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Predicting Individual Residential Engagement: Exploring the Role of Perceived Residential Environmental Quality, Descriptive Norms, Problem Awareness, and Place Attachment

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Abstract

This paper builds on place theory and the psycho-social approach to the study of perceived residential environmental quality to examine the relationship between environmental perceptions and residential action in the neighborhood. An exploratory study on (N = 185) Italian respondents assessed the role of perceived residential environmental quality (i.e., perceived quality of green areas and perceived maintenance levels within the neighborhood), awareness of neighborhood environmental problems, neighborhood descriptive norms, and place attachment (attachment to the neighborhood) as predictors of self-reported individual residential engagement (engagement in improving the environmental quality of the neighborhood). Likert-type measures of the corresponding constructs were included in a structured questionnaire and used to carry out an online survey. Findings showed problem awareness and descriptive norms to directly predict residential engagement. Problem awareness mediated the relationship between perceived maintenance levels and residential engagement. Place attachment was directly predicted by perceived residential quality (quality of green areas), but did not show an independent predictive power *vis-à-vis* residential engagement. Results suggest new possible research avenues for modelling the individual commitment to improve the environmental quality of one's own residential architectural and green environment.

Keywords: residential action; perceived residential quality; place attachment; local norms; problem awareness

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1. Introduction

Numerous studies have demonstrated that the socio-physical characteristics of the residential environment significantly influence the individual perceived quality of life and satisfaction (for recent discussions see, Refs. [1–8]). Consequently, people often choose residential settings that promise a positive quality of life (e.g., Refs. [9–12]). When the residential environment does not meet these expectations, individuals may consider taking action to address the issue by relocating (i.e., moving to another residential area) (e.g., Refs. [12–19]) or by engaging in behaviors aimed at enhancing the quality of their residential area. However, the latter type of action has been less frequently examined in empirical research.

Most investigations to date have been focused on participation in initiatives organized by others (e.g., local authorities, committees, public and private associations and organiza-

tions) and performed at the collective or community level (for reviews, see Refs. [20,21]). In addition, most studies have analyzed actions addressing broad collective issues of general community interest (for a review, see Ref. [22]), with a focus on older adults' participation in local public initiatives [23]. Little attention has been dedicated to the factors driving personal initiatives by the general population (i.e., the possible individual actions people may directly undertake) to enhance specific socio-physical features of their local residential environment or neighborhood.

Furthermore, most research to date has emphasized the role of broad social factors at the collective or community level, such as sense of community, trust in institutions, community cohesion, and others [22] (see also Ref. [24]). Few studies have explored how the perceived socio-physical characteristics (e.g., street lighting, green spaces, walkability, etc.) of a neighborhood (defined here as a socio-physical area—or place—of the city with a perceived characterizing identity, distinguished from other areas of the same city) (for reviews of the concept, see Refs. [25–27]; for discussions on neighborhood perception, see Ref. [28]) can influence individual residential engagement (defined here as the individual commitment to actions aimed at improving the quality of one's neighborhood environment). Moreover, we know little about the extent to which the effect of these factors may be moderated or mediated by specific personal factors at the local level, such as place attachment (e.g., Ref. [29]), problem awareness (e.g., Ref. [30]), and local descriptive norms [31,32].

In addition, few studies have attempted to assess whether the same factors can be integrated into a comprehensive model of individual residential engagement.

The present paper aims to discuss all these gaps, while presenting some preliminary evidence of the opportunity to open new research avenues on the topic. More specifically, building on the tenets of *place theory* [33–35], and the social psychological approach to the study of neighborhood perceived quality (e.g., Ref. [28]), we aimed to lay the ground for the development of a conceptual model linking socio-physical perceptions, place attachment, problem awareness, and descriptive norms to individual residential engagement.

1.1. Place Theory and Residential Perception

Formulated during the 1960s and 1970s, place theory (e.g., Ref. [33]; see also Ref. [34]) sought to challenge and transcend the deterministic paradigm that had long dominated the studies on the environmental influence on human behavior. At the time, prevailing assumptions portrayed individuals as passive users of physical settings, with such environments conceived merely as engineering or architectural objects, designed to serve a particular, universally comprehensible function—a notion well synthesized by the slogan "form follows function" [35]. In contrast, place theory viewed individuals as active agents within their environments, whose actions were the result of their personal interpretation and experience of the settings (whether these be rooms, buildings, cities, or natural landscapes). The meanings and purposes that people ascribe to places, together with the specificities of the normative frameworks that regulate socio-spatial interactions, were all included in the concept of place, defined as "an aspect of experience . . . distinct from a mere space or location" [35] (p. x), "within which activities and physical form are amalgamated" [35] (p. 71). Place, in this view, has three broad fundamental components:

- The physical form and properties, pertaining to the objective characteristics and physical parameters of the environment, such as structure, scale, geographical location, boundaries, nomenclature, toponymy, etc.—as well as the physical amenities and affordances available within the setting;
- The activities, actions, and behaviors encompassing the range of actions and behaviors intended for (or enacted within) the place, the goals and intentions that underpin them, and the rules or normative expectations that are socially constructed within that context;
- The conceptualizations and meanings, referring to the distinctive ways in which individuals interpret and make sense of a place, integrating personal experience with socio-cultural meanings, and the personal emotional responses associated with that place (e.g., affective responses, place attachment, etc.).

Crucially, place theory foregrounded the inherent dynamism of places, which were continually renegotiated through the personal and social interactions occurring within them [34,35].

One of the key implications of place theory for urban planning at all scales has been a growing recognition that divergences may emerge between experts' and users' perceptions and conceptualizations of the same environments (places). This has highlighted the necessity to include the analysis of users' perceptions (cognitions, emotions, and behaviors) in the planning process. Moreover, the theory highlighted the necessity to develop theoretical, methodological, and predictive models capable of translating the broad conceptualizations of place theory into practical guidelines for planners and designers (for recent applications, see e.g., Ref. [36]).

It is to this broad theoretical framework that the research into perceived residential environmental quality can be naturally linked, in many ways.

1.2. The Perceived Residential Environmental Quality Indicators

Several studies carried out in urban contexts have demonstrated the importance of integrating experts' technical evaluation of residential environmental quality with citizens' subjective point of view on the same issue (for early studies, see Refs. [9,37–41]; for recent discussions, see Ref. [4]). This is because the two types of evaluations may not always (or not completely) coincide, due to the different knowledge bases, experience of places, and priorities to which they may be anchored (e.g., Refs. [42–45]). Consequently, numerous scholars have proposed to accurately identify and measure the crucial factors affecting residents' evaluations of their residential environment, as this could be essential for incorporating citizens' needs and expectations into the urban planning processes (for early discussions, see e.g., Refs. [37,44,46,47]; for more recent discussions, see Refs. [39,43,48,49]). For example, in one of the earliest empirical studies on this topic, Lansing and Marans [44] found residents' perception of (and satisfaction with) neighborhood quality to be related to various specific characteristics of the neighborhood, such as its maintenance, noise, aesthetics, and social interaction levels. Extremely important in this perspective was the notion of quality evaluation as a subjective (rather than objective) phenomenon, reflecting the life experiences of the occupants of a particular urban setting (e.g., Ref. [39]). A few years later, Craik and Zube [37] confirmed that upkeep and maintenance, noise levels, and social ties were strongly associated with neighborhood quality evaluation. They also brought attention to the relevance of other aspects, such as greenery, crime, and safety levels. Crucially, their findings reinforced the idea that evaluations of the neighborhood quality could not be merely described as a direct function of specific objective physical characteristics of such environments. On the contrary, they were the result of a complex dynamic process involving the interaction

among personal (subjective), physical, and socio-cultural factors (see also Ref. [50]). This theorization was later further detailed and clarified within both the place theory (as previously discussed) and the people–environment (or person in environment) transactional theoretical framework (e.g., Refs. [51,52]). All these theorizations revealed to be essential for explaining why similar features of different environments would lead to different evaluative or behavioral responses, depending on the particular circumstances or combination (and relative weight) of the various subjective and objective factors (see also Ref. [39]).

These pioneering studies inspired the work of many other authors in various research areas of social sciences and led to the proposal of dedicated measures of perceived residential quality. For example, Bonaiuto and colleagues [47,53–55] identified 11 dimensions composing their PREQUIs (Perceived Residential Environmental Quality Indexes) scale. The scale was then tested in various national contexts (e.g., Refs. [56–59]), showing acceptable to substantial cross-cultural validity, reliability, and factorial stability. Among the components identified, the perceived presence, quality, and accessibility of green areas (parks, gardens, and natural spaces), the perceived upkeep and care levels, and the perceived safety and healthiness of the neighborhood emerged as factors particularly relevant for assessing the environmental quality of a residential environment (neighborhood).

