

**Place Attachment, Trust and Mobility:  
Three-way Interaction Effect on Urban Residents' Environmental  
Citizenship Behaviour**

**Abstract**

In this research, we study the civic perspective of pro-environmental behaviour, i.e. the environmental citizenship behaviour of urban residents. We examine a three-way interaction effect of residents' place attachment, their trust in local governments' environmental policies and their mobility on environmental citizenship behaviour. Using data from a sample of Beijing residents (N=423), we test our hypotheses using moderated regression analyses. Our findings suggest that place attachment and trust influence urban residents' environmental citizenship behaviour. We also find a two-way interaction effect, which indicates that the effect of place attachment on environmental citizenship behaviour is stronger when residents have a higher level of trust. Interestingly, our results support the existence of a three-way interaction effect, implying that the positive relationship between place attachment and environmental citizenship behaviour is strongest when trust is high and when mobility is high. The theoretical and practical implications of these findings are also discussed.

**Keywords**

Environmental citizenship behaviour, place attachment, trust, mobility

## 1. Introduction

Extant research on pro-environmental behaviour has studied various individual (e.g., environmental knowledge, self-construal, sense of control, and cognitive bias) and social factors (e.g., residency, social class, and proximity to sources of environmental problems) which influence pro-environmental behaviour (see Gifford & Nilsson, 2014). More recently, researchers have started to investigate the role of place attachment—which is defined as the affective relationship that people have with places (Lewicka, 2011)—in influencing pro-environmental behaviour. The basic tenet is that “if individuals have a strong attachment to a place, they would want to protect it” (Gifford & Nilsson 2014, p.146). However, the findings from previous research on the relationship between place attachment and pro-environmental behaviour are inconclusive (Scannell & Gifford, 2010; Gifford & Nilsson, 2014). For instance, place attachment might not predict pro-environmental behaviour in a situation where residents are already satisfied with the environmental condition of a particular place (Scannell & Gifford, 2010). The goal of this research is to contribute to the debate on the relationship between place attachment and pro-environmental behaviour, and, in doing so, this study considers the effect of two variables that have been neglected in previous research: residents’ trust in local governments’ environmental policies, and mobility. The exclusion of these two important variables in previous research such as in Scannell and Gifford (2010), inter alia, may be justified on the grounds that these studies were conducted in small towns or neighbourhoods where one would normally expect low levels of mobility and high levels of trust in local governments’ environmental policies. Thus, the present research examines place attachment, trust and mobility simultaneously in the context of cities.

To facilitate the examination of the relationships among constructs considered in this study, we choose the city of Beijing as our research context. Like other mega cities around the world, Beijing faces major environmental crises as well as a low level of residents’

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engagement with respect to pro-environmental behaviours. Indeed, recent research indicates that Chinese urban residents do not actively participate in pro-environmental behaviour (e.g., sorting their household waste for recycling) (Chen et al., 2011; Wang et al., 2011). This low level of engagement in pro-environmental behaviour may be surprising given the severity of the environmental problems in many Chinese cities (Parry, 2013). Previous research has indeed shown that only a relatively small proportion of urban Chinese are motivated to engage in pro-environmental behaviour for the benefit of the natural environment despite increasing levels of public awareness about such problems (Zhao et al., 2014; Zhao & Hu, 2017). Two possible explanations for this have been proposed in the literature. The first such explanation is that Chinese urban residents tend to presume that it is the responsibility of the authorities to deal with such problems. The second is that residents have very low levels of trust in local government initiatives to protect the environment (Harris, 2006; Zhao et al., 2014). Researchers such as Zhao and Hu (2017) have posited that trust in governments' initiatives is low and this could explain why environmental policy initiatives have not had the desired response. Thus, a key question for municipal policy makers in China is how to promote pro-environmental behaviour among urban residents while at the same time overcoming the challenge of low levels of trust in local governments' initiatives. The present study's main objective is to address the above issues.

Our study makes the following three contributions. First, we acknowledge that there is extant literature on the relationship between place attachment and pro-environmental behaviour, but we also note that the effect of place attachment on a more altruistic facet of pro-environmental behaviour, which is captured by environmental citizenship behaviour (ECB), has not received enough attention in the pro-environmental literature. Examining ECB is important since it can help us to understand residents' discretionary behaviours toward the environment that are not explicitly motivated by formal reward systems and that

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contribute to more effective environmental management in cities.

Second, this study contributes to the on-going debate about the relationship between place attachment and pro-environmental behaviour by examining two factors that have not been examined in the literature but could potentially explain residents' ECB. Specifically, these two factors are trust in local governments' environmental policies, which is important for residents' engagement but is decreasing, and mobility, which has become a key feature of urban residents in big cities. Both factors, just like place attachment, characterise how urban residents relate to their place of residence. However, research on how these factors affect the relationship between place attachment and ECB remains scarce in the literature. Our contention is that there is a need to study how these two variables might affect the relationship between place attachment and ECB.

The third and main contribution of the paper—which is derived from the two other contributions above—concerns the examination of a potential three-way interaction effect of the aforementioned factors. Previous research has studied the impact of place attachment on residents' pro-environmental behaviour. However, we argue that examining this relationship is insufficient because it ignores two factors that can potentially affect the effectiveness of government policy in promoting ECB. Our thesis in this context is that trust towards local governments' environmental initiatives and mobility simultaneously influence the likelihood of engaging in ECB. More specifically, we predict that mobility and trust jointly moderate the positive relationship between place attachment and ECB. Neglecting this interaction effect among these three factors may lead to either the overestimation or underestimation of the effect place attachment has on ECB.

The remainder of this paper is organised as follows. First, we review the literature of the key constructs that we have used in our research and develop our hypotheses. Next, we

explain our research methodology. Then, we discuss our findings and propose policy and research implications. Our conclusions are presented in the last section of the paper.

## 2. Literature Review

### 2.1 Environmental citizenship behaviour (ECB)

Pro-environmental behaviour encompasses a range of activities and behaviours “*that benefit the natural environment, enhance environmental quality, or harm the environment as little as possible*” (Larson et al., 2015, p. 113). Most previous research has focused on individuals’ green behaviours that take place in the private sphere, neglecting the civic and socially active aspects of pro-environmental behaviour. Amongst the various conceptualizations and measurements of environmentally friendly behaviours, the civic perspective of pro-environmental behaviour is typically referred to as ECB (Stern, 2000; Takahashi et al., 2017). This construct enables us to understand residents’ discretionary pro-environmental initiatives to engage in local governments’ environmental programmes, which entails, for instance, encouraging and helping fellow citizens to behave pro-environmentally.

The decision to engage in ECB represents a social dilemma. Members of a group face a choice: either participate to maximise the group’s welfare, or free-ride and benefit from others’ actions (Messick & Brewer, 1983; Gupta & Ogden, 2009; Gleim et al., 2013). Irwin (2009) argues: “*Because prosocial behaviour is costly to the individual, self-interested people should rarely, if ever, act in prosocial ways*” (p. 166). To promote environmental citizenship, group identity and a sense of belonging have been found to be important. Research on social dilemma has demonstrated that enhancing in-group identity and belonging promotes cooperation in resource conservation dilemmas (Kerr, 1995). For instance, when individuals identify with a group, they are more likely to think in a collective, rather than individualistic,

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way thus taking into consideration collective benefits and costs (Kramer & Goldman, 1995). The perception of group identity - “we” rather than “I” - can also lead to more social control, respect for others, self-restraint and a reluctance to let others down (Gupta & Ogden, 2009). According to the social identification theory, one of the factors that can resolve a social dilemma conflict with respect to community participation (including environmental engagements) is place attachment (Manzo & Perkins, 2006). Specifically, individuals who develop a strong attachment to, or who identify strongly with, a place should consider the interests of the place beyond their own interests (Miller, 1992). In the same vein, Brown et al. (2019) have called for more research on the influence of place and identity on pro-environmental behaviour to stimulate collective action that can counterbalance the dilemma of individual’s engagement in ECB.

