

Place Label Nudges: How Place Attachment Shapes Recycling Choice

Abstract

Consumers often discard everyday products like paper cups instead of recycling them. To address this environmental challenge, we propose and test a novel identity-based nudge: labelling products with a place name. [Across five studies and two additional studies utilising choice experiments](#), we demonstrate that place labels increase recycling intentions, but primarily among consumers with strong attachment to the place. This effect is mediated by an enhanced product-self connection. Furthermore, we identify a critical boundary condition: the effect is moderated by place image, such that a threatened (dirty) image strengthens the mediating pathway from attachment to recycling. Our research models a psychological process for sustainable behaviour and provides managers with a low-cost strategy to leverage local identity for environmental goals.

Keywords: Place attachment; Place label; Product–self connection; Recycling; Choice experiments

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1. Introduction

The paper cup holding our morning coffee is, for most consumers, a momentary convenience before disposal. For recycling research, however, it offers an opportunity to examine the psychological processes that shape everyday pro-environmental decisions. Thus, we use this ubiquitous, low-involvement product as a stimulus to investigate whether a simple place-based cue can nudge recycling behaviour. Across five hypothetical choice experiments, we examine how consumers' attachment to a place influences their selection of place-labelled cups for recycling when presented with images of cups—capturing stated preferences in a controlled setting that approximates real-world decision-making more closely than abstract intention measures.

We acknowledge at the outset that paper cup recycling is more complex than often assumed. Most paper cups are lined with polyethylene, making them difficult to process in standard recycling facilities, and contamination from food residue further complicates recovery (Donnelly et al., 2023). Only a minority of municipal recycling programs currently accept these cups. Thus, when we refer to “recycling choice” throughout this paper, we refer to consumers' selection of a cup for disposal in a recycling bin—a behavioural measure that captures decision-making in a controlled context, but one that must be coupled with appropriate infrastructure and consumer education to be environmentally beneficial (Catlin et al., 2021). Our theoretical contribution concerns the psychological pathway underlying this choice, not the technical recyclability of any specific material.

Existing literature addressing consumer engagement consistently points to place attachment (PA) as a key facilitator. This emotional bond between consumers and places, also referred to as sense of place, has been documented as an antecedent to recycling behaviour

(Lewicka, 2011; Song et al., 2019). The rationale is that consumers who are strongly attached to a place are more likely to protect its environment and thus engage in pro-environmental behaviours, including recycling (Daryanto & Song, 2021). In the context of everyday product recycling, place attachment is particularly relevant since daily routines often unfold within meaningful places—coffee shops, local communities, residential cities—towards which consumers may hold attachment feelings (Halpenny, 2010). However, little research has examined whether and how consumers’ sense of place, when made salient by a relevant product cue (i.e., a place label), can be channelled into pro-environmental behaviours through enhanced psychological connections to the product.

Thus, our research examines whether consumers attached to a place tend to recycle paper cups imbued with place cues. We focus on city names as labels (hereafter “place labels”) because, from a cognitive processing fluency perspective, text-only labels are processed more easily than image-only alternatives (Jaud & Melnyk, 2020).

In so doing, we address three research gaps. First, we introduce and model a novel, contextually relevant intervention for promoting recycling: place-based product labeling. While prior work has focused on incentives and policies (Li et al., 2021), we demonstrate how a subtle, identity-aligned cue can influence disposal choices. We formalise and test a psychological model wherein the presence of a place-labelled option engages consumers’ pre-existing place attachment, thereby increasing recycling choice.

Second, we advance theoretical understanding of the link between place attachment and pro-environmental behaviour by identifying and testing a product-related mechanism. Prior research has established a correlation but left the process unexplained from a consumption perspective. We provide clarity by establishing product-self connection as a critical mediator,

explaining how place-attached consumers translate that attachment into stewardship of a specific product. This offers a more granular, actionable pathway for intervention design.

Third, we address a methodological gap by employing choice-based experiments to study place attachment. Prior work has relied largely on surveys (e.g., Brocato et al., 2015) or artificial priming (e.g., “Imagine you are attached to Place A”) (Ariccio et al., 2021; Jiao et al., 2023). Our approach, which embeds place labels within constructive decision tasks (Bettman et al., 1998), more authentically captures how place attachment operates in real consumption contexts—where choices are contingent on the attributes of available options (Elmor et al., 2025). This method allows us to test our proposed model and provides robust evidence for the psychological pathway. Specifically, we ask: how does place attachment influence everyday decision-making with respect to pro-environmental behaviours, such as choosing which everyday products to recycle? As choices can be constructive and decision processes highly contingent on how the choice set is displayed (Bettman et al., 1998), our goal is to shed light on how place labels, acting as salient cues, can influence environmentally relevant choices. Through a series of choice experiments, we test whether consumers are more likely to choose a place-labelled everyday product over a plain one, and whether this preference operates through a psychological pathway where place attachment enhances product-self connection.

The paper proceeds with an in-depth discussion of the theoretical development underpinning our hypotheses, followed by five experimental studies designed to test them. We conclude by outlining key findings, contributions, limitations, and directions for future research.

2. Theoretical development

2.1. Place attachment and recycling

Place attachment, or individuals' sense of place, has been used to explain pro-environmental engagement across different behavioural domains including recycling (Scannell & Gifford, 2010; Vaske & Kobrin, 2001; Wan et al., 2022). Most researchers conceptualise place attachment as a multi-dimensional construct comprising place identity, place dependence, place social bonding and place affect (Ramkissoon et al., 2012; Song et al., 2019). These sub-dimensions provide explanations on why an individual is attached to a place. Place identity refers to the symbolic meaning of the place, place dependence depicts the functional evaluation of the place, place social bonding describes the sense of belonging or membership to the group of people within the place, and place affect demonstrates individuals' sentiments or "love" towards the place (Ramkissoon & Mavondo, 2015; Ramkissoon et al., 2013). Since this emotional bond individuals form with a specific place often shapes, reflects, and reinforces their social identity, the concept of place attachment comprises feelings of belonging and identity, as well as emotional and functional comfort (Lewicka, 2011). In our research, we refer to place attachment as a multidimensional construct by considering all its central components, ensuring alignment with its established conceptualisation.

