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We are at risk, and so what? Place attachment, environmental risk perceptions and preventive coping behaviours[☆]



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ABSTRACT

Place attachment regulates people–environment transactions across various relevant environmental –psychological processes. However, there is no consensus about its role in the relationship between environmental risk perception and coping behaviours. Since place attachment is strongly related to place-specific dimensions of one’s own identity and may be linked to spatial-biases, it is hypothesized that place attachment negatively moderates the relation between environmental risk perception and prevention behaviours enacted to cope with environmental risks. Two studies were conducted in two Italian cities exposed to low and high flood risk. Results show that, even though higher levels of risk perception may exert a positive effect in improving people’s willingness to cope with an environmental risk, this effect is weaker when it is associated with strong place attachment. Findings suggest that affect-based cues, such as place attachment, diminish environmental risk coping intentions and actions when associated with high risk perception. Theoretical and practical implications are discussed.

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1. Introduction

According to the European Environment Agency, climate change has already begun in Europe (EEA, 2012). The atypical climate events related to climate change exacerbate the European urbanization process (Antrop, 2004; Kabisch & Haase, 2011; Kowarik, 2011): Local communities have already started to face issues related to climate change, such as increased precipitation patterns, frequent flood events, sea level rise, and many other extreme weather conditions (IPCC, 2014). Within such scenarios, citizens’ proactive adaptation to climate change is an imperative and

challenging goal (EEA, 2010, 2012). Thus, with climate change increasing the likelihood of extreme weather events, from a social-psychological perspective it is important to understand which processes enhance or mitigate preventive behaviours carried out to cope with the increasing environmental risk. Indeed, the present research aims to understand the role played by a crucial social-psychological variable regulating people–environment transactions – place attachment (e.g., Giuliani, 2003; Manzo & Devine-Wright, 2014) – in moderating the basic relation between environmental risk perception and related coping behaviours.

Among other environmental risks, floods are those highly linked to climate changes (Environment Agency, 2009; Kay, Davies, Bell, & Jones, 2009; Nirupama & Simonovic, 2007); they account for about one third of all natural disasters and for the related one third of the whole economic loss from all natural catastrophes (White, 2000). Unfortunately, floods are also responsible for more than half of all disaster related fatalities in the world (White, 2000). Recent evidence also states that floods have increased in frequency and severity (UNISDR, 2012). However, structural interventions aimed

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to mitigate the effect of floods (such as rebuilding river banks or relocating entire neighbourhoods) are often unsustainable and will not eliminate extreme floods (Bradford et al. 2012; Kundzewicz, 1999; Tobin, 1995). For example, recent findings estimate that changes in extreme weather conditions that cause floods may translate into changes in economic losses (Dumas, Hallegatte, Quintana-Segui, & Martin, 2013). Therefore, it becomes fundamental to guide attitudes and to effectively inform at-risk citizens with proper and effective communication strategies, in order to prepare them to face the increasing risk. However, O'Sullivan et al. (2012) found that people show a reluctance to prepare or respond appropriately to flood risk information. Indeed, recent findings show that several social-psychological variables may influence individuals' perceptions toward environmental risks. These variables can improve or mitigate individuals' willingness to cope with impending environmental risks, such as flood risk (De Dominicis et al., 2014). Although some research has been conducted to understand variables enhancing citizens' resilience (e.g., Bradford et al., 2012; De Dominicis et al., 2014; Johnson, Siegel, & Crano, 2012; Miller, Adame, & Moore, 2013; Raaijmakers, Krywkow, & van der Veen, 2008), there is still a lack of research aiming at studying how person-environment transactions mitigate individuals' willingness to cope with impending disasters. Thus, according to recent developments in the field (Devine-Wright, 2013), we aim to understand whether, and how, place attachment affects environmental risk coping behaviours, investigating its moderating role in the risk perception-behaviour relationship. In fact, among other variables, risk perception itself is one of the basic predictors for the execution of preventive and coping behaviours (Slovic, 1987).

1.1. Risk perception

Risk perception is defined by Slovic (1987) as an intuitive judgement of risks, made by individuals and groups, in the context of limited and uncertain information. Given a specific understanding of a particular threat, risk perception is an individual's interpretation or impression of the risk related to the object perceived as a threat. Risk perception is not constant across individuals: for example, men and women hold different risk perceptions of the same risk, and the risk itself may have different meanings according to gender specificity (Gustafson, 1998). Yet risk is always perceived situationally. For example, Raaijmakers and colleagues (Raaijmakers et al., 2008) define risk perception through the relationship of a set of situation-specific risk characteristics: awareness, worry and preparedness. Accordingly, when one of these characteristics increases in the perceiver, the general risk perception may rise, and thus his/her resilience might be enhanced. Therefore, environmental risks are defined both individually and situationally. In fact, there are a multitude of factors that affect risk perception, such as frequency, seriousness and direct/indirect experience of risk events (Fazio & Zanna, 1981; Uzzell, 2000). However, all these factors may in turn lead to biased perceptions of that risk. Indeed, Liechtenstein and colleagues (Liechtenstein, Slovic, Fischhoff, Layman, & Combs, 1978) defined the "primary bias" as the tendency to underestimate the frequency of common causes of death, and to overestimate rare causes of death frequency. They also found the "secondary bias" (Liechtenstein et al., 1978), according to which sensational causes of death lead to overestimates of the risk, while ordinary causes of death lead to underestimates of the risk. Accordingly, people tend to ignore low probability events even when these events may have a catastrophic potential effect (Keller, Siegrist, & Gutscher, 2006; Slovic, Finucane, Peters, & MacGregor, 2004; Slovic, Fischhoff, & Liechtenstein, 1978): unfortunately, environmental risks, and specifically floods, fit

perfectly into this category.

Floods, as a form of environmental hydro-geological risk, represent one of the most hazardous environmental risks of our time (Miceli, Sotgiu, & Settanni, 2008; Mysiak et al., 2014): however, given its intrinsic unpredictable nature, its occurrence is mostly underestimated (Baan & Klijn, 2004; Terpstra, Gutteling, Geldof, & Kappe, 2006). Moreover, studies in environmental crisis management show that disaster awareness peaks during, and immediately after, the occurrence of an environmental threat, but it rapidly decreases between disasters (Stefanovic, 2003). People appear to have short memories and, in fact, immediately after a flood they tend to overestimate flood risk (Baan & Klijn, 2004). However, Penning-Rowsell (2003) showed that worry decreases fast and, after a few years, flood risk returns to being underestimated. Furthermore, even if in high risk perception conditions people are more willing to, and tend to carry out, proactive behaviours (Covello, 2003), there is still not a consensus about what exactly encourages people to carry out preventive behaviours to cope with the environmental risk. More generally, it is also clear that simply informing people is not enough to motivate them to change their usual behaviour (Schultz, 2011). These considerations raise important questions: to what extent people living in at-risk zones are willing to adopt the necessary behaviours to cope with the environmental risk? Which are the social-psychological variables linking individuals' characteristics and places' features that could mitigate people's willingness to cope with an environmental risk?