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## 2.2 Place attachment

Place attachment has been defined as the bond between a person and a place (Lewicka, 2011; Ramkissoon & Mavondo, 2015). People can develop such attachment with more than one place (Lewicka, 2011). They might be attached to a place and travel to it regularly whilst also being attached to their place of residence. Residents might also choose to stay in their place of residence because of work or work-related commitments and, at the same time, have a sense of attachment to other places. Individuals’ multiple attachment to different places, according to Lewicka (2011), presents a challenge for research on place attachment. She has recommended that research on place attachment should have a clear definition of what is meant by a place in the operationalization of the construct of place attachment (Lewicka, 2011). In this research, we focus on a person’s city of residence as the object of attachment.

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Place attachment is a multi-dimensional construct, containing facets of identity, dependence, affect and social bonding. Place identity is the symbolic or ideological

connection between an individual and a setting (Stedman, 2002). Place dependence refers to attachment to a place in terms of it meeting a person's functional needs (Lewicka, 2011), and researchers believe that this facet of place attachment involves an evaluation of the place against its alternatives (Yuksel et al., 2010). Other researchers have studied the emotive dimension of place attachment, place affect (Ramkissoon et al., 2013), which is conceptualized as an individual's sentiments about a place and the meaning given to it. Since social bonding between residents may also create a sense of belonging and thus attachment to a place, place social bonding, a fourth dimension, has also been considered (Yuksel et al., 2010). This facet of place attachment refers to the feelings of belongingness to, or membership of, a group of people, such as friends and family, as well as emotional connections based on shared history, interests or concerns.

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Researchers have hypothesized that attachment to a place motivates individuals to protect and improve it (e.g., Gifford & Nilsson, 2014). Results of some empirical research have demonstrated that people who are attached to a place are more likely to engage in environmentally friendly activities than those who feel less attached. For example, using a sample of property owners from a county in Wisconsin, Stedman (2002) finds a positive link between place attachment and engagement in behaviours that benefit the place. The research findings of Vaske and Kobrin (2001) show that people with a higher level of attachment towards a place tend to engage more in environmentally responsible behaviours. Similarly, drawing from a survey conducted in a national park in Australia, Ramkissoon et al. (2013) find a positive and significant effect of place attachment on park visitors' pro-environmental behavioural intentions. This positive link has also been confirmed cross-culturally in Ramkissoon and Mavondo (2017) using data from Australia and Canada.

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Despite the evidence of a positive link between place attachment and pro-environmental behaviour, some other studies have demonstrated that there is no link between

place attachment and pro-environmental behaviour. For instance, (Gosling & Williams, 2010) find no association between the two constructs when the behaviours are perceived as costly and difficult. Indeed, other studies have found a negative association (Bonaiuto et al., 2002; Devine-Wright & Howes, 2010). An interesting example here is Devine-Wright and Howes (2010)'s study, which reveals people's negative reaction to offshore wind turbines in the coastal areas in which they live because they believe that the wind turbines will destroy the visual appearance of their coastal landscape and thus hamper the economic benefits of the local tourism industry. In a review article on the relationship between place attachment and pro-environmental behaviour, Carrus et al. (2013) find that the inconsistencies in the research findings could be explained by how an individual interprets the consequences of behaving pro-environmentally. If these consequences are perceived to be beneficial for the place to which the individual is attached, a positive association is likely to be observed, and vice versa. However, there has been no attempt in the literature thus far to study the effect of place attachment on ECB and how the interplay of two other related constructs—trust and mobility—may moderate this effect.

We anticipate that place attachment will have a positive impact on ECB. Research by Ramkissoon, Mavondo and Uysal (2017) shows a positive link between place attachment and citizenship behaviour in the tourist context. From a place attachment theory perspective, a greater sense of attachment to a place can lead to a resident being more motivated to act collectively to improve their community and to participate in local environmental management. The literature suggests that processes of collective action work better when emotional ties between places and their inhabitants are cultivated (Manzo & Perkins, 2006).

Thus, we propose the following hypothesis.

**Hypothesis 1:** Place attachment has a positive impact on ECB.

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## 2.3 Trust

In a widely cited paper on trust, Mayer et al. (1995) strongly argues that researchers must clearly lay out the specific domain of trust as otherwise the concept becomes blurred by the research objectives. In tourism, for example, Nunkoo (2015) has followed this suggestion and studied residents' levels of trust in government initiatives. Therefore, in our research, trust refers to the extent to which residents are willing to ascribe good intentions to, and have confidence in, the intended policy and actions of their local government toward the environment.

Recent studies have demonstrated that trust is a significant predictor of residents' support for government policies and initiatives (Nunkoo & Ramkissoon, 2012; Nunkoo, Ramkissoon & Gursoy, 2012) and that there is a positive relationship between trust and pro-environmental behaviour, such as residents' willingness to pay higher local taxes to support local governments' environmental programmes (e.g., Jones et al., 2011). Conversely, researchers such as Blake (1999) have found that a lower level of trust would result in residents' reluctance to behave pro-environmentally since they might feel that their engagement cannot change the current state of the environment. Hence, as these studies have demonstrated, there is a positive relationship between local residents' trust and pro-environmental behaviour. Whilst there has been some previous research on the impact of trust on pro-environmental behaviour, there has not been much investigation into the impact of trust on ECB. We anticipate that trust would have a positive effect on ECB similar to that of pro-environmental behaviour as when residents have confidence in local governments' policy initiatives, they are motivated to behave more collectively and altruistically in environmental engagement. Thus, we propose the following hypothesis:

**Hypothesis 2:** Trust has a positive impact on ECB.

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We have explained the main effects on ECB of place attachment and trust respectively. From a policy maker (i.e., local government)'s perspective, a question arises as to whether and how place attachment and trust can jointly influence ECB. Research in social and industrial psychology indicates that people's attachment to an object (e.g., brand, workplace) can be enhanced if people have a higher level of trust in an authority (e.g., manufacturer, leader). For instance, research in workplace engagement has demonstrated that employees' engagement to their workplace increases if they have a high level of confidence in the decisions being made by their supervisors, and this leads to more positive behaviours (e.g., employee citizenship behaviour) in the workplace (Macey & Schneider, 2008). In the context of the current study, this suggests that trust should enhance the impact of residents' attachment to their city on ECB. To clarify, suppose that a new local policy is introduced to improve air quality by controlling the number of cars in a city using number plate restrictions which at the time of writing is being implemented in Beijing. Residents who have a high sense of attachment to a city may react more positively toward this kind of policy compared to those with a low sense of attachment (e.g., by driving less frequently) if they believe this to be a good policy. They may also encourage fellow residents to react similarly, thus demonstrating a high level of ECB. On the contrary, if a resident believes that this is not an effective policy and other measures (such as closing down factories responsible for heavy pollution) should have been taken, the impact of attachment on driving behaviours and ECB will be weaker. Thus, if the level of trust in the new local policy is low, the effect of place attachment on pro-environmental behaviour and ECB will be weaker, compared to when trust is high. Therefore, in addition to the direct effect of trust on ECB, trust can play a moderating role in fostering the relationship between place attachment and ECB. Accordingly, we propose the following hypothesis:

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**Hypothesis 3.** Trust moderates the relationship between place attachment and ECB such that the positive effect of place attachment on ECB will become stronger as trust increases.

