scannell, L., & Gifford, R. (2010). The relations between natural and civic place attachment and pro-environmental behavior. *Journal Of Environmental Psychology*, 30(3), 289-297.  
<http://doi/10.1016/j.jenvp.2010.01.010>
- Scannell, L., & Gifford, R. (2013). Personally Relevant Climate Change: The Role of Place Attachment and Local Versus Global Message Framing in Engagement. *Environment And Behavior*, 45(1), 60-85.
- Silver, A., & Grek-Martin, J. (2015). "Now we understand what community really means": Reconceptualizing the role of sense of place in the disaster recovery process. *Journal Of Environmental Psychology*, 42, 32-41. <http://doi/10.1016/j.jenvp.2015.01.004>
- Song, Z., Daryanto, A., & Soopramanien, D. (2019). Place attachment, trust and mobility: Three-way interaction effect on urban residents' environmental citizenship behaviour. *Journal Of Business Research*, 105, 168-177. <http://doi/10.1016/j.jbusres.2019.08.001>
- Stedman, R. (2002). Toward a Social Psychology of Place. *Environment And Behavior*, 34(5), 561-581. <http://doi/10.1177/0013916502034005001>



- Stern, P. (2000). New Environmental Theories: Toward a Coherent Theory of Environmentally Significant Behavior. *Journal Of Social Issues*, 56(3), 407-424.  
<http://doi/10.1111/0022-4537.00175>
- Stokowski, P. A. (2002). Languages of place and discourses of power: Constructing new senses of place. *Journal of Leisure Research*, 34(4), 368-382.
- Sun, J., & Yang, K. (2016). The Wicked Problem of Climate Change: A New Approach Based on Social Mess and Fragmentation. *Sustainability*, 8(12), 1312.  
<http://doi/10.3390/su8121312>
- Ter Huurne E. F. J., Gutteling, J. M., (2008). Information needs and risk perception as predictors of risk information seeking. *Journal of Risk Research*, 11, 847–862.
- Udall, A., Groot, J., Jong, S., & Shankar, A. (2019). How do I see myself? A systematic review of identities in pro-environmental behaviour research. *Journal Of Consumer Behaviour*, 19(2), 108-141. <http://doi/10.1002/cb.1798>
- Van der Werff, E., Steg, L., & Keizer, K. (2013). I Am What I Am, by Looking Past the Present. *Environment And Behavior*, 46(5), 626-657. <http://doi/10.1177/0013916512475209>
- van Valkengoed, A., & Steg, L. (2019). Meta-analyses of factors motivating climate change adaptation behaviour. *Nature Climate Change*, 9(2), 158-163.  
<http://doi/10.1038/s41558-018-0371-y>
- Vaske, J. J., & Kobrin, K. C. (2001). Place attachment and environmentally responsible behavior. *The Journal of Environmental Education*, 32(4), 16-21.
- Venables, D., Pidgeon, N., Parkhill, K., Henwood, K., & Simmons, P. (2012). Living with nuclear power: Sense of place, proximity, and risk perceptions in local host communities. *Journal Of Environmental Psychology*, 32(4), 371-383. <http://doi/10.1016/j.jenvp.2012.06.003>
- Venables, D., Pidgeon, N., Simmons, P., Henwood, K., & Parkhill, K. (2009). Living with Nuclear Power: A Q-Method Study of Local Community Perceptions. *Risk Analysis*, 29(8), 1089-1104.  
<http://doi/10.1111/j.1539-6924.2009.01259.x>