1.2. Place attachment

Place attachment is one of the most crucial social-psychological aspects for people-environment transactions (Bonnes, Lee, & Bonaiuto, 2003). The preliminary theoretical and empirical conceptualizations of place attachment came from studies on people forcibly removed from their places of residence, and its psychological correlates (Fried, 1963). Place attachment was derived from Bowlby's (1988) attachment theory, and refers to affect and emotions that connect people to places. Shumaker and Taylor (1983) define place attachment as 'a positive affective bond or association between individuals and their residential environment' (p. 233). Hummon (1992) defines it as the 'emotional involvement with places' (p. 256), while Low (1992) considers it 'an individual's cognitive or emotional connection to a particular setting or milieu' (p. 165). However, a more specific definition based on Bowlby's (1988) concept of attachment is provided by Brown and Perkins (1992), who define place attachment as the overall feelings, bonds, thoughts, and behavioural intentions that people develop over time in relation to their social-physical environment. Specifically, these emotions and affective responses toward the places we live in, and which we form during the course of our lives, give us a stable sense of self and sense of continuity (Twigger-Ross & Uzzell, 1996). Place attachment also gives meaning to our life and defines our identities (Giuliani, 2003). In order to define a general conceptual framework for defining place attachment, Scannell and Gifford (2010) recently proposed the three-dimensional "person-process-place" framework for place attachment, which proposes that place attachment is a multidimensional concept that encompasses the person (the actor), his/her psychological process (affect, cognition, behaviour), and the related physical place dimensions (place characteristics and features). A relevant linked construct is place identity (Proshansky, Fabian, & Kaminoff, 1983; Twigger-Ross, Bonaiuto, & Breakwell, 2003; Twigger-Ross & Uzzell, 1996; Uzzell, 2000), namely an aspect of identity comparable to social identity (Tajfel & Turner, 1979), but describing an individual's socialization with the physical world (Uzzell, Pol, & Badenas, 2002). However,

rather than being a separate part of identity concerned with place, all aspects of identity will, to a greater or lesser extent, have place-related implications (Twigger-Ross & Uzzell, 1996). Following this line of research, and also according to Knez (2005), we argue that place attachment, as the place-specific affective component of one's own place identity, may function as a boost or as a barrier for several place-related behaviours, according to place-specific biases which are similar to those implied in social/self-identity processes (e.g., Twigger-Ross et al., 2003).

1.3. Place attachment and environmental risk

With few exceptions addressing the correlation of place attachment with either risk perception or intention to cope with environmental risk (e.g., Bonaiuto, De Dominicis, Fornara, Ganucci Cancellieri, & Mosco, 2011; Mishra, Mazumdar, & Damodar, 2010; Ruiz & Hernández, 2014), there is still a lack of systematic empirical research examining the moderating role of place attachment on the relationship between environmental risk perception, and related coping intentions and behaviours.

The nature of the correlation between place attachment and environmental risk perception is still unclear, on account of contradictory results. For example, some studies show a negative relation among place attachment and risk perception: for example, Armaş' results (2006) shows that a strong affective bond (feelings toward the residential area) offers a feeling of safety and leads to the neglect and even to the total denial of the hazard related to seismic risk in Bucharest. On the contrary, people scoring high in neighbourhood attachment show higher flood risk perception and related flood concern, but only for those living in low risk areas in Italy (Bonaiuto et al., 2011). However, Bernardo (2013), in Portugal and for a wide range of environmental risks, found that place attachment contributes to amplifying high probability risks perceptions while attenuating the perception of low probability risks. For risks perceived to be less likely (risks that are often the most dangerous), place attachment reduces risk perception; whilst in highly probable risks, attachment to place increases risk perception. These kinds of results, though contradictory, stress the importance of considering place attachment effects both on cognition and action, also taking into account areas with different levels of risk.

The relation of place attachment with risk coping is also unclear. For example in Italy, people scoring high in neighbourhood attachment showed higher coping intentions and behaviours in terms of collecting and storing useful items to cope with flood risk, but only for those who live in low risk areas (Bonaiuto et al., 2011). However, results in India, although they reveal that genealogical and economic attachment correlate positively with flood preparedness, show that religious attachment does not influence preparedness behaviour (Mishra et al., 2010). Even more in contrast, Bird, Gísladóttir, and Dominey-Howes (2011) found, in Iceland, that place attachment for rural residents is negatively related to acceptance of the evacuation plans, and also to resilience. These few examples, among others, show how the direct relation among place attachment and risk coping is not clear, being either positive, absent, or negative. One possibility is that this relation could change on the basis of the different actions and behaviours considered.

Moreover, the above mentioned evidence suggests, in at least some cases, that the effect of place attachment is not a simple and univocal effect; rather place attachment can moderate other variables' links (e.g., results' in Bonaiuto et al., 2011). In fact, Bihari and Ryan (2012), studying wildfires in the USA, show that past experience with wildfires and stronger place attachment significantly influence social capital and risk preparedness: people with greater

place attachment are more aware of the wildfire risk and are more involved in local associations. Here the authors showed that place attachment could exert a moderating or moderated effect on both perception and action levels, rather than a direct effect. Again, Paton, Burgelt, and Prior (2008), in a qualitative Australian study, find that sense of belonging to a place (measured in terms of attachment to home and property) moderates the relationship between positive outcome expectancy and both intentions and behaviours to cope with bushfire environmental risk. However, these kind of studies are still rare. Thus, further studies are needed in order to better test the moderating effects of place attachment, especially in relation with crucial dependent variables such as coping behaviours, and actions within environmental risk scenarios.

Furthermore, it is still unclear whether place attachment exerts its effect at the cognitive or behavioural level. For example, it has been found that attachment to place for rural residents is related on one side to an accurate knowledge of the risk (volcanic eruption), but on the other side to a lower acceptance of the evacuation plans and to higher resilience (Bird et al., 2011). This study offers an example about how place attachment effects could be different at the cognitive and at the conative level: while place attachment does not interfere with recognizing the risk, it negatively affects the action level. It is therefore worthy to focus on the direct or moderating effect of place attachment at the level of perception and evaluation of the risk; as well as to focus on place attachment effects at the level of risk coping intentions and actions. Additionally, some studies show that the relationships between place attachment, risk perception and coping behaviours may vary according to the specific place in which it is embedded (e.g., Bernardo, 2013; Bonaiuto et al., 2011; Casakin, Hernández, & Ruiz, 2015). In other words, it seems that affective social-psychological variables such as place attachment need to be taken into account at the level of the specific place when addressing issues related to people-environment transactions (either in terms of perception and evaluation or intention and action).

Other results suggest that place attachment could in fact exert a negative moderation on both the relation among objective environmental risk and risk perception and among risk perception and coping behaviours. On the one hand, at the environmental risk perception level, individuals seem to believe that their environment is safer (i.e., less exposed to the risk) than others' ones environments (Gifford et al., 2009), according to the unrealistic optimistic bias (Radcliffe & Klein, 2002). This place-specific bias occurs in fact at various level of analysis, such as the home, neighbourhood or community (Pahl, Harris, Todd, & Rutter, 2005; Schmidt & Gifford, 1989; Weinstein, Klotz, & Sandman, 1988), and it is very likely to occur when referring to environmental risk (e.g., Dunlap, Gallup, & Gallup, 1993; Hatfield & Job, 2001; Lima & Castro, 2005; Pahl et al., 2005; Uzzell, 2000). Hatfield and Job (2001) found that residents believe that their local area is less likely to be affected by environmental hazard than the local area of their peers. Other findings coherently suggest that people tend to view proximal conditions (in physical and/or social terms) more favourably than distal conditions (e.g., Bonaiuto, Breakwell, & Cano, 1996). Also, recent studies report that perceptions of environmental quality decrease, or environmental problems increase, as the spatial level increases from the local, to the national, to the global level (Dunlap et al., 1993; Schultz et al., 2005; Uzzell, 2000). Gifford et al. (2009), aggregating data from 18 different countries, found that individuals report environmental problems as more severe when they are considered globally instead of locally.