## 2.4 Mobility as a contingent factor

We have proposed above in hypothesis 3 that trust may moderate the relationship between place attachment and ECB. Building upon that hypothesis, we now consider mobility, which enables us to introduce the possibility of a three-way interaction effect of place attachment, trust and mobility on ECB. Similar to Lewicka (2011), mobility in this research refers to the number of cities a resident has visited (Lewicka, 2011) assuming that he/she is a permanent resident of his/her current city (e.g., with a fixed home address).

Although there has been some discussion on how mobility directly affects civic behaviours such as philanthropic engagement (Clerkin et al., 2013), previous research on the relationship between place attachment and pro-environmental behaviour has not considered how mobility might be a contingent factor. We posit that in evaluating the impact of place attachment on ECB, we must also study mobility as a residential characteristic that moderates the relationship between the two constructs. As far as we are aware, there has not been any previous research on the moderating effect of mobility on the attachment-behaviour relationship. Our proposition here is that the moderating effect of mobility on the attachment-ECB relationship is more likely to be pronounced when it is jointly considered with trust.

More specifically, when we consider mobility as a contingent factor, highly mobile residents, compared to residents with low mobility, may have acquired more experiential knowledge and information resources in evaluating the intended outcomes of local governments' environmental policies. For example, highly mobile residents, through their observations from the different cities that they have visited, might have acquired more knowledge as to how credible government policies bring positive changes to the environment.

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In contrast, when a resident's mobility is low, he or she is assumed to have lower cognitive resources with which to interpret the same government policy messages. The idea here is that when residents are not mobile, they are less sensitive to the prospective effectiveness of local government policies. Furthermore, we argue that less mobile residents may not even notice the nuanced environmental changes in their neighbourhood. According to this proposition, the relationship between place attachment and ECB will be strongest for highly mobile residents who also have a higher level of trust. Thus, we propose the following hypothesis:

**Hypothesis 4.** There is a three-way interaction effect of place attachment, trust and mobility on ECB, whereby the positive relationship between place attachment and ECB is strongest when trust is high and when mobility is high.

Our hypothesised relationships are summarized in Figure 1.

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[INSERT FIGURE 1 HERE]

### 3. Methodology

#### 3.1 Sample and data collection

We collected data using an online questionnaire targeting Beijing residents. We hired one professional research agency in China, which had a large pool of potential respondents. The respondents were offered monetary incentives in exchange for their participation. The agency sent the questionnaires to its panel members, and used a filtering system to make sure only residents of Beijing participated. In total, 423 respondents answered the questionnaire completely. The majority of respondents in the sample indicated that they were currently living in Beijing, and 61.7% were born in the city. Most respondents (62.9%) reported that they had lived in the city for over ten years. Marginally over half of respondents were female (50.4%), reflecting a similar gender ratio of the city as reported in *Beijing Statistical*

Yearbook 2015 (Statistics 2015). Most respondents were aged between 18 and 44 years (78.7%) and had a university education or above (86.3%).

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### 3.2 Measures

We used a seven-point Likert scale, ranging from strongly disagree (1) to strongly agree (7), to measure all psychometric items. We applied a translation and back-translation procedure to develop these items since the survey was conducted in Mandarin. We adapted the scale developed by Boiral and Paillé (2012) to measure ECB, which consists of three sub-dimensions: helping, engagement, and initiatives. The scale was originally developed for the context of an organisation explaining employee citizenship behaviours in the workplace. In adapting the scale, we amended items according to our research context. According to research by McCunn and Gifford (2014), residents' attachment to their place of residence is similar to employees' commitment to their organisation. Essentially, the authors argued that residents "*in some way perceive their neighbourhood as comparable to an organization,*" and both types of attachment "*seem to manifest themselves behaviourally in participation*" (p.22).

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We used the scale developed by Yuksel et al., (2010) to measure place attachment, which consists of four sub-dimensions: identity, affect, dependence, and social bonding. We used three items adapted from Paxton (1999) to measure trust. All measurement items are shown in Table 1.

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Mobility is an umbrella concept that encapsulates different kinds of movement or travel of people for one location to another such as daily commuting, long-distance business or vocational travel, residential mobility, and international migration (Gustafson, 2009). It is therefore important to identify the specific nature of mobility that contextualises the research objectives due to the potential different relationships that can exist in the inter-relationship between place attachment, trust and various types of mobility. In this research, we focus on

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the short-term inter-city travels since long-distance travels for business and tourism are getting more and more common for residents in big cities such as Beijing (China Tourism Academy, 2018; World-Statistics.org, 2018). Following Lewicka (2011), we measured mobility with a single item where respondents were asked to indicate the number of different cities/towns they had visited or had a short stay in (less than three months). We did not consider in our research mobility to other cities which is longer than three months since longer stays in a different city may imply more complexity such as residential mobility or international migration. Next, we created a dummy variable to represent low mobility vs. high mobility. We placed respondents who indicated that they had visited five or more different cities into the high mobility category, with all others placed into the low mobility category. We also included demographic variables in our survey (e.g., age, gender, place of birth).

[INSERT TABLE 1 HERE]

## 4. Results

### 4.1 Measurement models

As we have explained above, place attachment and ECB have multidimensional scales. Therefore, before testing the main effect hypotheses (i.e., H1-H2), we conducted a confirmatory factor analysis to assess the validity of these constructs with place attachment and ECB modelled as second-order factors. The confirmatory factor analysis (CFA) model of the second-order factors with their first-order constructs yielded an acceptable model fit to the data (Chi-square=945.57, df=291, p=0.00, RMSEA=0.07, SRMR=0.05; CFI=0.98, TLI=0.98). All standardized first-order factor loadings were significant and substantial, suggesting that all place attachment first-order constructs and all ECB first-order constructs were well defined. Furthermore, the second-order loadings were associated with their

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respective higher latent constructs: identity (0.98), affect (0.96), dependent (0.89), bonding (0.92), help (0.89), engagement (0.96) and initiatives (0.94). Next, we added trust into the second-order CFA model. Results revealed an acceptable fit (chi-square=921.48, df=365, RMSEA=0.06, CFI=0.94, TLI=0.93) with all first- and second-order loadings found to be significant. For each construct, Cronbach's alpha was greater than 0.70, and the average variance extracted (AVE) exceeded 0.50, indicating that each latent construct exhibited high internal consistency (Bagozzi & Yi, 1988) (see Table 2). As we can see in Table 2, all constructs achieved discriminant validity, as the square root of their AVE estimates exceeded the correlations among other constructs (Fornell & Larcker, 1981).

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We also tested for common method bias in our model by including a common method factor that was uncorrelated with all other constructs and loaded on every manifest variable (Podsakoff et al. 2003). The common method factor reflects the variance common to all indicators. The results of the common-factor model were identical to those of the original CFA model without the marker factor (chi-square=903.01, df=365, RMSEA=0.06, CFI=0.94, TLI=0.93), indicating that our results were not affected by common method bias.