- Verplanken, B., Marks, E., & Dobromir, A. (2020). On the nature of eco-anxiety: How constructive or unconstructive is habitual worry about global warming?. *Journal Of Environmental Psychology*, 72, 101528. <http://doi/10.1016/j.jenvp.2020.101528>
- Vesely, S., & Klöckner, C. (2020). Social Desirability in Environmental Psychology Research: Three Meta-Analyses. *Frontiers In Psychology*, 11. <http://doi/10.3389/fpsyg.2020.01395>
- Wang, Z., Han, Z., Liu, L., & Yu, S. (2021). Place Attachment and Household Disaster Preparedness: Examining the Mediation Role of Self-Efficacy. *International Journal Of Environmental Research And Public Health*, 18(11), 5565. <http://doi/10.3390/ijerph18115565>
- Wakefield, S., Elliott, S., Eyles, J., & Cole, D. (2005). Taking Environmental Action: The Role of Local Composition, Context, and Collective. *Environmental Management*, 37(1), 40-53. <http://doi/10.1007/s00267-004-0323-3>
- Wakefield, S.E.L., Elliott, S.J., Cole, D.C., & Eyles, J.D., (2001). Environmental risk and (re)action: air quality, health, and civic involvement in an urban industrial environment. *Health and Place*, 7, 163-177.
- White, K., Hardisty, D. & Habib, R. (2021). The Elusive Green Consumer. *Harvard Business Review*, (July-August 2019), 124-133.
- Wilson, E. O. (2016). *Half-earth: Our planet's fight for life*.
- Wolff, K., Larsen, S., & Øgaard, T. (2019). How to define and measure risk perceptions. *Annals Of Tourism Research*, 79, 102759. <http://doi/10.1016/j.annals.2019.102759>
- Xu, D., Peng, L., Liu, S., Su, C., Wang, X., & Chen, T. (2017). Influences of Sense of Place on Farming Households' Relocation Willingness in Areas Threatened by Geological Disasters: Evidence from China. *International Journal Of Disaster Risk Science*, 8(1), 16-32. <http://doi/10.1007/s13753-017-0112-2>
- Xue, K., Guo, S., Liu, Y., Liu, S., & Xu, D. (2021) . Social Networks, Trust, and Disaster- Risk Perceptions of Rural Residents in a Multi-Disaster Environment: Evidence from Sichuan,

China. *International Journal Of Environmental Research And Public Health*, 18(4), 2106.

<http://doi/10.3390/ijerph18042106>

Zhang, Y., Zhang, H.-L., Zhang, J., & Cheng, S. (2014). Predicting residents' pro-environmental behaviors at tourist sites: The role of awareness of disaster's consequences, values, and place attachment. *Journal of Environmental Psychology*, 40, 131- 46.

<http://dx.doi.org/10.1016/j.jenvp.2014.06.001>.

## Appendices

### Appendix A: Questionnaire used in this study including informed consent

# Boyne Valley Final Survey

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## Section 1 INFORMATION ABOUT THE RESEARCH; VERSION FOR PARTICIPANTS

### ➤ Why do I receive this information?

You are being invited to participate in this research on a once-off basis because you meet the requirements of being informed about the issue which is the subject of this research. This research is being carried out by Aidan Ring, as part of a Master thesis, and Tom Downer, the principal investigator, from the Behavioral and Social Science Faculty of the University of Groningen, The Netherlands.

### ➤ Do I have to participate in this research?

Participation in the research is voluntary. However, your consent is needed. Therefore, please read this information carefully. Ask all the questions you might have, for example because you do not understand something. Only afterwards do you decide if you want to participate. If you decide not to participate, you do not need to explain why, and there will be no negative consequences for you. You have this right at all times, including after you have consented to participate in the research.

### ➤ Why this research?

The purpose of this research is to explore place attachment (the emotional bond formed with a place) and how this affects our behaviour when such a place is likely to be changed (e.g. by construction). The research will also explore how people's circumstances and capacity affects the relationship between place attachment and associated behaviours.

### ➤ What do we ask of you during the research?

You will be asked for consent to participate. You will then be asked to fill out measures to assess how you feel about a specific place, its future and your own capacity to take certain actions in relation to that place. It typically takes around 10 minutes to complete.

### ➤ What are the consequences of participation?

Your participation will contribute to scientific knowledge about place attachment and what motivates people's behaviours in relation to that place. You will also be informed of the results if you wish and you may contact the main researchers to this end. Risks in the study are minimal but, if you feel stressed or overwhelmed when filling out the questionnaire, you can stop participating at any time.

➤ How will we treat your data?

The data you provide will be used as part of a Masters thesis project only. Your data will be collected anonymously, treated confidentially, uploaded, and stored securely in the university drive for up to 10 years for research purposes only. Nobody will be able to identify your information. We will not ask for personalised information (such as your name or other personal data) and your IP address will not be tracked. This yields anonymity for all participants.

➤ What else do you need to know?

You may always ask questions about the research: now, during the research, and after the end of the research. You can do so by emailing a.r.ring@student.rug.nl or t.j.downer@rug.nl, the researchers involved. Do you have questions/concerns about your rights as a research participant or about the conduct of the research? You may also contact the Ethics Committee of the Faculty of Behavioural and Social Sciences of the University of Groningen: ec-bss@rug.nl. Do you have questions or concerns regarding the handling of your personal data? You may also contact the University of Groningen Data Protection Officer: privacy@rug.nl. As a research participant, you have the right to a copy of this research information.