On the other hand, at the environmental risk coping behaviours level, Devine-Wright (2009, 2013) argues that some forms of place-protective actions may arise, especially when new elements

threaten pre-existing emotional attachments to places and one's own place-identity. Accordingly, it has also been shown that place attachment does not merely lead to place protection, but it may even underlie actions that are self-detrimental or harmful to one's own place (Brown, Altman, & Werner, 2012; Devine-Wright, 2009; Devine-Wright & Howes, 2010). These phenomena could be particularly evident in case of a high level of risk perception: for example, Fried (2000) showed that highly attached communities refused to evacuate their homes despite warnings of an impending flood.

This unrealistic optimism, namely the erroneous expectation of a positive outcome, is therefore associated with information-processing biases and maladaptive coping styles (Radcliffe & Klein, 2002). In other words, it is likely that correct information can be erroneously processed according to affective-based biases (i.e., place attachment as a form of place-specific bias; see also Bonaiuto et al., 1996), leading to process deficits and defensiveness (Radcliffe & Klein, 2002), and therefore to non-adaptive behaviours. Given these examples of negative place attachment effects on people-environment transactions (e.g., the higher the place attachment, the lower the coping behaviours), it is plausible to assume that such biased transactions could increase as a function of place attachment, making it a barrier variable for enacting preventive behaviours.

According to the outlined literature and given the conflicting results, further investigation is needed to understand whether or not place attachment is a significant moderator of the risk perception-coping behaviour relationship in the environmental risks domain. It is also unclear where an affective variable such as place attachment could exert its effect in the above mentioned relation, either at the cognitive and/or conative level, because the effect could be different across these two levels of analysis. In the present work, the focus is on the second level, namely the link among risk perception and risk coping. Therefore, in order to better understand the role of a possible antecedent of resilient behaviours in case of environmental risk, the present research specifically investigates the moderating role of neighbourhood attachment in the relation between flood risk perception and related preventive behaviours. Thus, according to the possible effect of place-specific biases (Bonaiuto et al., 1996; Gifford et al., 2009; Radcliffe & Klein, 2002; Schultz et al., 2014), and the possible barrier effect of place attachment in influencing people-environment transactions (Bonaiuto et al., 2011; Brown & Perkins, 1992; Brown et al., 2012; Devine-Wright, 2009, 2013; Devine-Wright & Howes, 2010; Fried, 2000; Gifford, 2014; Scannell, 2013; Scannell & Gifford, 2013), we expect a negative moderating effect of place attachment on risk perception and preventive behaviours. Given previous evidence that has highlighted potential differences of such a moderating effect in relation to different areas (as in the previously reported studies by Bernardo (2013), Bonaiuto et al. (2011), Casakin, Hernández, and Ruiz (2015)), we have conducted two studies in two cities in Italy, which are respectively subject to low and high objective flood risk (Bonaiuto et al., 2011; De Dominicis, 2012; De Dominicis et al., 2014): Rome and Vibo Valentia. These two settings could allow to control for the degree of risk, and to check for generalizability of the results.

1.4. Research overview

The central question of the research is to determine whether, and how, place attachment moderates the relation between risk perception and preventive behaviours. Two studies were designed to test this general hypothesis. The first was conducted to determine whether place attachment mitigates the relationship between risk perception and intentions to enact preventive behaviours to cope with flood risk, while the second aimed to

assess this moderating effect on overt preventive behaviours. Both studies were conducted in two cities in Italy, already surveyed in previous research: Rome and Vibo Valentia. This allowed us to account for a plausible influence of the context on the occurrence of such a hypothesised moderating effect, according to the magnitude of risk perception and place attachment. Records indicate that the city of Rome is objectively subject to moderate hydro-geological risk, while the city of Vibo Valentia is exposed to an objectively higher level of hydro-geological risk (Bonaiuto et al., 2011; De Dominicis et al., 2014), suggesting that in the high risk context the expected moderation effect should be greater. Moreover, these works also established that for each of the two cities, knowledge and responsibilities of municipal authorities involved in the management of the hydro-geological risk (e.g., communication, intervention, etc.) were equivalent. Finally, intentions and behaviours used here as the main dependent variables are (as defined by Protezione Civile il Comune di Roma (2006)): “look for flood relevant information” (actively and effectively search information on various media about the relevant risk), “store useful items” (actively and effectively store items such as water, food, medicine, copy of documents and house key, which will be useful in case of flood) and “avoid wrong behaviours” (actively and effectively prepare before an incoming flood for preventing to enact wrong behaviour, such as switch off the electricity from the electrical panel, park the car in a safe place, move relatives and pets upstairs).

2. Study 1

2.1. Aims and hypotheses

The goal of Study 1 is to identify the moderating effect of place attachment (measured as neighbourhood attachment; Fornara, Bonaiuto, & Bonnes, 2010) in the relation between flood risk perception and intention to enact preventive behaviour to cope with that risk, for inhabitants exposed to low and high flood risk areas in Italy (Rome and Vibo Valentia, respectively). Given the link between place attachment, place identity and in-place biases (Bonaiuto et al., 1996; Devine-Wright, 2013; Gifford et al., 2009; Radcliffe & Klein, 2002; Schultz et al., 2014), as well the previous research on the barrier effect of place attachment on behaviours (conative level of influence), it is generally hypothesized that the positive relationship between risk perception and preventive behaviour (Terpstra et al., 2006) will be weaker for higher level of neighbourhood attachment (Gifford et al., 2009; Twigger-Ross & Uzzell, 1996; Uzzell, 2000). More specifically, given that previous studies (Bonaiuto et al., 2011; De Dominicis et al., 2014; De Dominicis, 2012) demonstrated a realistic perception of the objective flood risk for citizens living in these contexts, we expect that the moderating effect is greater in the higher risk context, the city of Vibo Valentia, since they would perceive themselves as exposed to a higher risk and therefore the moderating effect of place attachment should be magnified within this subsample compared to the one in the lower risk area.

2.2. Method

2.2.1. Sample

A survey on random respondents who accepted to participate in our research was administrated in public places and door-by-door within the two cities. Trained researchers administrated the survey in the selected neighbourhoods within each of the two contexts. A stratified sampling procedure was used and samples were paired by gender, age and residential area within the relevant research contexts. The stratified sampling procedure was done to ensure the recruitment of high-to-low risk respondents within

each of the two contexts, which were selected according to their area of residence. An overall sample of 444 respondents (around 1000 citizens were contacted), all home owners, participated in the survey, approximately evenly divided between Rome ($n = 210$) and Vibo Valentia ($n = 234$). Approximately 51% of the sample was male; respondents' ages covered a wide range (18–29 years old: 17.1%; 30–39 years old: 22.1%; 40–49 years old: 24.8%; 50–59 years old: 18%; 60–79 years old: 18%).

2.2.2. Measures

Respondents answered a 32-item questionnaire. To assess flood risk perceptions, a 5-item scale measured on a 5-point Likert scale was developed ($\alpha = .88$), adapted from Brewer and colleagues' meta-analysis (Brewer et al., 2007). Some items from the scale are: "It is likely that I could be harmed in a flood," and "I feel exposed to flood risk." Four 7-point Likert-type items from Fornara et al. (2010) were used to measure neighbourhood attachment ($\alpha = .78$), according to the sampling procedure and respecting the place specific approach of the research. Five 5-point evaluative semantic differential scales (Osgood, 1964) were used to measure each of the three specific attitudes toward three different preventive behaviours for flood risk (look for flood relevant information, store useful items, avoid wrong behaviours). The three subscales have been aggregated to form the general attitude measure ($\alpha = .81$). Three 5-point Likert-type items were used to measure each of the relevant behavioural intentions (look for flood relevant information, store useful items, avoid wrong behaviours; $\alpha = .82$). Table 1 reports a synthesis of the results on both the factorial structure and the reliability of the above mentioned scales. Finally, five socio-demographic were also assessed (gender, age, education, occupation, residence).