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[INSERT TABLE 2 HERE]

## 4.2 Hypothesis testing

### 4.2.1 Regression analysis

To test the main effects of place attachment and trust on ECB, (H1, H2) and the moderating role of trust and mobility on the relationship between place attachment and ECB (H3, H4), we conducted a hierarchical regression analysis. We used composite scores by averaging items that belong to each construct. We introduced gender (i.e., dummy coded, 1=male, 0=female) and place of birth (i.e., dummy coded as Born, 1=born in Beijing, 0=otherwise) as control variables since previous research has shown that these variables influence pro-environmental behaviour (e.g., Clark et al., 2003; Adeola, 2007; Gifford & Nilsson, 2014). Prior to the empirical modelling, we centred the main psychometric construct variables of our study (i.e., place attachment, trust and ECB, but not the dummy variable of mobility) by subtracting the means of each variable from its scores. Mean-centring is useful in interpreting and comparing the regression coefficients of the main effects in relation to their original variables and can also reduce multicollinearity amongst the predictor variables (Aiken & West, 1991).

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We created three two-way interaction terms from the product of the main terms (i.e., place attachment x trust, place attachment x mobility, trust x mobility) as well as a three-way interaction term (place attachment x trust x mobility). The three-way interaction term allowed us to test for the presence of interaction between place attachment and trust for the two levels of mobility (low and high) for each individual. In our analysis, we first entered the covariates (i.e., Gender and Born; Model 1). Next, we entered the main effect variables (i.e., Model 2) followed by the two-way interaction terms (i.e., Model 3) and finally the three-way interaction term (i.e., Model 4). Although our interest is in the hypothesized two-way interaction of place attachment with trust and the three-way interaction between place attachment, trust and mobility, we followed (Aiken & West, 1991) and included those un-

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hypothesized (or non-hypothesized) two-way interaction terms (e.g., place attachment x mobility, trust x mobility) in the regression models.

The regression results are presented in Table 3. H1 and H2 were tested by examining the regression results corresponding to the testing of the main effects of place attachment and trust on ECB. Following Atinc et al. (2012), we first report the effect of the control variables on ECB. Evaluating the amount of variance explained by control variables is important so as to determine whether control variables can be actually treated as substantive variables. If the amount of variance explained by control variables is larger than the amount variance explained by substantive variables, control variables should be regarded as substantive variables. As can be seen in Table 3, Model 1 indicated that the effect of gender was not significant ( $b=-.01$ , n.s.) but the effect of Born was significant ( $b=0.63$ ,  $p<0.01$ ) indicating that those who were born in Beijing were more likely to exhibit ECB compared to those who were not. The amount of variance explained by these two control variables was quite small (i.e.,  $R^2$  of Model 1= 0.12) compared to the amount of variance explained by a larger model (i.e.,  $R^2$  of Model 2= 0.47,  $\Delta R^2=0.47$ ). Thus, both variables indeed should be treated as control variables.

The regression results from Model 2 indicate that place attachment had a significant impact on ECB ( $b=0.29$ ,  $p<.001$ ), supporting H1 and the impact of trust on ECB was also significant ( $b=0.26$ ,  $p<.001$ ), supporting H2. Model 3 shows that the interaction between place attachment and trust was significant, thus supporting H3 ( $b=0.08$ ,  $p<.001$ ). None of the other interaction terms were significant. The incremental variance explained by the three-way interaction effect was one percent.

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To study the direction and significance of the three-way interaction effect, we performed two additional analyses. First, following Ng and Feldman (2012), we conducted a group analysis where, in the first place, we examined the two-way interaction of trust and mobility on ECB within high mobility and low mobility groups and then conducted a simple effect analysis (Aiken & West, 1991) for each group. Second, we used Dawson and Richter (2006) slope difference test to examine statistical differences among four regression slopes corresponding to four groups created based on one standard deviation below and above the mean of trust and a dummy variable of mobility. This slope-difference method also provided a visual aid in interpreting the three-way interaction effect and allowed us to inspect all possible pairwise differences across slopes.

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#### 4.2.2 Group analysis

Our results show that the two-way interaction between place attachment and trust was not significant for low levels of mobility ( $b=0.00$ ,  $t=0.06$ ,  $p=0.95$ ,  $f^2=0.00^1$ ), but was significant for high levels of mobility albeit the effect size was quite small (Cohen 1988) ( $b=.11$ ,  $t=4.52$ ,  $p<.00$ ,  $f^2=0.06$ ). More precisely, at a low level of mobility, the effect of place attachment on ECB was nearly equal at low vs. high level of trust respectively ( $b=.32$ ,  $t=1.86$ ,  $p=.07$  at low trust,  $b=0.31$ ,  $t=2.08$ ,  $p<0.00$  at high trust). At a high level of mobility, the effect of place attachment on ECB was stronger at a high level of trust ( $b=0.52$ ,  $t=8.2$ ,  $p<.00$ ) as opposed to a low level of trust ( $b=0.29$ ,  $t=7.65$ ,  $p<.00$ ). These results support hypothesis 4 that trust and mobility moderate the relationship between place attachment and ECB. Furthermore, the positive effect of place attachment on ECB with high levels of trust and mobility was the strongest of all the four groups.

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<sup>1</sup>  $f^2$  is the effect size for the interaction effect, defined as the proportion of variance accounted for the interaction effect relative to unexplained variance in the dependent variable (Aiken & West, 1996, p. 157).

#### 4.2.3 Slope difference test

Following Dawson and Richter (2006) recommendation for testing the existence of a three-way interaction effect, a three-way interaction plot is depicted in figure 2. Consistent with the simple effect analysis that we have previously conducted, we find that the strongest positive slope for the effect of place attachment on ECB was observed when both the level of trust and mobility were high. Basically, the statistical slope difference test revealed that the differences in slopes of high trust-high mobility vs. high trust-low mobility was significant ( $p=0.05$ ) and the difference between low trust-high mobility and low trust-low mobility was not significant ( $p>.05$ ). Moreover, the differences in slope of high trust-high mobility vs. low trust-high mobility ( $p<.01$ ) and high trust-high mobility vs. low trust-low mobility were both significant ( $p<.05$ ). We also find that the differences in slope of high trust-low mobility vs. low trust-high mobility ( $p<.01$ ), high trust-low mobility vs. low trust-low mobility were significant ( $p<.05$ ), respectively. Thus, these results further support hypothesis 4. That is, the relationship between place attachment and ECB is strongest in the high trust-high mobility condition.

[INSERT FIGURE 2 HERE]

## 5. Discussion and implications

### 5.1 Discussion

The empirical results support the four hypotheses of our research. Place attachment positively influences ECB, trust positively affects ECB, and trust moderates the relationship between place attachment and ECB, implying that the positive effect of place attachment on ECB will become stronger as trust increases. Importantly, in addition to the direct effects, we

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find that there is a three-way interaction effect whereby the positive relationship between place attachment and ECB is strongest when both trust and mobility are high.

The first hypothesis of the research is concerned with the relationship between place attachment and ECB. Although there is extant research on the relationship between place attachment and pro-environmental behaviour, the impact of place attachment on ECB in an urban environmental management context has not received much research attention despite the call by Dobson (2007) and Larson et al. (2015) that the civic aspect of pro-environmental behaviour deserves more attention. Thus, in particular, we follow Larson et al. (2015)'s recommendation that ECB "*may have a more powerful influence on the trajectory of human-environment interactions*" and that "*there is a growing need to examine the characteristics and frequencies of place-based behaviours, which play a critical role in local environmental quality, yet are rarely considered in PEB [pro-environmental behaviour] research*" (Larson et al., 2015, p.114). In our study, we focus on the place attachment-ECB relationship that represents these human-environment interactions.