Consent INFORMED CONSENT 'PLACE-PROTECTIVE ACTION IN RESPONSE TO A THREAT PSY-2021-S-0494

- I have read the information about the research. I have had enough opportunity to ask questions about it.
- I understand what the research is about, what is being asked of me, which consequences participation can have, how my data will be handled, and what my rights as a participant are.
- I understand that participation in the research is voluntary. I myself choose to participate. I can stop participating at any moment. If I stop, I do not need to explain why. Stopping will have no negative consequences for me.
- Below I indicate what I am consenting to.

Yes, I consent to participation and to the processing of my personal data as mentioned in the research information. I know that until 20/09/2021 I can ask to have my data withdrawn and erased. I can also ask for this if I decide to stop participating in the research

No, I do not consent to participate

---

Section 3 The following information will not be used for any purposes other than to aid this research

---

## Q1 Gender

- Male
- Female
- Non-binary / third gender
- Prefer not to say
- 

## Q2 Age

---

## Q3 Household income bracket

- 
- 20,000 - 50,000€
- 50,000 - 80,000€
- 80,000 - 120,000€
- >120,000€
- Prefer not to say
-

## Q4 Educational Attainment

- Primary
  - Junior Certificate or equivalent
  - Leaving Certificate or equivalent
  - Third level / Undergrad
  - Masters or higher
  - Prefer not to say
- 

## Q5 What is your home-ownership status?

- Home-owner
  - Tenant
  - Other
  - Prefer not to say
- 

## Q6 For how long have you been living in your current home?

---

## Q7 Roughly how far from the Boyne Valley is your current home?

- <500m
- 500m - 2km
- 2km - 5km
- 5km - 10km
- >10km

---

Section 4 This survey will ask questions about your experience of the River Boyne and the Boyne Valley as well as your thoughts about its future.

N.B. From this point on, any reference to the Boyne Valley also refers to the River Boyne and the sacred sites in the areas surrounding the Boyne.

---

Q8 Have you, your household, or a group you are involved with, submitted a planning objection to the proposed Dawn Meats factory pipeline?

- Yes
  - No
- 

Q9 On average over the past year, how often do you visit the Boyne Valley?

- Every day
  - At least once a week
  - At least once a month
  - At least once a year
  - Less than once a year
  - I live in the Boyne Valley
- 

Q10 When did you start visiting the Boyne Valley?

- During the past 3 months
  - During the past year
  - During the past 5 years
  - Since before 5 years ago
-



Section 5 We would like to get an idea of how you feel about the River Boyne and the Boyne Valley and surrounding areas. Please rate your agreement with the following statements as honestly as you can.

---

Q11 The Boyne Valley means a great deal to me

- Strongly disagree
  - Somewhat disagree
  - Neither agree nor disagree
  - Somewhat agree
  - Strongly agree
- 

Q12 I feel strong, positive feelings for the Boyne Valley

- Strongly disagree
  - Somewhat disagree
  - Neither agree nor disagree
  - Somewhat agree
  - Strongly agree
-

Q13 I am fond of the Boyne Valley

- Strongly disagree
  - Somewhat disagree
  - Neither agree nor disagree
  - Somewhat agree
  - Strongly agree
- 

Q14 I identify strongly with the Boyne Valley

- Strongly disagree
  - Somewhat disagree
  - Neither agree nor disagree
  - Somewhat agree
  - Strongly agree
- 

Q15 Visiting the Boyne Valley says a lot about who I am

- Strongly disagree
  - Somewhat disagree
  - Neither agree nor disagree
  - Somewhat agree
  - Strongly agree
-

Q16 I feel I can really be myself in the Boyne Valley

- Strongly disagree
  - Somewhat disagree
  - Neither agree nor disagree
  - Somewhat agree
  - Strongly agree
- 

Q17 I feel relaxed when I am at the Boyne Valley

- Strongly disagree
  - Somewhat disagree
  - Neither agree nor disagree
  - Somewhat agree
  - Strongly agree
- 

Q18 The Boyne Valley is the best place for what I like to do

- Strongly disagree
  - Somewhat disagree
  - Neither agree nor disagree
  - Somewhat agree
  - Strongly agree
- 

Section 6 We would like to get an idea of how you feel about the level of threat posed to the River Boyne and the Boyne Valley by the proposed Dawn Meats Factory pipeline.