2.3. Preliminary analyses and results

As far as the definition of the main dependent variable is concerned, the relationships among risk perception and

Table 1
Non-rotated factor loadings (PCA) and Cronbach's alphas for each scale in study 1.

Scale and item	Factor 1
Flood risk perception	$\alpha = .88$
It is likely that I could be harmed in a flood.	.85
It is likely that I could be harmed in a flood more easily than other people in my city.	.80
It is possible that I can die because of a flood.	.74
I feel exposed to flood risk.	.91
To which level of flood risk is your area/neighbourhood subject?	.82
Variance explained	68.2%
Neighbourhood attachment	$\alpha = .78$
This neighbourhood is part of me.	.88
It would be very hard for me to leave this place.	.89
This is the ideal place for me.	.85
I do not feel integrated in this place.	-.45
Variance explained	62.5%
Attitude toward preventive behaviours	$\alpha = .81$
Attitude toward look for flood risk information.	.77
Attitude toward store useful items.	.90
Attitude toward avoid wrong behaviours.	.89
Variance explained	73.2%
Intention to enact preventive behaviours	$\alpha = .82$
Intention to look for flood risk information.	.88
Intention to store useful items.	.84
Intention to avoid wrong behaviours.	.85
Variance explained	73.4%

Factor loadings for each item are presented in bold. Cronbach's alphas and percentage of explained variance for each factor are presented in italics.

neighbourhood attachment, attitudes and intentions are investigated. Specifically, risk perception positively correlated with neighbourhood attachment, attitude toward coping behaviours and coping intention (Table 3), while attitude positively correlated with intention to enact preventive behaviours to cope with flood ($r = .15$; $p = .002$). Accordingly, intention is used as dependent variable, given its power to predict behaviours (Ajzen, 1991; Fishbein & Ajzen, 1981).

Then, regarding the main independent variable, risk perception at city level is correlated ($r = .36$; $p < .001$) to the objective flood risk cities are subject to; see Protezione Civile il Comune di Roma (2006). This means that the sample realistically perceives the environmental risk their residential area is subject too, also confirming previous findings (Bonaiuto et al., 2011; De Dominicis, 2012; De Dominicis et al., 2014). Therefore, flood risk perception is considered as the main independent variable for our main hypothesis test.

Finally, a series of independent sample *t*-tests have been conducted in order to assess the differences in the two cities on relevant variables. Specifically, significant differences between Rome and Vibo Valentia have been found for flood risk perception, with $t(417.33) = 8.13$, $p < .001$, $d = .79$, neighbourhood attachment, with $t(420) = 6.40$, $p < .001$, $d = .63$, attitude to enact preventive behaviour to cope with a flood, with $t(348.18) = 2.13$, $p = .04$, $d = .22$, and for intention to enact preventive behaviour to cope with flood risk, with $t(421) = 3.27$, $p = .001$, $d = .32$. Variances were not equally distributed for flood risk perception and attitude, with Levene's test significant at $p < .001$, yet the large sample size allow us to consider these results reliable. As shown in Table 2, citizens in Vibo Valentia reported higher levels of flood risk perception, neighbourhood attachment, attitude and intention to enact preventive behaviour to cope with a flood. According to this set of preliminary analyses, Rome and Vibo Valentia can be considered as two very different cities in terms of environmental risk related social-psychological variables. Thus, in order to test the main hypothesis, a three-way interaction effect (context-place attachment-risk perception on coping intention) is first assessed: then, in order to further explore the effect, two moderation effects of place attachment on the risk perception-coping intention relation were tested (Aiken & West, 1991; Peters, O'Connor, & Wise, 1984), one in each of the two contexts (low risk context and high risk context).

2.4. Main analyses and results

The principal aim of Study 1 is to test the moderating effect of neighbourhood attachment on the relation between risk perception and intention to enact preventive behaviours to cope with flood risk. In order to test this effect, a three-way interaction moderate multiple regression was first conducted (Aiken & West, 1991; Baron & Kenny, 1986; Dawson & Richter, 2006) to detect the influence of the context (the two cities of Rome and Vibo Valentia) on the hypothesized moderation effect (neighbourhood attachment moderation on the relationship between environmental risk perception and coping behavioural intentions). Results show a significant influence of the three-way interaction (risk perception-context-neighbourhood attachment) in predicting intention to cope with the environmental risk: $b = -.04$, $p = .001$.

Then, given the significance of the three-way interaction term and the strong correlation between risk perception and intention to cope with the risk ($r = .59$; $p < .001$), two hierarchical multiple regression analyses (one for each of the two contexts) were performed to test increases in variance (if any) when neighbourhood attachment and its interaction with risk perception were added to the simple one-way regression model (risk perception predicting

Table 2

Means (*M*), Standard Deviations (*SD*) and sample sizes (*N*) for Rome and Vibo Valentia on relevant variables in study 1. The associated *p*-value and effect size (*d*) is referred to the mean difference *t*-test for independent samples.

Variable	Rome		Vibo Valentia		Sig. <i>p</i> (<i>d</i>)
	<i>M</i> (<i>SD</i>)	<i>N</i>	<i>M</i> (<i>SD</i>)	<i>N</i>	
Flood risk perception.	2.91 (.80)	190	3.65 (1.08)	233	.0001 (.79)
Neighbourhood attachment.	4.44 (1.26)	189	5.27 (1.38)	233	.0001 (.63)
Attitude to enact preventive behaviours.	3.53 (.52)	184	3.69 (.94)	218	.043 (.22)
Intention to enact preventive behaviours.	3.11 (.91)	190	3.42 (1.01)	233	.001 (.32)

Table 3

Pearson's correlation matrix for relevant variables in study 1. Means (*M*), Standard Deviations (*SD*) and sample sizes (*N*) are shown for the whole sample.

Measure	1	2	3	4	<i>M</i> (<i>SD</i>)	<i>N</i>
1. Flood risk perception.	–				3.28 (1.04)	444
2. Neighbourhood attachment.	.263 ^a	–			4.88 (1.37)	443
3. Attitude to enact preventive behaviours.	.180 ^a	.068	–		3.60 (.77)	422
4. Intention to enact preventive behaviours.	.595 ^a	.122 ^b	.151 ^a	–	3.26 (.97)	444

^a Correlation is significant at the .01 level (2-tailed).

^b Correlation is significant at the .05 level (2-tailed).

coping intention). Thus, the two three-step regression models were tested using the product variable approach suggested by Baron and Kenny (1986). In the first step, flood risk perception only was entered. In the second step, neighbourhood attachment was added. In the third and last step, the interaction term of risk perception and neighbourhood attachment was also added, resulting in the proposed full model. As stated before, given the significant three-way interaction effect previously found, data were analysed and results presented separately by city. Table 4 lists, for each of the two cities, predictors added in each step of the two-way models, corresponding multiple squared correlation changes, and betas for each variable, with *t* and *p* values.

2.4.1. Low risk context

This first set of results pertains to the low objective risk context, the city of Rome. In the first step, flood risk perception alone explained most of the variance in intention to enact preventive behaviours to cope with flood risk, with $R^2 = .52$, $F(1, 187) = 200.32$, $p < .001$. The second step variable, neighbourhood attachment, as well as the third variable, the risk perception/neighbourhood attachment interaction, did not add a significant amount of variance, respectively with $\Delta R^2 < .001$, $F(1, 186) = .02$, $p = .89$ and $\Delta R^2 = .001$, $F(1, 185) = .39$, $p = .53$. In the final model, where all three variables were included, only flood risk perception was significant ($p < .001$) in predicting intention to enact preventive behaviours to cope with flood risk.