In our research, we find that residents' sense of attachment to a city can influence their level of engagement in ECB. This means that residents' emotional ties to a place can promote civic aspects of pro-environmental behaviour. This result corroborates findings in tourism research where attachment to tourist destinations has been found to be positively related to visitors' citizenship behaviours (e.g., Payton, Fulton & Anderson, 2005; Ramkissoon, Smith & Weiler, 2013; Ramkissoon, Mavondo & Uysal, 2018). Similar results have also been found in the field of community research. For example, Pradhananga and Davenport (2017) find that residents who are attached to their community are more likely to engage civically in local water management. Similarly, the research of Buta, Holland and Kaplanidou (2014) finds that attachment to the community predicts residents' civic pro-environmental engagement in protecting a local national park. As our study is conducted in the context of urban

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environmental management, we extend the findings from tourism and community research into a new context.

Our findings also contribute to the debate on the link between place attachment and pro-environmental behaviour by supporting the positive relationship between place attachment and the civic aspect of pro-environmental behaviour, i.e. ECB. The rationale is that ECB emphasises the collective benefits from behaving pro-environmentally where the outcomes can be perceived as beneficial for the place to which a resident is attached.

Our second and third hypotheses are concerned with the role of trust in fostering ECB. The results show that residents' trust in local governments' environmental policies increases the likelihood of them engaging in ECB. This corroborates previous research on the link between trust and civic engagement (e.g., Blake, 1999; Payton et al., 2005; Jin & Shriar, 2013). Our specific contribution to the literature in relation to the role of trust comes when we consider how trust operates as a moderating variable of the relationship between place attachment and ECB. We find that trust amplifies the effect of place attachment on ECB. Urban residents who are attached to their place of residence are more likely to engage in ECB if they believe their local governments' environmental policies are credible and will make a difference.

The fourth hypothesis, and the main contribution of our research, is concerned with the manner in which the relationship between trust, place attachment and ECB varies across different levels of mobility. Our results show that mobility, when jointly considered with trust, amplifies the positive relationship between place attachment and ECB. Previous research by Lassen (2006) and Sager (2006) find that travelling outside one's local area leads one to become more knowledgeable and more sensitive to geographically diverse social contexts. This, in the context of our research, presupposes that there is a difference in the ways in which residents of high mobility and residents of low mobility gauge the credibility of

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governments' environmental policies. We find that, for highly mobile residents, a higher level of trust must be attained for place attachment policies to be effective in promoting ECB.

## 5.2 Policy Implications

Previous research on the role of place attachment prescribes that a policy that enhances residents' attachment to their place of residence will in turn increase residents' engagement in pro-environmental behaviour. Our research strengthens the case for the consideration and implementation of such policies and, importantly, by considering the concept of ECB, our results suggest that such policies will also be effective if urban authorities in China want to enhance civic activities for the environment.

Trust, which is essential in fostering civic behaviours, is also found to be a significant antecedent to urban residents' ECB. Thus, municipal governments can increase their residents' ECB by gaining their trust in environmental initiatives. Moreover, in our research, we also investigate the role that trust plays in influencing the relationship between place attachment and ECB. Our results suggest that residents who are attached to a city are more likely to adopt ECB if they believe that their local government's environmental policy initiatives are credible. This implies that the role of trust in environmental management might be more important compared to what has been accounted for in previous research, which has focused mainly on the direct effect of trust. In terms of policy implications, local governments' initiatives to promote ECB by increasing the place attachment levels of their residents would be more effective if residents trust local authorities to deliver on their promises. Thus, it is important for municipal governments to gain trust from their residents, and this is particularly the case for Chinese cities since a meaningful institutional framework

in China is yet to be established to fulfil government promises regarding public participation in environmental protection (Li, Liu & Li, 2012).

Another important policy implication of our study is related to the role of mobility and its interaction with place attachment and trust in influencing urban residents' ECB. As is the case in other cities around the world, urban residents in Chinese cities are becoming more mobile and making intercity travel more often for business and leisure. For example, in 2017, China was the biggest source of international outbound tourism, with the number of outbound trips reaching 129 million. In that same year, the number of domestic trips in China reached 5 billion, accounting for a 12.5% increase over the previous year (China Tourism Academy, 2018). Our research corroborates findings from previous research that policy interventions intended to promote both trust and place attachment will lead to an increase in residents' participation in ECB, but also warns that the effectiveness of such policies may vary across different groups of residents. Our findings indicate that local authorities must acknowledge that mobility of residents can potentially influence the effectiveness of their environmental management policies, in particular those that are meant to foster place attachment and increase residents' level of trust. To illustrate this in the case of our research context, residents will visit places which they may judge to be in either a better or worse environmental state than Beijing. If residents travel to places where the environmental state is judged to be worse than Beijing, they may not wish that their city becomes like one of these places. Concurrently, if residents have visited places which are perceived to be in a better environmental state, they may wish for Beijing to become like one of these places. So, in both situations, it is expected that highly mobile residents may have more observations and thus make more assessment on the different environmental state of different places compared to those who are less mobile. However, mobility, when considered alone, does not influence ECB or moderate the relationship between place attachment and ECB. Importantly, the

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three-way interaction effect shows that more engagement in ECB will only be achieved if those highly mobile residents are also both highly attached to their places of residence and trust their local government environmental policies. This implies that even when residents who are attached to their city compare the environmental state of different cities during their inter-city travels, they are not motivated to act on the environmental difference. They will only act on it when they trust the local governments in their policy effort to improve the local environment. We speculate that mobile residents not only compare the environmental state of different cities, but also pay more attention to government environmental policies.

Importantly, our research posits that high levels of engagement in ECB can only be achieved if these mobile and attached residents have faith in the sincerity and effectiveness of their local government environmental policies. More specifically, our findings imply that simply enhancing place attachment may not be sufficient to engage residents in ECB. To encourage pro-environmental efforts of urban residents, municipal policy makers must consider improving trust as well as place attachment, and particularly so among those residents who are mobile.

### 5.3 Research implications

Two main research implications emerge from our findings. First, the literature on the impact of place attachment on pro-environmental behaviour to date has focused on the direct effect of place attachment. By examining the joint effects of trust and mobility and their interactions with place attachment, our study enriches the scant literature on the interaction effects of these variables on the ECB of urban residents. That is, trust and mobility, just like place attachment, are factors which in their own ways define how people relate to places. Therefore, there is a need to consider how these two variables can potentially change the nature of the relationship between place attachment and ECB. To be more specific, as far as



we are aware, this research is the first to empirically demonstrate the presence of boundary conditions in the relationship between place attachment and ECB by explicitly considering the interaction effects of trust, mobility and place attachment. Our research results show that trust and mobility jointly enhance the link between place attachment and ECB.

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Second, although we have empirically identified the interaction effect of place attachment, trust and mobility, our research findings in that respect highlight the need for a better understanding of the concept of mobility, such that urban authorities must consider the increasing mobility of residents in formulating environmental policies. In our research, we use mobility to conceptualize the intercity movement of urban residents, but we ignore the differences in environmental conditions of different cities during the movement. It is possible that residents gain better environmental awareness by visiting different types of cities or neighbourhoods that are obviously differ in terms of their environmental conditions. This leads us to propose a new concept of environmental mobility which captures how residents compare the environmental conditions of cities that they have visited with the cities in which they reside. Thus, our reasoning on the effect of mobility, which we have discussed in the hypothesis development section, that mobility might lead to greater cognitive assessment, could actually be confounded by environmental mobility. Future research should explore this possibility.