According to the literature of place attachment, those with a strong sense of place would be more likely to protect that place (Daryanto & Song, 2021; Halpenny, 2010; Relph, 1976). For example, Faccioli et al. (2020) demonstrate that residents with greater attachment to their place of residence tend to display higher willingness to pay for ecosystem services. To explain the effect of place attachment on pro-environmental behaviour, most researchers refer to Social Identity Theory (Turner et al., 1987). Researchers believe that individuals who are strongly attached to a place tend to incorporate the place into their self-concept. Due to this identification, individuals tend to sacrifice their own interests for the interests of the place (Carrus et al., 2014). For example, Vaske and Kobrin (2001) demonstrate that individuals' attachment to a place would promote environmentally friendly behaviour towards that place including recycling.

Using data of 1,071 Hong Kong respondents, Wan et al. (2022) show that place identity and place dependence influence consumers' recycling intentions. Collectively, the stream of research suggests that attachment to a place enhances consumers' self-identification with that place, which promotes their protective behaviours towards the place.

2.2. The role of place labels in recycling decisions

The role of product labels has been widely documented in the field of marketing (Araya et al., 2022; Celhay et al., 2020; Heroux et al., 1988). Previous studies have shown that labels attached to a product could convey crucial information about product quality, value and authenticity (e.g., Chi et al., 2022; Qiu & Zuo, 2023) and play an important role in influencing consumers' subconscious decision-making (Akoglu & Ozbek, 2022).

According to identity-accessibility effects, when an identity is made salient, **it would elicit behaviours** that are consistent with that identity (Brewer 1991). For instance, symbols of Chinese culture (e.g., the Great Wall) could activate Hong Kong residents' Chinese identity and encourage collective behavioural tendencies (Zhang & Khare, 2009) , and contextual cues of globalisation (e.g., multicultural features) in an ad would activate individuals' global identity and increase preference for global products (Nie et al., 2022).

Similarly, a place label on a product can serve as a cue of place bond, influencing consumers' behaviour. For instance, local food products labelled with a local place of origin not only improve perception of product quality but also relate to local identity and thus tend to promote purchase intention among local consumers (Chen, 2021; Zhang & Khare, 2009). Food products with the label of a tourist destination can signal the culinary culture and heritage of their place of origin, and motivate destination travelling and purchase behaviours among attached consumers (Hall & Sharples, 2004; Spielmann et al., 2018; Savelli et al., 2022). Place labels irrelevant to the products may also be used to evoke emotions. For example, Coca-Cola

has successfully launched a series of “city” bottles, with specific city names and images presented on the product bottles (Shuie, 2019).

Along the same line, we posit that in a choice context containing a place-labelled product, consumers’ pre-existing attachment to that place will be a key driver of their choice to recycle that product, relative to a plain alternative. Therefore, we hypothesise:

***H1:** When consumers are presented with an everyday product labelled with a place they feel attached to (vs. otherwise), their place attachment would increase the likelihood of choosing the former product for recycling. Specifically:*

***H1a:** When consumers are presented with an everyday product labelled with a place they feel attached to (vs. a plain one), their place attachment would increase the likelihood of choosing the former product for recycling.*

***H1b:** When consumers are presented with an everyday product labelled with a place they feel attached to (vs. a place they feel less attached to), their place attachment would increase the likelihood of choosing the former product for recycling.*

2.3. Product–self connection

Prior research has shown that a key driver for consumers’ decision to recycle is the link between the product and consumers’ identities (Schulte et al., 2020; Trudel et al., 2016). When an everyday product is imbued with consumers’ self-identity, they are more likely to recycle it since alternative ways of disposal (e.g., trashing) tend to create an identity threat (Trudel et al., 2016). Specifically, when their identity is tied to a product and that identity link is made salient, consumers will opt for the least threatening means to dispose of the identity-linked product (i.e., recycle).

Accordingly, we propose that consumers with strong attachment to a place would be more likely to recycle a product when the product is linked to that place because the place label on a product can serve as a stimulus (Qiu & Zuo, 2023), arousing a sense of self connection with the labelled product. Indeed, this product–self connection, as a psychological bond, arises when consumers perceive a product as meaningfully linked to their self-concept, and when the product aligns with how consumers see themselves (e.g., a Beijing-labelled cup evoking one’s pre-existing sense of belonging as a Beijing resident). The product is no longer just a functional object but a symbolic extension of the self, thus influencing consumers’ behaviours.

Similar to consumers pursuing benefits from a brand to construct one’s self-concept (Escalas & Bettman, 2003; Fazli-Salehi et al., 2021), the connection between consumers and the place-imbued products helps to achieve emotional, functional, and self-expressive benefits (Marticotte et al., 2016; Wirtz et al., 2013). That is, when a place contributes to the fulfillment of consumers’ self-definition needs, consumers are more likely to build a relationship with the product bearing the place cue. Thus, consumers would tend to develop a sense of connection with a product labelled with a place to which they are highly attached. This product–self connection will lead to recycling behaviour so that they could keep the component of their place identity and connection.

Note that the product–self connection construct is typically associated with high-involvement products. Nevertheless, we argue that this product–self connection can also be established between consumers and low-involvement items (e.g., paper cups) due to the following two reasons. First, consumers can feel connected to a low-involvement product because they have regularly used it or had experience with it (Kirmani, 2009). Anecdotal observations suggest that coffee drinkers might feel a stronger personal connection to paper cups than those who skip the caffeine. Second, product–self connection can be formed when the low-involvement product contains symbolic or identity-relevant meaning. Indeed, prior

research has suggested that low-involvement products can carry symbolic value (Escalas & Bettman, 2005; Richins, 1994; Weiss, 2022). For example, Richins (1994) demonstrates that everyday objects can hold private meanings – meanings shaped by personal experiences. That is, the objects can be meaningful for customers if the products are imbued with personally relevant cues such as a label of their city name (“[The label brings my city to mind](#)”). In fact, products can become self-linked if they are used by consumers to construct, maintain, and enhance the self as instances of egocentric categorisation—active ways of classifying products in relation to oneself (Weiss, 2022). In one of the experiments conducted by (Weiss, 2022), a mug—a low-involvement product featuring the logo of the participants’ university—was used to examine how the university logo could influence participants’ willingness to purchase the mug (see p. 294). The above literature supports our argument that product–self connection accounts for low-involvement products. Thus, we propose that consumers who are highly attached to a place are more likely to recycle an everyday product that is linked to a place because of product–self connection.