2.4.2. High risk context

This second set of results regards the high objective risk context, the city of Vibo Valentia. In the first step, flood risk perception alone explained most of the variance in intention to enact preventive behaviours to cope with flood risk, with $R^2 = .25$, $F(1, 231) = 76.82$, $p < .001$. The second step variable, neighbourhood attachment, did not add a significant amount of variance, with $\Delta R^2 = .002$, $F(1, 230) = .72$, $p = .34$. However, in the third step, the addition of the interaction term improved the prediction of intention by 2%, specifically with $R^2 = .27$, $F(1, 229) = 27.99$, $p < .001$. In the final model, where all three variables were included, two variables were significant in predicting intention: risk perception with $p < .001$ and the risk perception/neighbourhood attachment interaction with $p = .02$, while neighbourhood attachment alone was non-significant ($p = .86$). Specifically, as expected, the interaction term negatively predicted intention, with $\beta = -.15$. To further explore the

Table 4

Hierarchical regression of Intention to enact preventive behaviour to cope with a flood.

Step	Variable	R^2	ΔR^2	β	<i>t</i>
Rome					
1	Flood risk perception	.52	.52	.719	14.15***
2	Flood risk perception	.52	.001	.718	13.93***
	Neighbourhood attachment			.007	
3	Flood risk perception	.52	.001	.712	13.54***
	Neighbourhood attachment			-.006	
	Interaction*			-.035	
Vibo Valentia					
1	Flood risk perception	.25	.25	.500	8.77***
2	Flood risk perception	.25	.002	.508	8.77***
	Neighbourhood attachment			-.049	
3	Flood risk perception	.27	.02	.563	9.03***
	Neighbourhood attachment			-.010	
	Interaction*			-.147	-2.27**

Note. Only significant *t* values are shown. * Interaction term is computed as flood risk perception by neighbourhood attachment. ** $p < .05$. *** $p < .001$.

nature of this interaction effect, simple slope analyses were performed following Aiken and West (1991) procedure. Simple slopes were plotted for the interaction in Fig. 1. In line with the hypothesis, the analysis revealed that the simple relation between flood risk perception and intention to enact preventive behaviours varies depending on different levels of neighbourhood attachment. Specifically, risk perception is more strongly positively related to intention for lower levels of neighbourhood attachment, whereas when neighbourhood attachment is stronger, risk perception is less positively related to intention to cope with the risk.

2.5. Discussion

The main aim of study 1 is to test the moderating effect of place attachment (operationalized as neighbourhood attachment; Fornara et al., 2010) in the relation between flood risk perception and intention to enact preventive behaviours to cope with flood risk. Risk perception has often been found to be a predictor of preventive behaviour, specifically for flood risk (Baan & Klijn, 2004; Stefanovic, 2003; Terpstra et al., 2006). However, we predicted that place attachment may negatively moderate this positive relation, according to the possible effect of place-specific biases, such as the optimistic bias applied to environmental risk perception (Gifford

et al., 2009; Radcliffe & Klein, 2002; Schultz et al., 2014). Accordingly, this barrier effect should be stronger for objectively higher risk contexts, places in which the bias may be greater. In fact, results show that the context influences the occurrence of such an effect. Specifically, results show that, in the lower objective risk context (the city of Rome), flood risk perception is the strongest predictor of intention to enact preventive behaviour to cope with flood risk, but that no effect is associated with neighbourhood attachment, nor to the interaction between these two variables. In other words, in contexts subject to low environmental risk, and where inhabitants risk perceptions reflect this low level of objective risk, individuals tend to enact preventive behaviours according to their risk perception, and irrespective of their attachment to their residential place. However, this is not the case in higher objective risk contexts. In fact, in places where risk perception is higher due to the higher objective risk to which citizens are exposed, risk perception is more strongly positively related to intention at lower levels of neighbourhood attachment, while for higher levels of neighbourhood attachment, risk perception is less positively related to intention. These findings confirm that place attachment may function as a barrier for enacting preventive behaviours in order to cope with an environmental risk, especially when the perceived risk is higher due to the exposure to a higher objective risk. Thus, risk perception is negatively moderated by place attachment in its influence on coping intention, but only in the high objective risk context. Study 1 provides evidence for self-reported intentions to cope with an impending disaster but not for actual behaviours. Study 2 will therefore assess findings emerged in Study 1, by measuring effects of risk perception and neighbourhood attachment on preventive behaviours.

3. Study 2

3.1. Aims and hypotheses

The goal of Study 2 is to confirm and enlarge the findings emerged in Study 1, and specifically to identify the moderation effect of place attachment (neighbourhood attachment; Fornara et al., 2010) in the relation between flood risk perception and preventive behaviours to cope with that risk for inhabitants exposed to low and high flood risk areas in Italy (Rome and Vibo Valentia, respectively). According to the findings of Study 1, it is hypothesized that the positive relation between flood risk

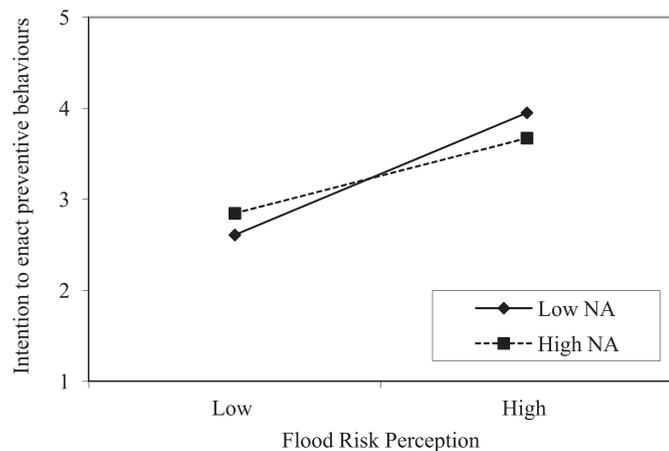


Fig. 1. Flood risk perception by Neighbourhood Attachment (NA) interaction on Intention to enact preventive behaviours to cope with flood risk in the high risk context (city of Vibo Valentia).

perception and preventive behaviours to cope with that risk (Terpstra et al., 2006) will be stronger for lower levels of neighbourhood attachment (Gifford et al., 2009; Twigger-Ross & Uzzell, 1996; Uzzell, 2000), while it will be weaker for higher levels of neighbourhood attachment. Again, as argued in Study 1, this effect will be greater in the higher risk context, the city of Vibo Valentia.

3.2. Method

3.2.1. Sample

For this study, the same procedure of Study 1 was used (survey on random respondents, public places and door-by-door; stratified sampling procedure; sample paired by gender, age and residential area within the two cities – Rome and Vibo Valentia). An overall sample of 466 respondents (who did not take part in the first study), all home owners, participated in the survey, approximately evenly divided between Rome ($n = 236$) and Vibo Valentia ($n = 230$). Around 49% of the sample was male; respondents' ages covered a wide range (18–29 years old: 20.2%; 30–39 years old: 22.3%; 40–49 years old: 20%; 50–59 years old: 19.7%; 60–79 years old: 17.8%).

3.2.2. Measures

The tools here used were similar to those used in Study 1. Respondents answered a 14-item questionnaire. The same two scales used in Study 1 were used for flood risk perception and neighbourhood attachment. Finally, five socio-demographic were also assessed (gender, age, education, occupation, residence).