Please indicate how *likely* you think the following possible consequences are

---

Q19 Noise nuisance caused in the Boyne Valley by the construction and operation of the pipeline

- Very unlikely
  - Somewhat unlikely
  - Neither likely nor unlikely
  - Somewhat likely
  - Very likely
- 

Q20 Reduced air quality caused in the Boyne Valley by the construction and operation of the pipeline

- Very unlikely
  - Somewhat unlikely
  - Neither likely nor unlikely
  - Somewhat likely
  - Very likely
- 

Q21 Reduced water quality in the River Boyne caused by the construction and operation of the pipeline

- Very unlikely
  - Somewhat unlikely
  - Neither likely nor unlikely
  - Somewhat likely
  - Very likely
-

Q22 Negative impacts on the biodiversity of the Boyne Valley caused by the construction and operation of the pipeline

- Very unlikely
  - Somewhat unlikely
  - Neither likely nor unlikely
  - Somewhat likely
  - Very likely
- 

Q23 Diminished overall enjoyment and restoration associated with the Boyne Valley

- Very unlikely
  - Somewhat unlikely
  - Neither likely nor unlikely
  - Somewhat likely
  - Very likely
- 

Section 7 Please indicate how *severe* you think each possible consequence would be

---

Q24 Noise nuisance caused in the Boyne Valley by the construction and operation of the pipeline

- Not at all severe
- Somewhat unsevere
- Neither severe nor unsevere
- Somewhat severe
- Very severe

---

Q25 Reduced air quality caused in the Boyne Valley by construction and operation of the pipeline

- Not at all severe
  - Somewhat unsevere
  - Neither severe nor unsevere
  - Somewhat severe
  - Very severe
- 

Q26 Reduced water quality in the River Boyne caused by the construction and operation of the pipeline

- Not at all severe
  - Somewhat unsevere
  - Neither severe nor unsevere
  - Somewhat severe
  - Very severe
- 

Q27 Negative impacts on the biodiversity of the Boyne Valley causes by the construction and operation of the pipeline

- Not at all severe
  - Somewhat unsevere
  - Neither severe nor unsevere
  - Somewhat severe
  - Very severe
-

Q28 Diminished overall enjoyment and restoration associated with the Boyne Valley

- Not at all severe
  - Somewhat unsevere
  - Neither severe nor unsevere
  - Somewhat severe
  - Very severe
- 

Section 8 Considering your answers so far and your future intentions, please rate your level of agreement with the following action statements

---

Q29 I would take a civic action to protect the Boyne Valley (e.g. signing a petition)

- Strongly disagree
  - Somewhat disagree
  - Neither agree nor disagree
  - Somewhat agree
  - Strongly agree
-

Q30 I would take a practical action to protect the Boyne Valley (e.g. picking up litter and encouraging others to take their litter away with them)

- Strongly disagree
  - Somewhat disagree
  - Neither agree nor disagree
  - Somewhat agree
  - Strongly agree
- 

Q31 I would contribute whatever resources I could, such as my time or financial resources, to projects that help to protect the Boyne Valley (e.g. a media campaign)

- Strongly disagree
  - Somewhat disagree
  - Neither agree nor disagree
  - Somewhat agree
  - Strongly agree
- 

Section 9 In the *past*, how often have you performed the following actions in relation to the Boyne Valley?

---

Q32 Signed petitions in support of protecting the Boyne Valley

- Never
- Once
- More than once
- Frequently



---

Q33 Participated in a public meeting about managing the Boyne Valley

- Never
  - Once
  - More than once
  - Frequently
- 

Q34 Written correspondence to policy-makers in support of the protection of the Boyne Valley (e.g. a planning objection)

- Never
  - Once
  - More than once
  - Frequently
- 

Q35 Contributed donations to ensure protection of the Boyne Valley (this does not include standard fees for valley utilities e.g. a fishing license)

- Never
  - Once
  - More than once
  - Frequently
-

Q36 Voluntarily reduced or stopped your use of a favourite spot in the Boyne Valley if it needed to recover from environmental damage

- Never
  - Once
  - More than once
  - Frequently
- 

Q37 Volunteered your time to projects that help the Boyne Valley (e.g. a media campaign)

- Never
  - Once
  - More than once
  - Frequently
- 

#### Section 10

We would like to get your perspective on taking action. **Considering your own availability, skills and knowledge**, please rate how easy it would be for you to perform the following options.