***H2:** Product–self connection mediates the relationship between place attachment and the choice of products for recycling; that is, consumers who are highly (vs. less) attached to a place are more likely to recycle an everyday product labelled with the place (vs. one not labelled with the place) because of their self-connection with the product.*

2.4. The effect of city residency

Cities often serve as a locus of place attachment formation (Lewicka, 2008), making them particularly effective in evoking place attachment through product labelling. Although consumers attached to a place are more likely to choose a place-labelled product (vs. a plain one) for recycling, the choice could be influenced by residency-related variables (e.g., length

of residency and residency status) which exert their influence directly or indirectly via place attachment. Residency offers a key base for the development of place attachment, providing the necessary time, stability, and lived experiences to forge emotional, cognitive, and behavioural bonds with a place (Lewicka, 2011). That is, long-term residence, daily interactions (e.g., with neighbours, local landmarks, or cultural practices), and (social, economic, or emotional) investment in a local community naturally cultivate deeper attachment to that place. Early researchers in the field of place attachment used length of residency as a proxy measure for attachment (Riger & Lavrakas, 1981), given that positive connections to a place are typically tied to residency within it. Recent empirical results also show that length of residency is positively correlated with place attachment (Lu et al., 2018; Strandberg, 2023).

Thus, we posit that city residents (e.g., Beijing residents), by virtue of living in that city (e.g., Beijing), are more likely to feel emotionally connected to it than to other cities (e.g., Shanghai which they may know or have visited, but not call home). When a product is labelled with a consumer's residential city (e.g., "Beijing" for a Beijing resident), the product becomes a symbol associated with his or her local identity. This emotional connection between the consumer and the product then makes him or her more inclined to engage in pro-social behaviours toward it (e.g., recycling). In contrast, a product labelled with another city (e.g., "Shanghai" for a Beijing resident) is perceived as lacking a strong connection, and this absence or low level of connection diminishes the motivation to recycle it.

Furthermore, the word "Beijing" ("Shanghai") on a product could be inherently more attractive to Beijing (Shanghai) residents. Previous research has demonstrated that consumers see products with familiar or personally relevant cues (e.g., brand names and packaging) as more attractive (Janiszewski, 1993; Saile et al., 2025; Zajonc, 1968).

Accordingly, we argue that, to a Beijing resident, the label of "Beijing" serves as a familiar, relevant stimulus, and thus a product bearing this label feels more appealing. Conversely, a

“Shanghai”-labelled product is less relevant to the Beijing resident, and therefore, the product may be less attractive to him or her. Hence, we propose the following hypothesis.

***H3a:** Consumers are more likely to choose an everyday product labelled with the name of their residential city (vs. one labelled with another city) for recycling.*

That being said, non-residents—such as visitors—may also develop attachment to a place due to emotional experiences (e.g., memorable vacations), meaningful social interactions with locals, or symbolic connections to personal milestones (e.g., a wedding venue, or a childhood holiday spot) though these often differ from residents’ attachments in terms of magnitude or nature (Daryanto & Song, 2021). For example, researchers in tourism literature have provided substantial evidence for the positive link between place attachment and pro-environmental behaviours, such as recycling, among visitors in recreational destinations (Han et al., 2019; Ramkissoon et al., 2013). Thus, we propose that, even when consumers are not residents of a particular city, they may still show a higher tendency to choose for recycling the everyday products labelled with that city to which they feel strongly attached, compared to products labelled with other cities they feel less connected to. For example, Beijing-labelled (Shanghai-labelled) product will be chosen for recycling by those who are more attached to Beijing (Shanghai), although they are neither Beijing nor Shanghai residents.

***H3b:** Consumers are more likely to choose for recycling an everyday product labelled with a city they feel attached to (vs. another city they feel less attached to) when they are residents in neither city.*

2.5. The boundary condition of city image

According to Trudel et al. (2016), consumers will be more likely to discard a product if it is negatively associated with their identity. This is because “trashing a product with a negative identity-link may serve as a symbolic act of dissociation from that identity” (p. 258). However, we posit that, in the context of place, the prediction might not hold. In fact, we predict the opposite. We argue that if consumers are highly attached to their city, portraying a negative image of the city (e.g., highlighting that part of the city is dirty) might motivate them to engage more in pro-environmental behaviours to improve the city’s image (e.g., recycling place-labelled products).

The rationale is that place attachment fosters a motivation to protect and restore the place when its environment seems threatened or damaged (Gottwald & Stedman, 2020). Identity compensation theory (Steele, 1988; Sherman & Cohen, 2006) suggests that a dirty image threatens place identity, motivating restoration through action. Research shows that threats can amplify place-protective motivations (Han, 2025; Köhler & Han, 2024), and place-protective actions may arise when new elements threaten pre-existing emotional attachments to places and one’s own place identity (De Dominicis et al., 2015). That is, individuals with strong place attachment will resist and employ coping strategies to deal with changes that threaten the capacity of a place to satisfactorily contribute to identity.

A dirty city image may also generate a sense of anticipated guilt among highly attached individuals—they may anticipate a sense of guilt if they do not take protective actions toward the beloved city. Guilt motivates reparative behaviours and the cessation of harm (Tangney & Dearing, 2003), and research has shown that place attachment is positively associated with discrete emotions like guilt, which in turn drive pro-environmental behaviours (Shipley & van Riper, 2022; Shipley et al., 2023).

Crucially, product–self connection (PSC) is theorised to be present regardless of city image. However, its behavioural relevance should depend on whether the place is threatened.

In the clean condition (i.e., being exposed to a clean image of the city), PSC exists but lacks motivational urgency because no threat requires action. In the dirty condition (i.e., being exposed to a dirty image of the city), identity threat and anticipated guilt amplify the behavioural impact of PSC, transforming it from a dormant identity marker into an active driver of recycling choice. In other words, the dirty image does not change *whether* PSC is present; it changes *what PSC does*.

Thus, we propose that city image acts as a critical boundary condition on the second stage of the psychological pathway from place attachment to recycling (via product–self connection). For individuals with high place attachment, a dirty city image should intensify the motivational power of product–self connection on recycling choice. When the city is seen as threatened (dirty), the product’s connection to the self becomes not just a link to identity, but a channel for restorative action. Recycling the place-labelled product becomes a concrete act of stewardship to counteract the negative city image. In contrast, a clean city image aligns with the attached individual’s positive identity, providing no urgent threat to resolve. In this non-threatening context, the product–self connection, while positive, lacks the amplified motivational urgency to drive the recycling choice. Importantly, this moderating effect should be specific to place-labelled products, which serve as tangible symbols of the place. A plain product, lacking this symbolic link, cannot engage this place-based restorative motivation, regardless of the city image.

H4: The positive relationship between product-self connection and the preference for recycling a place-labelled (vs. plain) product will be stronger when consumers are exposed to a dirty (vs. clean) image of the city.