However in this study, after the completion of the survey, participants were asked to fill out an application form in which they may choose to participate (for free) or not in different training activities related to the general topic of “flood risk prevention,” organized by the Municipality of their city (at the end, each participant was debriefed about this). Flood prevention behaviours were therefore measured by participants' volunteer participation to one or more of the following activities on flood risk prevention: to receive information, to participate in a half-day class, and to participate in an all-day outdoor experience. Even though the actual activity was not carried out, we measured as preventive behaviour their factual commitment (signature) to participate to one or more of the proposed activities. Each of the previous activities was presented for three different topics, and participants may choose one or more topics: looking for flood related information, avoiding wrong behaviours in case of flood, storing useful items in advance of a flood. For each topic, participants could choose to get involved in one or more activities, measured by 5-point Likert scales (from “never” to “4 or more times per year”). A specific behavioural measure was computed for each of the three topics. Table 5 shows PCA factor loadings and Cronbach's alphas for each scale.

3.3. Preliminary analyses

Similarly to study 1, a series of independent sample t -tests has been conducted in order to define differences in the two cities on relevant variables. Specifically, significant differences between Roma and Vibo Valentia were found for flood risk perception, $t(464) = 4.66, p < .001, d = .42$, neighbourhood attachment, $t(421.62) = 5.09, p < .001, d = .48$, and for preventive behaviour to cope with a flood, $t(445.97) = 3.91, p < .001, d = .37$. Variances were not equally distributed for neighbourhood attachment and preventive behaviour, respectively with Levene's test significant at $p < .001$ and $p < .01$, yet the large sample sizes allowed us to consider these results as reliable. Again, as shown in Table 6, citizens in Vibo Valentia reported higher levels of flood risk perception,

Table 5
Non-rotated factor loadings (PCA) and Cronbach's alphas for each scale in study 2.

Scale and item	Factor 1
Flood risk perception	$\alpha = .88$
It is likely that I could be harmed in a flood.	.87
It is likely that I could be harmed in a flood more easily than other people in my city.	.78
It is possible that I can die because of a flood.	.75
I feel exposed to flood risk.	.89
To which level of flood risk is your area/neighbourhood subject?	.84
<i>Variance explained</i>	<i>68.74%</i>
Neighbourhood attachment	$\alpha = .76$
This neighbourhood is part of me.	.88
It would be very hard for me to leave this place.	.90
This is the ideal place for me.	.81
I do not feel integrated in this place.	-.47
<i>Variance explained</i>	<i>61.38%</i>
Preventive behaviours (training activity application)	$\alpha = .97$
Look for flood risk information.	.98
Store useful items.	.97
Avoid wrong behaviours.	.96
<i>Variance explained</i>	<i>93.78%</i>

Factor loadings for each item are presented in bold. Cronbach's alphas and percentage of explained variance for each factor are presented in italics.

neighbourhood attachment, and preventive behaviour to cope with a flood, consistent with the objective higher flood risk to which this city is exposed; this is also consistent with Study 1. Thus, according to this set of preliminary analyses, we will first test a three-way interaction effect (context-place attachment-risk perception on coping behaviours), then we will test two different two-way moderation effects of place attachment on the risk perception-coping behaviour relation (Aiken & West, 1991; Peters et al., 1984), one in each of the two contexts (low risk context and high risk context).

3.4. Main analyses and results

The principal aim of Study 2 is to test the moderating effect of neighbourhood attachment on the relation between risk perception and preventive behaviours to cope with flood risk. Thus, we first conducted a three-way interaction through multiple regression (Aiken & West, 1991; Baron & Kenny, 1986; Dawson & Richter, 2006) in order to test for the influence of the contexts (the two cities of Rome and Vibo Valentia) on our hypothesized moderation effect (neighbourhood attachment moderation on the relationship between environmental risk perception and coping behaviours). Results showed a significant influence of the three-way interaction term (context-risk perception-neighbourhood attachment) in predicting environmental risk coping behaviours, $b = -.05$, $p < .05$.

Then, given that the significant three-way interaction effect emerged and also considering the strong correlation between risk perception and preventive behaviours to cope with the risk ($r = .36$; $p < .01$; Table 7), two hierarchical multiple regression analyses (one for each of the two contexts) were performed to test increases in

Table 6
Means (*M*), Standard Deviations (*SD*) and sample sizes (*N*) for Rome and Vibo Valentia on relevant variables in study 2. The associated *p*-value and effect size (*d*) is referred to the mean difference *t*-test for independent samples.

Variable	Rome		Vibo Valentia		Sig. <i>p</i> (<i>d</i>)
	<i>M</i> (<i>SD</i>)	<i>N</i>	<i>M</i> (<i>SD</i>)	<i>N</i>	
Flood risk perception.	2.74 (.97)	236	3.15 (.99)	230	.0001 (.42)
Neighbourhood attachment.	4.78 (1.38)	236	5.34 (.97)	230	.0001 (.48)
Preventive behaviours.	5.32 (2.61)	235	6.36 (3.08)	229	.0001 (.37)

Table 7
Pearson's correlation matrix for relevant variables in study 2. Means (*M*), Standard Deviations (*SD*) and sample sizes (*N*) are shown for the whole sample.

Measure	1	2	3	<i>M</i> (<i>SD</i>)	<i>N</i>
1. Flood risk perception.	–			2.94 (1.00)	466
2. Neighbourhood attachment.	.077	–		5.05 (1.23)	466
3. Preventive behaviours.	.362***	.032	–	5.83 (2.90)	464

***. Correlation is significant at the .01 level (2-tailed).

variance (if any) when neighbourhood attachment and its interaction with risk perception were added to the simple one-way regression model (risk perception predicting coping intention). The two three-steps regression models were tested using the product variable approach suggested by Baron and Kenny (1986). In the first step, flood risk perception only was entered. In the second step, neighbourhood attachment was added. In the third and last step, the interaction term of risk perception and neighbourhood attachment was added, resulting in the proposed full model. As stated before, given the significant three-way interaction effect previously found, data were analysed and results presented separately by city. Table 8 lists, for each of the two cities, predictors added in each step of the two-way models, corresponding multiple squared correlation changes, and betas for each variable, with *t* and *p* values.

3.4.1. Low risk context

This first set of results is presented for the low risk context, the city of Rome. In the first step, the flood risk perception alone explained most of the variance in preventive behaviours to cope with flood risk, with $R^2 = .12$, $F(1, 233) = 30.96$, $p < .001$. The second step variable, neighbourhood attachment, as well as the third variable, the risk perception/neighbourhood attachment interaction, did not add a significant amount of variance, respectively with $\Delta R^2 < .001$, $F(1, 232) = .17$, $p = .68$ and $\Delta R^2 = .001$, $F(1, 231) = .22$, $p = .64$. In the final model, where all three variables were included, only flood risk perception was significant ($p < .001$) in predicting preventive behaviours to cope with flood risk.

3.4.2. High risk context

This second set of results is presented for the high risk context, the city of Vibo Valentia. In the first step, the flood risk perception alone explained most of the variance in preventive behaviours to cope with flood risk, with $R^2 = .11$, $F(1, 227) = 28.77$, $p < .001$. The second step variable, neighbourhood attachment, did not add a significant amount of variance, with $\Delta R^2 = .001$, $F(1, 226) = .08$, $p = .78$. However, in the third step, the addition of the interaction term improved the prediction of intention by 2%, specifically with $R^2 = .13$, $F(1, 225) = 11.08$, $p < .001$. In the final model, where all three variables were included, two variables were significant in predicting intention: risk perception with $p < .001$ and the risk perception/neighbourhood attachment interaction with $p = .04$, while neighbourhood attachment alone was non-significant ($p = .71$). Specifically, as expected, the interaction term negatively predicted intention, with $\beta = -.14$. To further explore the nature of this interaction effect, simple slope analyses were performed

Table 8
Hierarchical regression of Preventive behaviour to cope with a flood.