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## 6. Conclusions

Previous research has found that urban residents in China do not engage in pro-environmental behaviour because they do not trust local governments' environment policies or they assume that it is the responsibility of local authorities and not residents to tackle the environmental problems of their cities (Harris, 2006; Zhao et al., 2014). In this research, we have addressed this particular issue by focusing on ECB, and we have examined how this is

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influenced by residents' place attachment, trust and mobility. ECB represents the civic aspect of pro-environmental behaviour, which, we posit, is important for municipal policy makers compared to other measures of pro-environmental behaviours since it provides more information regarding residents' discretionary behaviours beyond what is normally expected in relation to regulations in promoting and supporting local governments' environmental programmes and policies. Thus, our research sheds light on how to promote pro-environmental behaviour among urban residents while at the same time facing the challenge of decreasing trust in governments.

Several limitations of this study should be noted, which, nonetheless, provide some avenues for further research. First, our study shows the presence of a direct effect of place attachment and trust on ECB. In line with Baron and Kenny (1986), the presence of a direct effect might suggest that further research is needed to examine the underlying mechanisms behind the effects that we have found in our study. Specifically, there is a need for more research into mediating variables that further unpack how both place attachment and trust affect ECB. For instance, we propose consumer or individual environmental responsibility (Pawarkar et al. 2018) as a potential mediator between place attachment and ECB, which has been defined as "the intention of a person to act towards remediation of environmental problems not as an individual user with economic interests but as a responsible citizen having concerns about the social and environmental wellbeing of society" (p.560). We speculate that place attachment will be positively related to environmental responsibility. That is, individuals who are more attached to a place will feel more responsible for the environmental state of that place compared to those who are less attached.

Second, following Lewicka (2011), the concept of mobility in our research is defined as the number of different cities/towns that a resident has visited or had a short stay in (less than three months). However, as we have discussed previously, mobility of residents may take

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different forms such as residential mobility (i.e., moving to another city in the same country), daily mobility (e.g., commuting) and even migration (Gustafson 2009). Future research should investigate how different forms of mobility interact with place attachment and trust in affecting ECB. For example, visits of different durations (longer versus shorter for example) may influence how residents judge their cities' environmental state compared to places which they have visited. In addition, we propose that different destinations for these visits should be considered to better understand the interplay of mobility, place attachment and trust in affecting ECB. For instance, domestic versus international city visits will provide different contexts for comparisons of environmental state.

Third, the present study uses two control variables related to demographic characteristics of residents, i.e. gender and place of birth. These two control variables are extraneous (i.e., covariates) that are not the focus of the study but might affect variations in the dependent variable (i.e., ECB) (see Atinc et al., 2012). While the use of these two demographic characteristics as control variables is justified on the basis of previous research on pro-environmental behaviour, additional control variables related to the research context (e.g., residents' environmental satisfaction) might be needed to clarify the effects of the main constructs in the study. For instance, previous research (Adriaanse, 2007) showed that residents' environmental satisfaction, defined as the degree to which a person is satisfied with his or her residential environment, can explain residents' perceptions of the quality of their neighbourhood. Thus, it is possible that unsatisfied residents might be less likely to exhibit ECB compared to satisfied residents due to their low levels of attachment to their neighbourhood and thus to their city. Another control variable, which is also domain-specific and can be included in the model, is environmental knowledge. Previous research has indicated that this variable is a significant antecedent to pro-environmental behaviour (e.g. Cheng & Wu, 2015). It would be interesting to examine the influence of the tripartite

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relationship among place attachment, trust and mobility on ECB after the effect of environmental knowledge has been controlled for, and thus to provide more insights of these relationships.

Finally, our study has used survey data collected from a limited sample of Beijing residents. Therefore, further studies are encouraged in other cities that have different economic and social environment patterns from Beijing in order to generalize the insights of the present study.

## References

- Adeola Francis O. Nativity and environmental risk perception: An empirical study of native-born and foreign-born residents of the USA. *Human Ecology Review* 2007; 13-25.
- Adriaanse C. C. M. Measuring residential satisfaction: a residential environmental satisfaction scale (RESS). *Journal of Housing and the Built Environment* 2007; 22 (3): 287.
- Aiken Leona S, West Stephen G. *Multiple regression: Testing and interpreting interactions*. UK: Sage Publications, 1991.
- Atinc Guclu, Simmering Marcia J., Kroll Mark J. Control variable use and reporting in macro and micro management research. *Organizational Research Methods* 2012; 15 (1): 57-74.
- Bagozzi Richard P, Yi Youjae. On the evaluation of structural equation models. *Journal of the Academy of Marketing Science* 1988; 16 (1): 74-94.
- Baron Reuben M, Kenny David A. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology* 1986; 51 (6): 1173.
- Blake James. Overcoming the ‘value-action gap’ in environmental policy: Tensions between national policy and local experience. *Local environment* 1999; 4 (3): 257-278.
- Boiral Olivier, Paillé Pascal. Organizational Citizenship Behaviour for the Environment: Measurement and Validation. *Journal of Business Ethics* 2012; 109 (4): 431-445.
- Bonaiuto Marino, Carrus Giuseppe, Martorella Helga, Bonnes Mirilia. Local identity processes and environmental attitudes in land use changes: The case of natural protected areas. *Journal of Economic Psychology* 2002; 23 (5): 631-653.
- Brown Katrina, Adger W Neil, Devine-Wright Patrick, Anderies John M, Barr Stewart, Bousquet Francois, Butler Catherine, Evans Louisa, Marshall Nadine, Quinn Tara. Empathy, place and identity interactions for sustainability. *Global Environmental Change* 2019; 56: 11-17.
- Carrus Giuseppe, Scopelliti Massimiliano, Fornara Ferdinando, Bonnes Mirilia, Bonaiuto Marino. *Place attachment, community identification, and pro-environmental engagement*: Routledge: New York, NY, USA, 2013.
- Chen Xiaodong, Peterson M Nils, Hull Vanessa, Lu Chuntian, Lee Graise D, Hong Dayong, Liu Jianguo. Effects of attitudinal and sociodemographic factors on pro-environmental behaviour in urban China. *Environmental Conservation* 2011; 38 (1): 45-52.
- Clark Christopher F., Kotchen Matthew J., Moore Michael R. Internal and external influences on pro-environmental behavior: Participation in a green electricity program. *Journal of Environmental Psychology* 2003; 23 (3): 237-246.
- Clerkin Richard M., Paarlberg Laurie E., Christensen Robert K., Nesbit Rebecca A., Tschirhart Mary. Place, time, and philanthropy: Exploring geographic mobility and philanthropic engagement. *Public Administration Review* 2013; 73 (1): 97-106.
- Cohen Jacob. *Statistical power analysis for the behavioral sciences*: Routledge, 1988.
- Dawson Jeremy F., Richter Andreas W. Probing three-way interactions in moderated multiple regression: Development and application of a slope difference test
- Devine-Wright Patrick, Howes Yuko. Disruption to place attachment and the protection of restorative environments: A wind energy case study. *Journal of Environmental Psychology* 2010; 30 (3): 271-280.
- Eden Sally E. Individual environmental responsibility and its role in public environmentalism. *Environment and Planning A* 1993; 25 (12): 1743-1758.
- Ellen Pam Scholder, Wiener Joshua Lyle, Cobb-Walgreen Cathy. The role of perceived