3. Overview of the current studies

We conducted five experimental studies among Chinese participants to test our propositions and cooperated with a professional research agency located in Shenzhen, China, to collect data. We aimed to identify the influence of place attachment on the recycling choice of place-labelled paper cups (Study 1), explore the role of product–self connection as a mediator (Study 2), rule out product liking (Study 3) and residency effect (Study 4) as alternative explanations, and test the boundary condition of city image on recycling choice (Study 5). An overview of the studies, as well as types of participants involved in the studies, can be seen in Figure 1. The experimental studies and their findings are outlined below.

INSERT FIGURE 1 HERE

In addition to the five studies above, two more studies were conducted in this research¹. In Additional Study A, we conducted a between-subjects experiment to complement the within-subject choice designs used in our main studies. Our results confirmed that the place-labelled cup condition yielded significantly higher recycling choice than the plain cup condition. In Additional Study B, we replicated Study 5, ruled out social norms as alternative mediators, and examined the psychological states under the dirty condition (i.e., identity threat and anticipated guilt) that amplify the power of product-self connection in driving restorative recycling behaviour. Please see Appendix for the details of these two studies.

4. Study 1: the effect of place attachment on the recycling choice

We designed Study 1 to test our prediction that when consumers are presented with an everyday product labelled with a place they feel attached to, and a plain one, their place attachment would increase the likelihood of choosing the former for recycling (H1a). We used

¹ Thanks to the anonymous reviewers who suggested these.

coffee paper cups—either place-labelled or plain—to examine participants’ choices (see Figure 2).

INSERT FIGURE 2 HERE

4.1. Participants and procedure

We used G*Power 3.1 (Faul et al., 2009) to determine the minimum required sample size. The result suggested that 143 participants would be sufficient to detect a medium effect size (i.e., 0.30) with a statistical power of 0.80 and a significance level of 0.05. We also checked the minimum sample size requirement for a logistic regression with one predictor (i.e., place attachment). We specified a small-to-moderate odds ratio (Chen et al., 2010) with a statistical power of 0.80 and a significance level of 0.05, resulting in N=216. We also used these calculations as the basis for collecting data in our subsequent studies.

In this study, we recruited 216 Beijing respondents via the professional online survey agency. We included a cover letter in the survey that conveyed the nature of the research, assured respondents of their anonymity, emphasised voluntary involvement, and underscored the confidentiality of their responses. The agency sent the questionnaire link to its panel members and utilised a filtering system to ensure only the respondents who currently lived in Beijing participated. Respondents were asked to respond to a series of questions in an online survey and were told that the survey was a part of academic research to study consumers’ coffee consumption.

After reading the introductory page of the survey, respondents read the following: “Please see the two images of paper cups below. Which of the two paper cups do you want to throw into a recycling bin? (Select one cup by placing your cursor over the image you choose and click). Note that the two cups were of the same size”. The images of the cups on the online

survey page were placed side by side. The placement of the images was randomised to avoid presentation-order effect (Englund & Hellström, 2012). One cup was labelled with the city name “Beijing”, and the other was a plain cup that did not contain any labels.

4.2. Measures

To measure the level of their attachment to the city that they currently reside in, we asked the respondents to respond to a series of items of four-dimensional place attachment scale (Daryanto & Song, 2021; Yuksel et al., 2010), using a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree). The four dimensions were place identity ($\alpha = 0.731$, e.g., “I feel Beijing is part of me”), place affect ($\alpha = 0.722$, e.g., “Beijing means a lot to me”), place social bonding ($\alpha = 0.734$, e.g., “If I were to stop living in Beijing, I would lose contact with a number of friends”), and place dependence ($\alpha = 0.725$, e.g., “I enjoy living in Beijing and its social environment more than any other cities”). We combined the four sub-dimensions of place attachment by averaging them to form a reliable measure of place attachment ($\alpha = 0.853$). For residency check, despite the survey being sent to Beijing consumers, respondents were also asked to indicate in which city they currently live (1= Beijing, 2 = Other) and their demographic details, such as year of birth and gender.

4.3. Results and Discussion

Eight respondents who indicated that they were not living in Beijing were discarded, leaving 208 respondents for the subsequent analysis. Consistent with our prediction, respondents showed a strong preference for the Beijing cup over the plain cup in their recycling choice. Our result revealed that 83% (174 out of 208) chose the Beijing cup over the plain cup ($\chi^2(1) = 94.231$, $p = 0.000$). Next, we conducted a logistic regression analysis to examine the effect of place attachment on the choice of the paper cup. The binary logistic regression analysis

revealed that the effect of place attachment on choice of recycling was positive and significant ($b = 0.484$, $Wald = 8.963$, $p = 0.000$), suggesting that the more attached respondents felt towards Beijing, the more likely they would recycle the Beijing cup than the plain cup, thus supporting H1a.

5. Study 2: the mediation effect of product-self connection

The results of the Study 1 showed that respondents preferred the Beijing cup over the control for recycling. Although our analysis revealed that place attachment predicted this preference, there was a possibility that Beijing cup was chosen because it was compared with a plain cup with no text printed on it. Therefore, the Beijing cup could be selected because the word “Beijing” signalled a place, but the plain cup did not refer to any place. Thus, we conducted Study 2 to replicate the results of Study 1 by replacing the plain cup with a cup labelled with “Shanghai” (see Figure 3). We chose these two cities because Beijing and Shanghai, as the biggest and most famous two cities in China, are comparable in terms of their size and modernity. We predict that Beijing residents will be more likely to choose the Beijing-label cup than the Shanghai one (H1b).

INSERT FIGURE 3 HERE

Another aim of Study 2 is to uncover the mechanism through which place attachment affects the selection of the paper cup for recycling. We contend that respondents’ attachment to a city will facilitate the development of an identity connection between the respondents and the cup labelled with that city, i.e., product–self connection. Note that, despite a paper cup being a low involvement product, consumers can develop self-connection with such a product when it carries a symbolic meaning or appeals to consumers’ values (e.g., featuring meaningful texts

such as names, places, and brands). This connection then influences respondents' recycling choice of the paper cups since the respondents want to maintain their self-identity that is linked to the place-labelled cup. That is, we predict that the effect of place attachment on the recycling choice of the paper cups can be explained by product–self connection (H2).

5.1. Participants and procedure

We recruited 353 respondents from Beijing through the same professional online survey agency as in Study 1. We implemented the same procedure and replaced the plain paper cup used in Study 1 with the “Shanghai” cup.