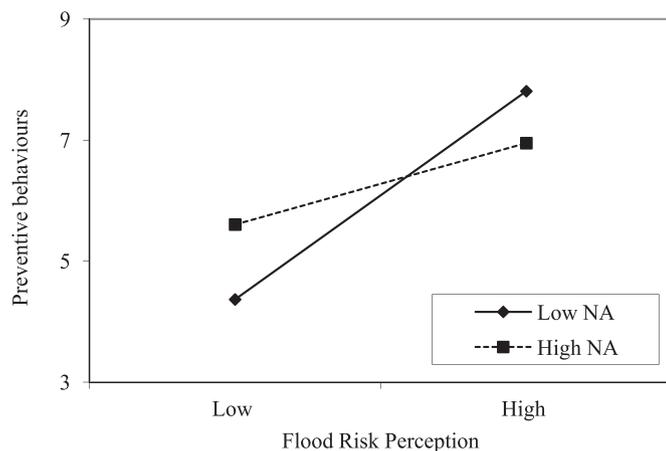
Step	Variable	R ²	ΔR ²	β	t
Rome					
1	Flood risk perception	.12	.12	.342	5.56***
2	Flood risk perception	.12	.001	.340	5.50***
	Neighbourhood attachment			-.025	
3	Flood risk perception	.12	.001	.336	5.34***
	Neighbourhood attachment			-.027	
	Interaction*			-.029	
Vibo Valentia					
1	Flood risk perception	.11	.11	.335	5.36***
2	Flood risk perception	.11	.001	.339	5.31***
	Neighbourhood attachment			-.018	
3	Flood risk perception	.13	.02	.385	5.71***
	Neighbourhood attachment			.024	
	Interaction*			-.143	2.02**

Note. Only significant *t* values are shown. * Interaction term is computed as flood risk perception by neighbourhood attachment. ***p* < .05. ****p* < .001.

following the procedure of Aiken and West (1991). Simple slopes for the interaction are plotted in Fig. 2. In line with the hypothesis, the analysis revealed that the simple relation between flood risk perception and preventive behaviours varies depending on different levels of neighbourhood attachment: risk perception is more strongly positively related to intention for lower levels of neighbourhood attachment, whereas when neighbourhood attachment is higher, risk perception is less positively related to intention.

3.5. Discussion

The principal aim of Study 2 is to test the moderation effect of place attachment (operationalized as neighbourhood attachment; Fornara et al., 2010) in the relation between flood risk perception and preventive behaviours to cope with flood risk. Consistent with the previous literature on flood risk (Baan & Klijn, 2004; Stefanovic, 2003; Terpstra et al., 2006), risk perception has been found to be a predictor of preventive behaviour. However, considering the affective level, it was predicted that place attachment may negatively moderate this positive relation, according to the possible effect of place-specific biases, such as the optimistic bias applied to



Note. Prevention behaviour scale ranges from 3 to 15.

Fig. 2. Flood risk perception by Neighbourhood Attachment (NA) interaction on preventive behaviours to cope with flood risk in the high risk context (city of Vibo Valentia).

environmental risk perception (Gifford et al., 2009; Radcliffe & Klein, 2002; Schultz et al., 2014). This restraining effect should be stronger for contexts where the risk is higher and where the bias may be greater. Results show that, in the low risk context (the city of Rome), the strongest predictor of preventive behaviour to cope with flood risk is in fact flood risk perception, while no effect is associated with neighbourhood attachment, nor with the interaction between these two variables. In other words, in contexts subject to low environmental risk, and where inhabitants risk perceptions reflect this low risk level, people enact preventive behaviours according to their risk perception, irrespective of the attachment to their residential place. However, this is not the case in contexts subject to higher environmental risk. In fact, in places where risk perception is higher due to the higher objective risk to which citizens are actually exposed, risk perception is more strongly positively related to preventive behaviours for lower levels of neighbourhood attachment, while for higher level of neighbourhood attachment, risk perception is less positively related to behaviours. This findings confirm that place attachment may function as a barrier for enacting preventive behaviours to cope with an environmental risk when the perceived risk is high. Study 2 enlarges the findings of Study 1 by confirming the same pattern of results for preventive behaviours, such as volunteering for classes and courses on flood risk prevention.

4. General discussion

The present research represents a systematic and structured starting point to study a new research topic, that is, the moderating role of an affect-based and place-specific social-psychological cue such as place attachment in the relation between environmental risk perception and the related preventive behaviours. The basic counterintuitive insight of this research comes from the notion on the strong relation between place attachment and place identity (Gifford et al., 2009; Speller, 2000; Speller, Lyons, & Twigger-Ross, 2002; Twigger-Ross & Uzzell, 1996; Uzzell, 2000). As it is for one's own self-identity, for which automatic processes enact various defensive responses to protect our own self-integrity and continuity against external threats (e.g., Giddens, 1991; Sherman & Cohen, 2006), place attachment, given its connection with one's own place and social identity, may act as an automatic defensive mechanism (e.g., self-affirmation theory; Sherman & Cohen, 2006) when we perceive a threat to our social identity (Bonaio et al., 1996; Breakwell, 1986, 1993; Speller et al., 2002). This effect should be stronger where the threat is actually more concrete, i.e., in a higher compared to a lower objective and perceived risk context. Accordingly, it was predicted that place attachment may function as a negative moderating variable on preventive behaviours when related to high environmental risk perception in contexts where the environmental risk is high, and that this restraining effect may provide a sort of automatic shield for protecting one's own place and social identity from the threat represented by the environmental risk. The two studies carried out in the present research empirically confirm our hypothesis. In Study 1, place attachment negatively moderates the relation between risk perception and intention to enact preventive behaviours to cope with flood risk; while in Study 2, the same pattern has been found on actual preventive behaviours. However, it is important to note that even if the interaction effect is negative, for higher levels of place attachment higher levels of behaviours were registered (although this effect was not significant). The results of these studies reflect a general tendency of place attachment to reduce the strength of the positive relation between risk perception and preventive behaviours, but not to reverse this relation. This finding is in fact in line with previous literature on environmental risks (Baan

& Klijn, 2004; Bonaiuto et al., 2011; Bradford et al., 2012; De Dominicis, 2012; De Dominicis et al., 2014; Mishra et al., 2010; O'Sullivan et al., 2012; Stefanovic, 2003; Terpstra et al., 2006) where risk perception and place attachment are positively related to coping behaviours. However, our findings here suggest that the cognitive perception of risk, even if generally related to a tendency to enact preventive behaviours to cope with the risk, is not enough to engage people to behave preventively at higher levels: in fact, several affect-based variables, such as place attachment, may interact with risk perception and negatively moderate its effect. Importantly, this mitigating effect occurs precisely in those places where the risk is highly concrete, and this trend consistently emerged in both studies.