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- consumer effectiveness in motivating environmentally conscious behaviors. *Journal of public policy & marketing* 1991; 102-117.
- Fornell Claes, Larcker David F. Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research* 1981; 39-50.
- Gifford Robert, Nilsson Andreas. Personal and social factors that influence pro-environmental concern and behaviour: A review. *International Journal of Psychology* 2014; 49 (3): 141-157.
- Gleim Mark R, Smith Jeffery S, Andrews Demetra, Cronin J Joseph. Against the green: a multi-method examination of the barriers to green consumption. *Journal of Retailing* 2013; 89 (1): 44-61.
- Gosling Elizabeth, Williams Kathryn JH. Connectedness to nature, place attachment and conservation behaviour: Testing connectedness theory among farmers. *Journal of Environmental Psychology* 2010; 30 (3): 298-304.
- Gupta S., Ogden D. T. To buy or not to buy? A social dilemma perspective on green buying *The Journal of Consumer Marketing* 2009; 26 (6): 376-391.
- Gustafson Per. Mobility and territorial belonging. *Environment and Behavior* 2009; 41 (4): 490-508.
- Harris Paul G. Environmental perspectives and behavior in China: Synopsis and bibliography. *Environment and Behavior* 2006; 38 (1): 5-21.
- Irwin Kyle. Prosocial behavior across cultures: The effects of institutional versus generalized trust. *Altruism and Prosocial Behavior in Groups*, 2009. pp. 165-198.
- Jin Myung H., Shriar Avrum J. Linking environmental citizenship and civic engagement to public trust and environmental sacrifice in the Asian context. *Environmental Policy & Governance* 2013; 23 (4): 259-273.
- Jones Nikoleta, Panagiotidou Kalliopi, Spilanis Ioannis, Evangelinos Konstantinos I, Dimitrakopoulos Panayiotis G. Visitors' perceptions on the management of an important nesting site for loggerhead sea turtle (*Caretta caretta* L.): The case of Rethymno coastal area in Greece. *Ocean & coastal management* 2011; 54 (8): 577-584.
- Kerr Norbert L. Norms in social dilemmas. In: David A. Schroeder editor. *Social Dilemmas: Perspectives on Individuals and Groups*: Praeger Publishers, 1995.
- Kramer Roderick M, Goldman Lisa. Helping the group or helping yourself? Social motives and group identity in resource dilemmas. *Social dilemmas: Perspectives on individuals and groups* 1995: 49-67.
- Larson Lincoln R, Stedman Richard C, Cooper Caren B, Decker Daniel J. Understanding the multi-dimensional structure of pro-environmental behavior. *Journal of Environmental Psychology* 2015; 43: 112-124.
- Lassen Claus. Aeromobility and work. *Environment and Planning A* 2006; 38 (2): 301-312.
- Lewicka Maria. On the varieties of people's relationships with places: Hummon's typology revisited. *Environment and Behavior* 2011; 43 (5): 676-709.
- Macey William H., Schneider Benjamin. The Meaning of Employee Engagement. *Industrial and Organizational Psychology* 2008; 1 (1): 3-30.
- Manzo Lynne C, Perkins Douglas D. Finding common ground: The importance of place attachment to community participation and planning. *CPL bibliography* 2006; 20 (4): 335-350.
- Messick David M, Brewer Marilyn B. Solving social dilemmas: A review. *Review of personality and social psychology* 1983; 4 (1): 11-44.
- Miller Byron. Collective action and rational choice: Place, community, and the limits to individual self-interest. *Economic geography* 1992; 68 (1): 22-42.
- Ng Thomas W. H., Feldman Daniel C. Breaches of past promises, current job alternatives,

- and promises of future idiosyncratic deals: Three-way interaction effects on organizational commitment. *Human Relations* 2012; 65 (11): 1463-1486.
- Parry Jane. Beijing pollution is becoming a "public health catastrophe," expert says. *BMJ : British Medical Journal* 2013; 346 (jan16 1).
- Paxton Pamela. Is Social Capital Declining in the United States? A Multiple Indicator Assessment. *American Journal of Sociology* 1999; 105 (1): 88-127.
- Payton Michelle A., Fulton David C., Anderson Dorothy H. Influence of Place Attachment and Trust on Civic Action: A Study at Sherburne National Wildlife Refuge. *Society & Natural Resources* 2005; 18 (6): 511-528.
- Pawaskar, Uttam Shankar, Rakesh D. Raut, and Bhaskar B. Gardas. Assessment of consumer behavior towards environmental responsibility: A structural equations modeling approach. *Business Strategy and the Environment* 2018; 27 (4): 560-571.
- Podsakoff Philip M, MacKenzie Scott B, Lee Jeong-Yeon, Podsakoff Nathan P. Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology* 2003; 88 (5): 879.
- Ramkissoon Haywantee, Mavondo Felix T. The satisfaction–place attachment relationship: Potential mediators and moderators. *Journal of Business Research* 2015; 68 (12): 2593-2602.
- Ramkissoon Haywantee, Smith Liam David Graham, Weiler Betty. Testing the dimensionality of place attachment and its relationships with place satisfaction and pro-environmental behaviours: A structural equation modelling approach. *Tourism Management* 2013; 36: 552-566.
- Sager Tore. Freedom as mobility: Implications of the distinction between actual and potential travelling. *Mobilities* 2006; 1 (3): 465-488.
- Scannell Leila, Gifford Robert. The relations between natural and civic place attachment and pro-environmental behavior. *Journal of Environmental Psychology* 2010; 30 (3): 289-297.
- Statistics Beijing Municipal Bureau Of. *Beijing Statistics Year Book*
- Stedman Richard C. Toward a social psychology of place: Predicting behavior from place-based cognitions, attitude, and identity. *Environment and Behavior* 2002; 34 (5): 561-581.
- Stern Paul C. New environmental theories: toward a coherent theory of environmentally significant behavior. *Journal of Social Issues* 2000; 56 (3): 407-424.
- Takahashi Bruno, Tandoc Jr Edson C, Duan Ran, Van Witsen Anthony. Revisiting Environmental Citizenship: The Role of Information Capital and Media Use. *Environment and Behavior* 2017; 49 (2): 111-135.
- Vaske Jerry J., Kobrin Katherine C. Place attachment and environmentally responsible behavior. *The Journal of Environmental Education* 2001; 32 (4): 16-21.
- Wang Zhaohua, Zhang Bin, Yin Jianhua, Zhang Xiang. Willingness and behavior towards e-waste recycling for residents in Beijing city, China. *Journal of Cleaner Production* 2011; 19 (9): 977-984.
- Yuksel Atila, Yuksel Fisun, Bilim Yasin. Destination attachment: Effects on customer satisfaction and cognitive, affective and conative loyalty. *Tourism Management* 2010; 31 (2): 274-284.
- Zhao Dahai, Hu Wei. Determinants of public trust in government: empirical evidence from urban China. *International Review of Administrative Sciences* 2017; 83 (2): 358-377.
- Zhao Hui-hui, Gao Qian, Wu Yao-ping, Wang Yuan, Zhu Xiao-dong. What affects green consumer behavior in China? A case study from Qingdao. *Journal of Cleaner Production* 2014; 63: 143-151.