5.2. Measures

We added four items to measure product–self connection ($\alpha = 0.902$) adapted from previous research (Escalas & Bettman, 2009). Three of the four items were measured on a 7-point Likert scale ranging from 1 = strongly disagree to 7 = strongly agree (e.g., “I feel connected to this coffee paper cup”), and one item measured on a 7-point bipolar scale ranging from 1 = not at all to 7 = extremely (e.g., “How connected do you feel to the coffee paper cup”).

5.3. Results and discussion

Five respondents indicated that they were not living in Beijing; therefore, they were excluded, leaving 348 respondents for the subsequent analysis. Consistent with our prediction, respondents showed a strong preference for Beijing cup over the Shanghai cup. Our result revealed that 86 % (299 out of 348) chose the Beijing cup over the Shanghai cup for recycling ($\chi^2(1) = 179.6, p < 0.001$). Next, we conducted a mediation analysis with product–self connection as a mediator of the relationship between place attachment and the choice of the paper cup (1= Beijing cup, 0 = Shanghai cup). We used PROCESS macro (Hayes, 2017, Model

4 with 5000 bootstrap samples) to test our prediction that place attachment affects the choice of cup indirectly via product–self connection. Our results (see Figure 4) showed that place attachment affected product–self connection ($b = 0.789$, 95% CI = 0.577, 1.005), and product–self connection affected choice of paper cups ($b = 0.336$, 95% CI = 0.108, 0.564). When controlling for product–self connection, the direct effect of place attachment on recycling choice was not significant ($b = -0.107$, 95% CI = -0.633, 0.418). More importantly, the indirect effect analysis showed that place attachment affected recycling choice of cups indirectly via product–self connection ($b = 0.265$, 95% CI = 0.067, 0.439).

INSERT FIGURE 4 HERE

6. Study 3: ruling out product liking

Study 2 showed similar results to those of Study 1 that Beijing respondents preferred the Beijing cup over the Shanghai cup for recycling. In addition, our mediation analysis revealed that the effect of place attachment on the choice of cup was mediated by product–self connection. Note that in Study 2, we used only Beijing respondents. Thus, the aim of Study 3 was twofold. First, we included both Beijing and Shanghai residents to increase the external validity of our findings. Second, we assessed product liking as another potential mediating variable to determine whether it could account for the observed relationship. Previous research shows that product labels may enhance product liking and then influence consumer decisions (e.g., Jaud, & Melnyk, 2020). It is possible that residents of a place feel familiar with a cup labelled with that place and thus tend to have positive evaluations of the place-labelled cup, which affects their recycling decisions. That is, seeing a familiar place name on the paper cup may trigger place attachment, which directly translates to a favourable evaluation of the cup itself (i.e., viewing it as more than a disposable item, but a small “symbol of the place”). Since

the products that one likes are more likely to be perceived as worth caring for, the place-labelled cup would prompt consumers to avoid waste and opt for recycling.

6.1. Participants and procedure

We recruited 327 respondents ($n_{\text{Beijing}} = 188$, $n_{\text{Shanghai}} = 131$, Other = 8) through the same online survey agency as in Study 1. In the study, respondents were exposed to both Beijing-label and Shanghai-label cups (see Figure 3) and responded to a series of questions. Respondents were presented with each cup (the order of the presentation was randomised). In-between the cup presentation, we inserted a filler, which was a short, unrelated task that was inserted between the presentations of the two cups in order to reduce potential demand effects, as suggested by Sawyer (1975). Specifically, participants were presented with a brief series of neutral and unrelated questions, such as “What is the colour of the sky today?”, “Blue is my favourite colour,” and “There have been occasions where I took advantage of someone.” These questions were designed to momentarily shift participants’ attention away from the main task and to minimise their ability to infer the purpose of the study.

Next, like in Study 1, respondents were asked to respond to questions that included measurement items for place attachment, choice of the paper cup, product–self connection, product liking, place of residence (Beijing vs. Shanghai), and demographics (e.g., year of birth and gender).

6.2. Measures

We measured place attachment with the scale used in Study 1 and calculated the composite score of the four dimensions (Beijing residents, $\alpha_{\text{PA}} = 0.790$; Shanghai residents, $\alpha_{\text{PA}} = 0.881$). We measured product–self connection with four items as in Study 2 (Beijing residents: $\alpha_{\text{Beijing cup}} = 0.858$; Shanghai residents: $\alpha_{\text{Shanghai cup}} = 0.895$). We measured product liking with two

items using a 7-point bipolar scale ranging from 1 = not at all to 7 = very much (e.g., “How much do you like the coffee paper cup?”, Beijing residents: $\alpha_{\text{Beijing cup}} = 0.743$; Shanghai residents: $\alpha_{\text{Shanghai cup}} = 0.853$).

6.3. Results and discussion

Eight respondents who indicated that they were neither Beijing nor Shanghai residents were discarded, leaving 319 respondents for the subsequent analysis. Consistent with our prediction (H3a), Beijing respondents showed a strong preference for the Beijing cup over the Shanghai cup for recycling; in contrast, Shanghai respondents showed a strong preference for the Shanghai cup over the Beijing cup. As can be seen from Figure 5, of residents who chose the Shanghai cup, 65 % (91 out of 139) were Shanghai residents. The pattern was reversed in the case of the Beijing cup—of residents who chose the Beijing cup, 78% (140 out of 180) were Beijing residents ($\chi^2(1) = 60.608, p < 0.001$). The results provided evidence that consumers were more likely to choose the coffee cup labelled with the name of their residential city (vs. one labelled with another city) for recycling, thus supporting H3a.

INSERT FIGURE 5 HERE

Next, we conducted a series of binary logistic regressions. We conducted a mediation analysis with product–self connection and product liking as parallel mediators of the relationship between place attachment and the choice of cup (1= Beijing cup, 0 = Shanghai cup). We used PROCESS macro (Hayes, 2017) to test our prediction that place attachment affected the choice of cup indirectly via product–self connection and product liking. That is, we used Model 4 of the macro and extended to include two mediators with 5000 bootstrap samples. We conducted separate mediation analyses using Beijing data and Shanghai data,

respectively. For Beijing residents, our results revealed that effect of place attachment on choice of cup was indirect and significant via product–self connection ($b = 0.507$, 95% CI [0.021, 1.143]) but not significant via product liking ($b = 0.05$, 95% CI [-0.205, 0.306]) (see Figure 6). We obtained similar findings for Shanghai residents that the mediation effect of product–self connection was significant ($b = -0.581$, 95% CI [-1.265, -0.138]) while the mediation effect of product liking was not significant ($b = 0.118$, 95% CI [-0.059, 0.434]) (see Figure 7).