1.3. Perceived Residential Quality, Well-Being, and Quality of Life

The development of validated measures of perceived residential quality was a prerequisite for the study of the outcomes of such perceptions. Various authors were then able to find positive relationships between perceived residential quality and various other factors (e.g., Ref. [39]), such as individual well-being and perceived quality of life (e.g., Ref. [60]; for reviews, see Refs. [1,3,4,61]), as well as, residential satisfaction [6,17,47,62,63]. These authors were able to demonstrate such associations at both the general and the specific levels, i.e., by examining the relationships among subdimensions of the constructs investigated (e.g., Ref. [60]). However, authors' opinions have tended to differ in terms of the psychological processes explaining such associations (e.g., Ref. [64]). Although various theoretical explanations were put forward, very little empirical evidence was produced to support any of them. For example, Sirgy and Cornwell [65] developed and tested the plausibility of three different theoretical models for explaining how the evaluation of specific features of the neighborhood could eventually influence residents' quality of life and life satisfaction, but only one of them found some empirical confirmation. In particular, the authors determined that the evaluation of particular features of the local environment was related to different domains of residential satisfaction (e.g., neighborhood, housing, home, community), which eventually influenced life satisfaction. Nevertheless, several open issues remained, including possible behavioral implications.

1.4. Behavioral and Normative Implications of Perceived Residential Environmental Quality

Most theorizations have assumed that residential environmental perceptions and satisfactions may lead to relevant behavioral outcomes (e.g., Ref. [39]). However, such an assumption has received comparatively lower empirical attention and support. Most studies to date have focused on assessing the role of environmental perception on citizens' participation in community actions and civic engagement (e.g., Refs. [66–70]), as well as in urban planning initiatives (e.g., Ref. [71]). The studies have testified to the many types of civic actions that people may undertake to improve their local communities [24,72,73]. However, they have typically examined participation in activities organized by external entities, such

as local authorities, committees, or associations. To the best of our knowledge, few studies have explored how the perceived characteristics of a neighborhood can influence individual actions to enhance the environmental quality at a local level, or how these perceptions may be moderated or mediated by specific personal and psycho-social factors.

For example, the majority of the studies have emphasized the role of social factors of a collective nature [22], such as perceived sense of community (for a review, see Ref. [24]), collective efficacy (e.g., Ref. [67]), social trust (e.g., Ref. [74]), and the strength of local social ties (e.g., Refs. [20,66]). However, to the best of our knowledge, no studies have deepened the role of more specific normative factors linked, for example, to the individual perception of the behaviors of other residents in the area. Normative factors like these, also known as 'local descriptive norms' (i.e., the individual perception of what others do; [31,75]) have already been shown to influence specific environmental behaviors at the neighborhood level, such as household waste recycling [32,76]. While it is sensible to expect these factors to also impact individual residential engagement, no empirical evidence has yet confirmed this hypothesis in the context of residential behavior. Such a type of test would also be of help to better understand whether this factor could mediate or moderate the influence of perceived residential quality on residential engagement.

A study by Liu and colleagues [77] provided evidence of an indirect link between perceived residential environmental quality and pro-environmental behavior, mediated by factors such as attitudes, norms, perceived control, and moral obligations. While their study did not specifically focus on the neighborhood level, it suggested that perceived neighborhood environmental quality may, in some circumstances, serve as an indirect rather than a direct predictor of environmental actions. However, to the best of our knowledge, no empirical study has yet validated this hypothesis in the context of individual residential engagement and in relation to other potential predictors of residential action, such as, for example, place attachment.

1.5. Place Attachment, Problem Awareness, and Residential Action

Place attachment has been defined as the emotional bonds people form with places as a result of their affective, behavioral, and cognitive ties (e.g., Refs. [29,78–81]). While numerous studies have highlighted associations between place attachment, perceived residential quality, and/or residential satisfaction (e.g., Ref. [82]), few of them have considered the potential role of place attachment in affecting residential engagement in actions at the local level. However, studies have consistently shown place attachment to be related to community participation and planning (e.g., Ref. [83]). For example, a study in Japan [84] found higher levels of place attachment to be related to particular forms of community activities, such as participation in festivals, meetings, and volunteering. The authors also found the strength of this relationship to be moderated by the 'person-community fit', i.e., it was higher for people whose values (traditional vs. modern) were in line with the characteristics of the community they lived in (rural vs. urbanized). Moreover, the authors suggested a circular relationship between place attachment and community engagement, as place attachment was found to both reinforce and be reinforced by community participation. One could thus wonder whether place attachment may also influence people's willingness to take action to enhance specific features of the residential environment of the neighborhood.