Another interesting feature of these results refers to spatial bias. Past research has shown that individuals view environmental risks as more likely to happen elsewhere, thus affecting other people and other local areas rather than themselves (e.g., Dunlap et al., 1993; Gifford et al., 2009; Hatfield & Job, 2001; Lima & Castro, 2005; Pahl et al., 2005; Uzzell, 2000). This bias, based on unrealistic optimism, is likely to function as a barrier for individuals to face local environmental problems (Schultz et al., 2014). However, spatial optimism may occur not only by the comparison of local vs. global (Gifford et al., 2009) or here vs. there (Hatfield & Job, 2001). It is here proposed that spatial optimism may occur at a deeper level, as well. Past research suggests that individuals aim to maintain a positive place identity (Brown & Perkins, 1992; Hugh-Jones & Madill, 2009; Twigger-Ross & Uzzell, 1996). Also, people tend to erroneously process correct information due to affective biases, leading to incorrect behavioural outcomes (Radcliffe & Klein, 2002). Thus, a person may tend to discount a problem if it is about a serious environmental issue (Schultz et al., 2014) or may not cope with the problem because of affective biases (Gifford et al., 2009; Radcliffe & Klein, 2002). Moreover, according to the motivated social cognition perspective (e.g., Baumeister, 1999), people tend to view themselves as possessing more favourable and less unfavourable qualities than the average person. Accordingly, it can be speculated that spatial-biases such as spatial optimism may occur even when no comparison is made, but only for the mere automatic response to defend and maintain a positive place and social identity (Bonaiuto et al., 1996). For this mechanism too, place attachment, being strongly related to one's place identity, may therefore play as a barrier for enacting preventive behaviours to cope with an environmental risk.

Furthermore, also according to an increasingly consistent amount of research that compares place and interpersonal attachment (Scannell, 2013; Scannell & Gifford, 2010, 2013), it is plausible that these kind of effects causing improper coping behaviours, could be driven by processes similar to the automatic processes used by individuals to defend their own identity from external threats (e.g., Giddens, 1991; Sherman & Cohen, 2006). Such an “in-place” bias process is comparable to the in-group bias process observed in the social identity and self-categorization framework (e.g., Tajfel & Turner, 1979), according to Bonaiuto et al. (1996) who proved the favouritism that individuals demonstrate towards their own places, compared to the places of others (see also Twigger-Ross et al., 2003).

An important avenue for future conceptual and empirical investigations is represented by the parallel which could be drawn among the interplay between attachment and risk within interpersonal relationships, on the one side, and within people–place relationships, on the other side. In fact, the role that place attachment had in the two studies presented here parallels the role that interpersonal attachment can play in some interpersonal dynamics. For example, the process of denying the risk related to the object we are attached to is itself a well-known phenomenon in other

fields of psychology having to do with relationships' disorders: within close relationships, a certain attachment styles can prevent proper or adaptive risk perceptions and risk copying strategies (e.g., Craparo, Gori, Petruccelli, Cannella, & Simonelli, 2014). In a similar vein, the results presented in Studies 1 and 2 show that, within a highly risky place, people more attached to that place are less prone to adopt the functional coping behaviours to face incoming risk. The same broad psychological process seems to be involved here: that is, once an individual is attached to a social entity—whether a person or a place—she/he is less able to enact those strategies which would allow her/him to protect her/himself from the risks implied by the interaction with her/his own beloved one, whether this is a person or a place. Future theoretical models and empirical investigation should be devoted to shed light on such fascinating psychological parallel mechanisms.

More generally, the study of the relation among place attachment and environmental risk can also be approached within a broader reciprocal interplay, where their reciprocal causal status is different (e.g., place attachment being considered as a dependent variable rather than a moderator): for example, recent findings (Ruiz & Hernández, 2014) showed that when at-risk citizens have to face an actual environmental hazard such as volcanic activity, they experience changes in place attachment and place identity, which in turn lead to a feeling of loss.

Despite the encouraging results, this research presents some limitations. First, it could not test for effective spatial bias based on the comparison between the two contexts. In this sense, the effect of this bias can only be speculated, even if it seems very plausible to address its effect and explain it in the framework of a place identity automatic defensive response. Second, this correlational study could not test causal effects. Future research on this topic should therefore address the strength of affective and identity-based processes on environmental risks preventive behaviours within an experimental research design. Moreover, our model does not address the role of attitudes toward coping behaviours as possible influencing variables in the examined relationship: future research should address this issue, incorporating other relevant social-psychological variables such as attitudes or perceived control in the study of affective cues with environments and their effect on preventive or coping behaviours for environmental risks. Third, this study lacks a real control group. The two contexts in which the research has been carried out, Rome and Vibo Valentia, are actually exposed to different levels of flood risk, respectively low and high (Bonaiuto et al., 2011; De Dominicis, 2012; De Dominicis et al., 2014). Thus, results are not compared to a context that was actually not subject to flood risk. Moreover, the two contexts are very different both in terms of population number and citizens' socio-economic status, therefore it was not possible to directly compare the cities among each other (e.g., via a 3-way interaction test): future research should address this issue, allowing for a direct comparison of different contexts. Last but not least, the effect sizes of the interactions found in the present research are slightly small, and further research is needed in order to address the issue of understanding how strong is the effect of place attachment in mitigating the positive relationship between environmental risk perception and related preventive behaviours.

Nevertheless, these findings may already have serious implications for communication strategies and policy makers. These results show that a large amount of variance in explaining at-risk citizens coping behaviours is given by risk perception. According to a considerable amount of research (e.g., Baan & Klijn, 2004; Fazio & Zanna, 1981; Liechtenstein et al., 1978; Penning-Rowsell, 2003; Raaijmakers et al., 2008; Stefanovic, 2003; Terpstra et al., 2006; Uzzell, 2000), when lacking knowledge and understanding of the specific environmental risk to which citizens are exposed, the

expected behavioural response will be very poor. However, given the spatial bias that may influence citizens' behaviours (Gifford et al., 2009; Radcliffe & Klein, 2002; Schultz et al., 2014), it is important to locally address these perceptions, awareness and knowledge. In fact, even if it is widely recognized that awareness and knowledge are important cues to motivate people to act, these aspects may not be sufficient to translate motivation and intention in actual preventive behaviours for environmental risks (Bradford et al., 2012; Mysiak et al., 2014; O'Sullivan et al., 2012) or to modify peoples' behaviours (Schultz, 2011). These findings suggest that local authorities and communication strategies need to be based on, and address, affective cues that drive environmental risks-related preventive behaviours, together with knowledge, awareness and information, and that these affective-based strategies should be weighted by the local risk level of a specific area. Recent research (e.g., Johnson et al., 2012) has shown that, for those who are indirectly affected by a threat, attitude-behaviour consistency may be increased by making salient their interpersonal closeness to persons who can be directly affected by that same threat. Although this effect needs to be further explored, it is plausible that environmental risk perception has a strong effect on behaviour also because it involves our relevant others, whose welfare may influence the target person to enact preventively, with all the related implications for the study of place attachment and place identity involved in this process.

Nevertheless, it is also fundamental to note that a place specific approach in the study of people-environment transactions is needed in addressing emerging environmental-related issues (such as coping with stronger environmental risks). The present research provides support to the "theory of places" previously emerged in classical environmental psychology research (e.g., Bonnes & Secchiarioli, 1995; Stokols & Shumaker, 1981). Environmental-related social-psychological variables and their effects on individuals' behaviours should be conceived as place-situated phenomena and should be studied directly taking into account the specific places or situations they are embedded in.

In conclusion, these findings indicate that place attachment may be a crucial factor for a wide range of basic preventive behaviours related to environmental risk. This affective cue may mitigate people's drivers to engage in some important classes of preventive behaviours to enhance their resilience, within contexts where the objective risk is very high and where the perceived risk is high, as well. Results of the present research suggest that adopting a place-specific and affect-based approach could be a rewarding method for many effective real-world applications (e.g., for pro-social communications in contexts of environmental risk, as well as for social policies development), and, together with the development of effective emergency policies and intervention plans, this local and place-specific approach could eventually contribute in the effort of helping to save human lives.

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