INSERT FIGURE 6 HERE

INSERT FIGURE 7 HERE

We also conducted tests for serial mediation for each type of residents: Place attachment → Product –self connection → Product liking → Recycling Choice. That is, we used Model 6 of PROCESS macro (Hayes, 2017) with 5000 bootstrap samples. The results of these tests were not significant (Beijing: $b = 0.059$, 95% CI [-0.207, 0.359]; Shanghai: $b = 0.171$, 95% CI [-0.098, 0.522]) and confirmed our prediction that place attachment affected the recycling choice of the paper cup via product–self connection instead of product liking.

7. Study 4: ruling out residency effect

In Studies 2 and 3, we used Beijing and Shanghai residents as our respondents. Through those studies, we demonstrated that Beijing respondents preferred the Beijing cup over the Shanghai cup for recycling, and the reverse was true for Shanghai respondents. Using mediation analyses on Beijing and Shanghai data separately, we also established that place attachment influenced the recycling choice of the paper cups via product–self connection. Nevertheless, the choice of paper cups may be affected by variables related to residency that

exert their influence either directly or indirectly through place attachment. For example, past studies show that length of residency is positively correlated with place attachment (Lu et al., 2018; Strandberg, 2023). Furthermore, the word “Beijing” (“Shanghai”) on a paper cup could be inherently more attractive to Beijing (Shanghai) residents. Therefore, we conducted Study 4 to rule out the residency effect by targeting respondents who were neither Beijing nor Shanghai residents. What we want to test is whether, among non-residents, the Beijing (Shanghai) cup will be selected by those who are attached to Beijing (Shanghai) (H3b).

7.1. Participants and procedure

We recruited 351 respondents using the same online survey agency as in the previous studies, targeting residents outside Beijing or Shanghai. The data collection procedure and contents of the survey were identical to those of Study 3, where respondents were asked to choose either a Beijing or Shanghai cup for recycling (see Figure 3).

7.2. Measures

Because we targeted non-residents, we retained only the sub-dimensions of place affect and place identity for measuring place attachment, as these two are highly relevant to our research context. Place dependence and place social bonding, however, are only relevant for residents. We measured respondents’ attachment to both Beijing and Shanghai.

7.3. Results and discussion

Seven respondents failed to pass a screening question regarding their place of residence, leaving 344 respondents, who were neither Beijing nor Shanghai residents, for the subsequent analysis. We calculated the composite scores for place attachment with respect to Beijing (PA_B) and Shanghai (PA_S). To test our prediction about the mediation effect of product–self

connection, we built a structural equation model (SEM) and used the R package lavaan (Rosseel, 2012) to estimate the path coefficients in the model and the indirect effects.

We first performed a confirmatory factor analysis (CFA) to assess the validity of our constructs. In our CFA model, place attachment was modelled as a second-order construct. Our results showed that the CFA model had an adequate fit to the data ($\chi^2 = 546.631$, $df = 165$, $RMSEA = 0.082$, $SRMR = 0.040$, $CFI = 0.946$, $TLI = 0.932$). Next, we implemented structural equation modelling. Our SEM model produced fit indices, showing that the model fit the data well ($\chi^2 = 617.012$, $df = 170$, $RMSEA = 0.088$, $SRMR = 0.047$, $CFI = 0.937$, $TLI = 0.923$). As shown in Figure 8, the indirect effect of product–self connection of the Beijing cup was positive and significant ($b = 0.120$, 95% CI [0.054, 0.383]). Similarly, the indirect effect of product–self connection of the Shanghai cup was negative and significant ($b = -0.272$, 95% CI [-0.043, -0.106]). These results confirmed our predictions and ruled out the residency effect, supporting H3b.

INSERT FIGURE 8 HERE

8. Study 5: the boundary condition of city image

According to Trudel et al. (2016), when a consumer’s identity is negatively linked to a product, discarding it serves as a symbolic act of dissociation and therefore eliminating the identity threat. However, place attachment theory suggests that attachment entails a protective, caring orientation toward the place itself (Gottwald & Stedman, 2020). Based on this reasoning, we predicted *a priori* that when the negative association is with the *place* the product represents (rather than the product itself), attached consumers should experience heightened restorative motivation. For these place-attached consumers, a dirty city image should *increase* recycling as a means of repairing the threatened place. Study 5 was designed to test this competing prediction.

8.1. Participants and procedure

We recruited 429 respondents using the same online survey agency as in the previous studies, targeting Beijing residents. We developed a one factor between-subject experiment by manipulating the perception of city image (dirty vs. clean). We randomly assigned the respondents to either a dirty or clean image experimental condition (see the stimuli in Figure 9). To ensure visual consistency across conditions, we used Photoshop to standardise the city scene; the only manipulation concerned street cleanliness (litter present vs absent).

In the dirty condition, the respondents read a vignette in which, while wandering around their city, they came across a dirty street where the air smelled strange and the sidewalk was messy with scattered trash such as fast-food wrappers. In the clean condition, they read a vignette in which they encountered a clean street where the air felt fresh and pure, and the sidewalk was spotless, with no trash in sight. After reading the vignette and viewing the corresponding image of the city street, respondents answered two manipulation check questions: “The street is dirty” and “The street is clean” (1 = totally disagree, 7 = totally agree). Next, participants in each condition were asked to select either a Beijing cup or a plain cup for recycling. Finally, they completed a series of questions designed to assess the constructs examined in the previous studies (e.g., place attachment and product–self connection), along with demographic measures.

INSERT FIGURE 9 HERE

8.2. Results and discussion

Before analysing our data, we coded the experimental condition of city image with a dummy variable (1 = clean, 0 = dirty). Next, we calculated the composite scores for place

attachment ($\alpha = 0.828$), and product–self connection ($\alpha = 0.939$); these two variables were significantly and positively correlated ($r = 0.569$).

Participants in the dirty condition ($M = 5.751$, $SD = 0.433$) rated the street as significantly dirtier than those in the clean condition ($M = 1.434$, $SD = 0.657$), $t(427) = 81.455$, $p < .001$. Participants in the clean condition ($M = 5.582$, $SD = 0.495$) rated the street as significantly cleaner than those in the dirty condition ($M = 1.197$, $SD = 0.478$), $t(427) = -93.187$, $p < .001$. Together, these results confirmed that the manipulation of city image was successful.