---

Q38 Signing petitions in support of protecting the River Boyne and the Boyne Valley

- Extremely difficult
  - Somewhat difficult
  - Neither easy nor difficult
  - Somewhat easy
  - Extremely easy
-

Q39 Participating in a public meeting about managing the Boyne Valley

- Extremely difficult
  - Somewhat difficult
  - Neither easy nor difficult
  - Somewhat easy
  - Extremely easy
- 

Q40 Writing correspondence to policy-makers in support of the protection of the Boyne Valley (e.g. a planning objection)

- Extremely difficult
  - Somewhat difficult
  - Neither easy nor difficult
  - Somewhat easy
  - Extremely easy
- 

Q41 Contributing donations to ensure protection of the Boyne Valley

- Extremely difficult
  - Somewhat difficult
  - Neither easy nor difficult
  - Somewhat easy
  - Extremely easy
-

Q42 Volunteering to reduce or stop your use of a favourite spot in the valley if it needs to recover from environmental damage

- Extremely difficult
  - Somewhat difficult
  - Neither easy nor difficult
  - Somewhat easy
  - Extremely easy
- 

Q43 Volunteering your time to projects that help the Boyne Valley (e.g. a media campaign)

- Extremely difficult
  - Somewhat difficult
  - Neither easy nor difficult
  - Somewhat easy
  - Extremely easy
- 

#### Section 11

Think of the potential actions mentioned in the previous questions. To what extent do you **agree** with the following statement

---

Q44 Such actions would make a difference to whether a pipeline gets built or not

- Strongly disagree
  - Somewhat disagree
  - Neither agree nor disagree
  - Somewhat agree
  - Strongly agree
-

## Appendix B: Descriptive Statistics for Demographics and variables of interest

Descriptive Statistics							
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
Gender	197	3	4	7	4,66	,562	,316
Household income bracket	197	8	1	9	4,21	2,637	6,951
Educational Attainment	196	5	1	6	3,96	,897	,804
What is your home-ownership status?	197	4	1	5	1,48	1,123	1,261
Roughly how far from the Boyne Valley is your current home?	195	4	1	5	2,66	1,362	1,856
Have you, your household, or a group you are involved with, submitted a planning objection to the proposed Dawn Meats factory pipeline?	199	1	1	2	1,57	,497	,247
On average over the past year, how often do you visit the Boyne Valley?	199	8	1	9	2,86	1,886	3,556
When did you start visiting the Boyne Valley?	199	4	1	5	4,67	,834	,696
PlaceAttachment	199	2,25	2,75	5,00	4,6074	,44506	,198
RiskPerception	199	2,70	2,30	5,00	4,4859	,47716	,228
PlaceProtectiveActionPast	199	3,00	1,00	4,00	1,8802	,71913	,517
PlaceProtectiveActionFuture	199	3,67	1,33	5,00	4,5595	,55627	,309
PerceivedEfficacy	199	2,75	2,25	5,00	3,9615	,63353	,401
Valid N (listwise)	193						

**Appendix C: Copy accompanying questionnaire for social media pages**

I NEED HELP WITH MY MASTERS RESEARCH!!!

Greetings fellow Boyne enthusiasts! My name is Aidan Ring, I am a Masters student of Environmental Psychology. Since hearing about the proposal to build a pipeline that would discharge effluent into the River Boyne, I have decided to do some research on it for my own Masters thesis. Through chatting to those acquainted with the issue, I have developed a questionnaire to explore how local people who have an emotional bond with the River Boyne, and the Boyne Valley, feel about the proposed Dawn Meats factory pipeline as well as what they feel they can do about it. My survey takes around 10 minutes to complete and I would be extremely grateful to anyone who could fill it out (link below). Answers will, of course, be anonymous but I will use the research to help the campaign in any way that I can. I attach a couple of photos from a recent trip to the river for your enjoyment.

[https://rug.eu.qualtrics.com/jfe/form/SV\\_7QA96krbuTHIB8y](https://rug.eu.qualtrics.com/jfe/form/SV_7QA96krbuTHIB8y)

**Appendix D: List of facebook pages targeted with questionnaire**

1. Save the Boyne
2. Meath County Council
3. Boyne Catchment Angling Association
4. 16<sup>th</sup> Meath Kildalkey Scout Group
5. North Navan Communities – News, Issues & Discussion
6. Canoeing Ireland
7. Silver Bridge Kayak Club
8. Wild Water Kayak Club
9. Protect East Meath
10. Slane & Monknewtown Parish
11. Rossin Rovers AFC
12. Seneschalstown GFC
13. Rossnaree Parish Community Alert Group