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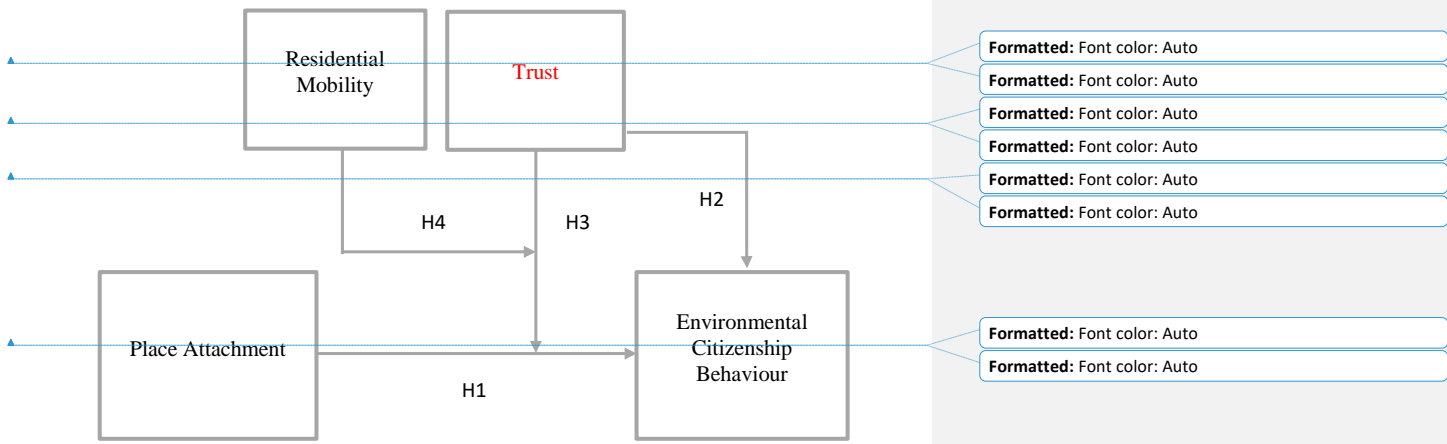


Figure 1. Conceptual model



**Table 1**

## Measurement Items

Construct	Wording	SL
Place Attachment	Place Identity	
	I feel BEIJING is part of me.	.85
	I identify strongly with BEIJING.	.83
	Living in Beijing says a lot about who I am.	.80
	Place Affect	
	I am very attached to BEIJING.	.88
	I feel a strong sense of belonging to BEIJING.	.89
	BEIJING means a lot to me.	.79
	Place Dependent	
	For my work and life, the resources and facilities provided by BEIJING are the best.	.68
	For my work and life, I could not imagine anything better than the resources and facilities provided by BEIJING.	.70
	I enjoy living in BEIJING and its social environment more than any other cities.	.86
	Place Social Bonding	
	If I were to stop living in BEIJING, I would lose contact with a number of friends.	.68
	My friends/family would be disappointed if I were to live in another city.	.73
	Many of my friends/family prefers BEIJING over many other cities.	.80
My friends here strongly connect me to BEIJING.	.74	
I live in BEIJING because my family is here.	.68	
I like the local culture and tradition of BEIJING.	.73	
I often get involved in local projects and activities.	.72	
Trust	I have confidence in the decisions that BEIJING municipal government makes to protect the environment.	.86
	I have confidence in decisions made by municipal staff at BEIJING to protect the environment.	.87
	I trust that BEIJING municipal staff will do what is right for the city in environmental protection.	.84
Environmental Citizenship Behaviour	ECB Help	
	I spontaneously give my time to help my family/friends/fellow citizens take the environment into account in everything they do in the city.	.77
	I encourage my family/friends/fellow citizens to adapt more environmentally conscious behaviour.	.74
	I encourage my family/friends/fellow citizens to express their ideas and opinions on environmental issues.	.75
	ECB Engage	
	I actively participate in environmental events organized in and/or by my city.	.79
	I undertake environmental actions that contribute positively to the image of my city.	.84
	I volunteer for projects, endeavours or events that address environmental issues in my city.	.82
	I stay informed of my city's environmental initiatives.	.74
	ECB Initiatives	
In my city, I weigh the consequences of my actions before doing something that could affect the environment.	.75	
I voluntarily carry out environmental actions and initiatives in my daily activities.	.70	
I make suggestions to my family/friends/fellow citizens about ways to protect the environment more effectively, even when it is not my direct responsibility.	.82	

SL=standardized loadings; ECB =environmental citizenship behaviour.

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**Table 2**

Psychometric measures and correlation among key constructs

Construct	M	SD	Cronbach 's alpha	ECB	PA	TRUST
ECB	5.65	.88	.89	<b>.764</b>		
Place Attachment	5.52	1.14	.89	.632	<b>.776</b>	
Trust	5.32	1.21	.94	.610	.606	<b>.907</b>

Ne: ECB = Environmental citizenship behaviour, PA= Place attachment, Values in the diagonal are the square root of the average of variance extracted (AVE)

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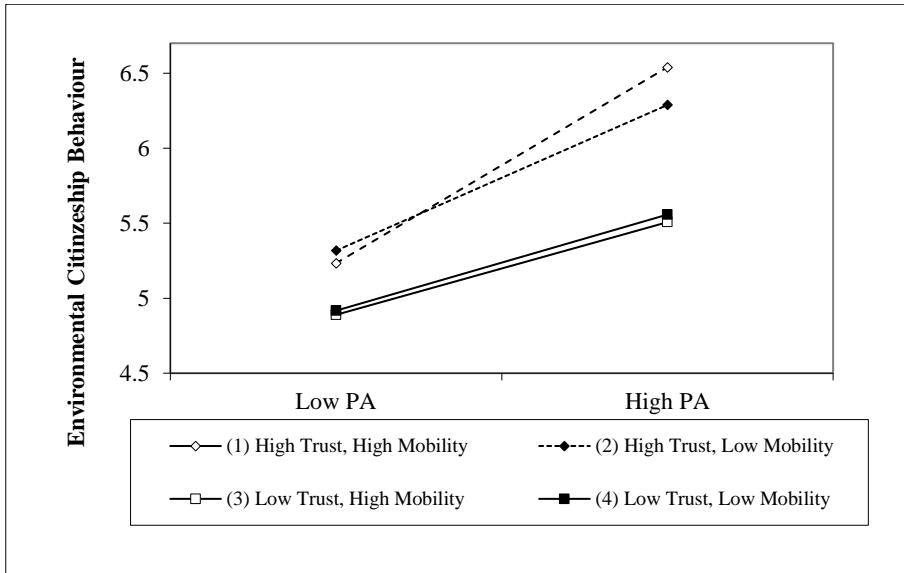
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**Table 3****Regression analysis results**

Variable	Model 1		Model 2		Model 3		Model 4	
	b	se	b	se	b	se	b	se
Constant	5.56	.11	5.56***	.11	5.56	1.37	5.50	1.39
Control Variables								
Gender	-.01	.08	-.02	.06	-.03	.06	-.03	.06
Born	.63**	.08	.10	.07	.07	.07	.07	.07
Main effects								
Place Attachment			.29***	.04	.38***	.08	.29***	.09
Trust			.26***	.03	.29***	.08	.19*	.09
Mobility			.03	.11	-0.01	.14	.04	.14
Two-way interaction								
Place Attachment x Trust					.08***	.02	.00	.04
Place Attachment x Mobility					-.01	.09	.10	.10
Trust x Mobility					-.02	.09	.08	.10
Three-way interaction								
Place Attachment x Trust x Mobility							.10*	.04
R <sup>2</sup>	.12		.47		.49		.49	
ΔR <sup>2</sup>	.12***		.36***		.02**		.01*	

Notes: b=Unstandardized coefficient and one-tailed test of significance were used; \*p<.05, \*\*\*p<.001. Born is a 0,1 dummy variable (1=born in Beijing, 0=otherwise). Gender is a 0,1 dummy variable (1=male, 0=female). Mobility is a 0,1 dummy variable (1=high mobility, 0=low mobility).

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**Figure 2.** The Three-Way Interaction Effect among Place Attachment, Trust and Mobility.  
 Note: PA=Place Attachment.

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