We developed two logit models and analysed them separately: (1) to test the interaction effect between place attachment and city image (Model 1), and (2) to test the interaction effect between product–self connection and city image (Model 2). Due to the nonlinearity nature of the logit model, testing an interaction effect in a logit model cannot rely solely on the assessment of the coefficient of the interaction term, as the interaction effect can exist although the coefficient is not significant (Ai & Norton, 2003; Karaca-Mandic et al., 2012; Mize, 2019).

Given this complexity, our focus was on the calculation and interpretation of the average marginal effects (AMEs) of our focal predictors (i.e., place attachment, and product–self connection) on the predicted probabilities of selecting the Beijing paper cup, and plots of the models' predictions for our focal predictors. AME measured the change in the predicted probability of selecting the Beijing paper cup for a one-unit change in a predictor variable, averaged across all observations (Daryanto, 2025; Wooldridge, 2016). We used Stata (version 18) to compute the AMEs at dirty and image conditions (i.e., conditional AMEs) and produced plots of the predicted probabilities. As Stata has no option for examining a moderated mediation model, we also used PROCESS macro (Model 14) (Hayes, 2017) – note that PROCESS macro does not produce AMEs – to examine the mediation of product–self connection on the relationship between place attachment and choice whereby the effect of product–self connection was moderated by city image. Stata and PROCESS relied on a different

mathematical procedure to calculate their outputs. For instance, Stata used a delta method to calculate the standard errors and confidence intervals of AMEs (Ai & Norton, 2003; Norton et al., 2004), whereas PROCESS macro used bootstrapping to calculate the standard errors and confidence intervals of the conditional effects (Hayes, 2017) typically reported in moderation analysis.

Table 1 shows the results of the logistic regression of the two logit models. As shown in the table, while the effects of place attachment (Model 1) and product–self connection (Model 2) were significant, those of the interaction terms were not. The table also reported the AMEs of place attachment (Model 1) and product–self connection (Model 2) at each city image experimental condition (dirty vs. clean). As can be seen from the table, at the dirty condition, the average marginal effect of place attachment was significant ($b = 0.082, p = 0.037$). Similarly, the average marginal effect of product–self connection was also significant ($b = 0.083, p = 0.000$). None of the AMEs on the clean condition were significant.

INSERT TABLE 1 HERE

To examine the interaction effect further, we created the plots of the models' predictions. Figure 10 presents the predicted probabilities of choosing the Beijing cup across the range of place attachment for dirty and clean conditions. The relationships shown in Figure 10 suggest that higher place attachment was associated with higher probabilities, and these probabilities depended on the city image condition. That is, the probabilities were higher when the city image was portrayed as dirty (vs. clean), particularly across a higher value of place attachment. The same patterns were observed for product–self connection (see Figure 11). The relationships shown in Figure 11 suggest that higher place attachment was associated with higher probabilities, and these probabilities depended on the city image condition.

To further test the mediation of product–self connection (i.e., testing H4), we conducted a moderated mediation analysis using PROCESS macro Model 14 (Hayes, 2017), using 5000 bootstrap samples. We used the recycling choice (0 = plain cup; 1= Beijing cup) as the dependent variable, place attachment as the independent variable, city image (dirty = 0, clean =1) as the moderator, and product–self connection (toward Beijing cup) as the mediator.

Our results (see Table 2) showed that place attachment increased product–self connection ($b = 0.839$, $se = 0.061$, $t = 13.849$, 95% CI [0.720, 0.958]). In addition, a stronger product–self connection led to more choice of the Beijing cup over the plain cup ($b = 0.331$, $se = 0.125$, $z = 2.649$, 95% CI [0.086, 0.577]). Unlike the AMEs reported by Stata, PROCESS reported the conditional effects – the effect of an independent variable on an outcome at specific values of a moderator. Specifically, our results revealed that the direct effect of product–self connection on recycling choice was significant under the dirty city condition ($b = 0.331$, $se = 0.125$, $z = 2.650$, 95% CI [0.09, 0.58]) but not under the clean city condition ($b = 0.073$, $se = 0.119$, $z = 0.616$, 95% CI [-0.159, 0.305]). Furthermore, the indirect effect of place attachment on recycling choice via product–self connection was significant in the dirty condition ($b = 0.278$, $se = 0.112$, 95% CI [0.073, 0.547]) but not in the clean condition ($b = 0.061$, $se = 0.107$, 95% CI [-0.143, 0.285]). As expected, none of the interaction effects, nor the index of moderated mediation were significant. These results of the conditional effects aligned with the conditional AMEs produced by Stata.

INSERT TABLE 2 HERE

Taken together, these findings provided further support for the boundary condition of city image. That is, place attachment strengthens product–self connection, which in turn increases

the likelihood of recycling the Beijing paper cup, and the indirect effect is moderated by city image, being stronger when the city is perceived as dirty.

9. General discussion

9.1. Key findings

The primary goal of this research was to examine whether and how place attachment, activated by a simple product label, influences consumers' recycling choices. Across five experiments, we demonstrate that consumers attached to a place are more likely to recycle an everyday product (e.g., paper cup) labelled with that place than a plain alternative. More importantly, our findings extend beyond a general identity-congruence model of disposal (Trudel et al., 2016) in three theoretically meaningful ways.

First, we identify place attachment as a *distinct antecedent* to identity-based disposal. Unlike identity connections formed through ownership or brand relationships, place attachment is a pre-existing bond that consumers bring to the product. The place label *activates* and *channels* attachment consumers already possess. Study 1 establishes this baseline effect, while Study 2 shows it operates through product-self connection—a mediator that explains how an attachment to place translates into a connection with a specific disposable object.

Second, we demonstrate that this mechanism operates for low-involvement, mundane products. Prior work on identity-linked disposal has focused on items with inherent identity relevance, such as customised goods or university merchandise (Trudel et al., 2016). We show that even a generic paper cup can become identity-relevant through a minimal cue (a city name) when consumers possess pre-existing place attachment. Studies 3 and 4 further strengthen this

claim by ruling out alternative explanations—product liking and residency effects—that might otherwise account for the observed recycling choices.

Third, and most critically, we identify a boundary condition that diverges from what a general identity-congruence model would predict. Trudel et al. (2016) suggest that negative associations with an object should reduce recycling, as trashing serves to dissociate from a threatened identity. Our Study 5 finds the opposite: exposure to a dirty (vs. clean) city image strengthened *the effect* of product-self connection on recycling choice. Place-attached consumers appear motivated to repair a threatened place, rather than dissociate from it. This points to a unique feature of place attachment—a sense of restorativeness and protectiveness that other forms of identity connection may lack.

In summary, our research provides novel insights into the roles of place labels, place attachment, and product-self connection in recycling behaviour. We show not only that place-attached consumers recycle place-labelled products, but why (product-self connection), for whom (those attached, regardless of residency), and when (especially when the place appears threatened). This moves beyond a simple demonstration of identity-congruent behaviour to specify a unique psychological pathway with distinctive boundary conditions.

9.2. Implications

First, this research advances the literature on sustainable consumption by identifying a novel, identity-based driver of recycling behaviour. In particular, our findings offer contributions to the recycling literature and particularly the recycling of disposable products such as paper cups. Prior studies on paper cup recycling have explored the roles of environmental concern, social norms, and task-specific benefits (Borg et al., 2020; Jacobsen et al., 2022). In our current research, we expand the documentation of antecedents to recycling by introducing the roles of place attachment and product–self connection **activated** by place

labels. Although previous studies have illustrated the effect of place labels on purchase intention (e.g., Chen, 2021), there has been little research on how place labels can influence post-consumption behaviours like recycling, particularly through the lens of place attachment. Our study provides preliminary evidence for the role of a place label in engaging place-attached consumers and fostering recycling. While prior work has focused on environmental concern, social norms (Borg et al., 2020; Jacobsen et al., 2022) and contextual salience such as eco-labels (Elmor et al, 2025), we demonstrate that a subtle place-based cue can effectively engage consumers' pre-existing place attachment to promote stewardship of everyday products. This shifts the focus from general attitudes to contextually resonant, identity-linked nudges in the disposal context.

Our findings also contribute to the literature of place attachment and its role in promoting pro-environmental behaviour. Previous research suggests that fostering a sense of place can positively influence individuals' pro-environmental behaviour (Daryanto & Song, 2021; Scannell & Gifford, 2010). The impact of place attachment on pro-environmental behaviour has been explained by social norm (Soopramanien et al., 2023), empathy with nature (Chen et al., 2024), and pride (Jiao et al., 2023). In our current research, we identify product-self connection as a mediator of the relationship, which has been overlooked in the place attachment as well as recycling behaviour literature.

Thirdly, we use choice experiments to demonstrate the relationship between place attachment and pro-environmental behaviour and thus respond to the call for experimental research methods in place attachment research (Jiao et al., 2023; Lewicka, 2011). Moving beyond priming place attachment in experimental conditions (e.g., Ariccio et al., 2021; Jiao et al., 2023), in our research, we demonstrate how place cues on products could influence place-attached residents' recycling choice.

Lastly, our findings contribute to nudging research. In pro-environmental behaviour research, the concept of nudging, popularised by Thaler and Sunstein (2008), has emerged as a significant theoretical framework for promoting sustainable actions (Wee et al., 2021). Nudging refers to the use of subtle, non-coercive interventions that influence individuals' decision-making processes without restricting their freedom of choice (Thaler & Sunstein, 2008). Among various nudging strategies, cue-based interventions have garnered substantial attention in the literature for their potential effectiveness in promoting pro-environmental behaviours (ElHaffar et al., 2025; Millet & Weijters, 2023). One of the key advantages of cue-based nudging interventions is their low-cost and non-intrusive nature; they work with existing psychological processes, making them more acceptable and likely to be adopted (Szasz et al., 2018). For instance, previous research shows that eco-labels have a nudging effect in promoting eco-friendly food choices (Potter et al., 2021); attentional cues, such as a picture of watching eyes and nature, elicit reputational and ecology-based concerns and reduce littering (Gangl et al., 2022). In our current study, we examine the role of place-cues, specifically the text labels that are linked to a place. We demonstrate that place-based cues can nudge pro-environmental behaviour by making geographic identity salient, thereby enhancing the product-self connection that motivates stewardship actions like recycling. Our results thus add to the nudging literature by highlighting the potential of place-based cues in pro-environmental nudging, offering a novel avenue for designing contextually relevant interventions that resonate with individuals' geographic attachments.

We emphasise, however, that nudges are most effective when embedded within supportive infrastructure. Place-labelling interventions should be paired with clear consumer guidance about local recycling capabilities and ideally implemented in contexts where the targeted products are genuinely recyclable. Without such infrastructure and education, even well-intentioned nudges risk increasing contamination rather than improving environmental

outcomes (Catlin et al., 2021). Our theoretical contribution concerns the psychological pathway underlying recycling choice; translating this insight into practical benefit requires attention to the material realities of recycling systems.

9.3.Limitation and future research

Our current research has several limitations that provide opportunities for future research. First, we focused exclusively on paper cups. While they offer methodological advantages—ubiquity, easy standardization, credible place labelling—the proposed mechanism should generalise to other products carrying place cues (e.g., bottles, takeaway containers). Future research should test this across diverse categories. Second, our experiments used hypothetical choices between cup images. These captures stated preferences through concrete selection—stronger than abstract intention scales—but lacks real-world consequences. Actual recycling involves effort, infrastructure, and soiled objects (Donnelly et al., 2023). Study 5 begins addressing one such factor (place image), but field experiments in actual cafés, manipulations of bin proximity, and tests of cup condition are needed. Third, most paper cups are polyethylene-lined and unrecyclable in many municipalities. Increasing recycling choices for non-recyclable items could exacerbate contamination (Catlin et al., 2021). Thus, place-label nudges should be paired with consumer education about local recyclability and, where appropriate, investments in infrastructure. Our theoretical contribution concerns the psychological pathway underlying choice, not the technical recyclability of specific materials. Fourth, we used city names as place labels, but place attachment operates at multiple geographic scales—nations, regions, neighbourhoods. Future research should examine whether effects generalise across scales, or whether scale moderates the mediating role of product-self connection. Fifth, our studies used Chinese consumers. Replication across cultures with different recycling infrastructures and place meanings is essential. Similarly, we focused

primarily on residents; future research should examine whether effects hold for tourists, for whom place attachment may differ in nature and intensity (Daryanto & Song, 2021). Sixth, we used text-only labels for processing fluency (Jaud & Melnyk, 2020). Future research should explore whether image-based or combined formats moderate the effect. Finally, while our focus was on the psychological mechanisms of place-label nudges, future research should compare the relative effectiveness of place-label nudges and other recycling interventions, such as charitable incentives (Donnelly, Mertens & Sintov, 2024), identify differences in their impact on recycling behavior, and investigate their potential interaction effects—including whether they complement or compete with one another, and under what conditions their combined application yields stronger outcomes than either intervention alone.

Conflict of interest: We have no known conflict of interest to disclose.

Ethics approval and consent to participate: The study was approved by the Research Ethics Committee of the corresponding author's university.

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