Previous investigations have shown place attachment to be related to pro-environmental actions in terms of civic engagement at the local level (for a review, see Ref. [85]). Positive emotional ties with places were related to "mitigation behaviors" (i.e., behaviors directed at reducing one's own environmental impact on the environment) and to the preservation of local cultural heritage [85]. However, the role of place attachment on other types of community-relevant actions often resulted in more complex or controver-

sial outcomes, as place attachment has been demonstrated to be able to both foster and reduce pro-environmental behaviours at the community level [85]. More specifically, as Carrus et al. [86] (p. 160) put it, "if behaving pro-environmentally is judged by an individual as beneficial for the place s/he is attached to, a positive link between attachment and behaviours is likely to emerge. Conversely, a place-attached individual might not necessarily choose the pro-environmental option, if this is interpreted as negative, or harmful, to the economic well-being of the individual and his/her place of living".

Several authors have, thus, also emphasized the role of individual awareness (or perception) of problems as a key predictor of environmental behaviors, incorporating it into comprehensive models of such behaviors, such as the VBN (Value–Beliefs–Norms) model of environmentalism [30]. However, to our knowledge, the potential influence of problem awareness on the relationship among perceived residential quality, place attachment, and residential action has never been tested before, and it would, thus, deserve to be more deeply explored.

1.6. Goals and Hypotheses

The aim of the explorative study reported herein was to offer a preliminary examination of the role of perceived residential quality, place attachment, descriptive norms, and problem awareness in predicting residential engagement, defined here as the individual commitment to actions aimed at enhancing the environmental quality of one's neighborhood. In particular, we drew the following hypotheses:

H1: *Place attachment (i.e., neighborhood attachment) would positively predict residential engagement (e.g., Refs. [29,79]);*

H2: *Problem awareness would positively predict residential engagement [30,87];*

H3: *Local descriptive norms would positively predict residential engagement [31];*

H4: *Perceived residential quality would positively predict neighborhood attachment and problem awareness.*

By testing these relationships, we also aimed to start the development of a model of residential engagement that incorporated both perceptual and normative factors.

2. Materials and Methods

Data from a cross-sectional online survey (based on a structured questionnaire) were used to test our hypotheses. The participants were asked to respond to a questionnaire administered through the Google Form function during March–April 2021.

2.1. Participants

The initial data set used for our analyses was a convenience sample of 199 participants of Italian nationality recruited using a snowball technique. Respondents were informed of the scientific goals of this study and gave their consent to participate on a voluntary basis. Responses from 14 participants were eventually excluded from our analyses due to incomplete data. Hence, the final data set consisted of 185 participants (113 of whom were female, 61.1%). The majority of participants (64.9%) had completed high school; 21.1% had an undergraduate degree, 8.6% a graduate degree, and 3.2% a postgraduate degree. Half of the participants (48%) were university students, and the majority of them were residents of Rome (75%). Age range was 18–75 years (M = 30.92; SD = 15.07).

The sample size was determined using G*power 3 [88]. To ensure a statistical power of 0.80 (80% probability of detecting a true effect if it existed) and using a significance level

(α) of 0.05, the required sample size was calculated to be approximately 74 participants. Hence, our final sample size provided sufficient power to detect the hypothesized effects and ensure robust and reliable findings within the specified parameters.

2.2. Measures

The questionnaire contained measures of the factors being investigated (i.e., perceived environmental residential quality, problem awareness, descriptive norms, place attachment, and self-reported residential engagement) in the form of Likert-type scales using 5-point response scales. The factors investigated were measured as follows (see Table 1 for detailed item descriptions):

- *Residential Engagement* (RES ENG: actions to improve neighborhood's residential quality) was measured through 11 ad hoc built items (since no validated scale for this construct existed in the literature), presenting a list of particular environmental problems at the neighborhood level (e.g., streets lacking maintenance, dirty sidewalks, ineffective garbage collection service, clogged drains, etc.), and preceded by the following sentence: "Please indicate how often (this year) you have engaged in actions to enhance/change the following problems of your neighborhood". The neighborhood problems included in this measure were identified and selected from two subscales (*Green Areas* and *Upkeep and Care*) of Bonaiuto and colleagues' [53] PREQUIs (Perceived Residential Quality Index; see more details on this scale below). Since such issues were shown to affect the individual perception of a neighborhood's quality, we thought that they could also represent aspects on which people might want to engage to improve their neighborhood. Responses ranged from 1 (not at all) to 5 (very much). We will refer to it as the Residential Engagement Scale (RES) [89];
- *Perceived residential quality* was assessed through the same two subscales from Bonaiuto et al. [53] (see also Ref. [55]) of the PREQUIs that inspired the construction of the RES scale. These are, namely, *PREQUI-Green Areas* (GA,10 items) and *PREQUI-Upkeep and Care* (U&C, 12 items). The instructions introducing these scales were as follows: "Below is a list of statements concerning your neighborhood. Please indicate how much you agree or disagree with them". Responses ranged from 1 (strongly disagree) to 5 (strongly agree);
- *Residential (neighborhood) attachment* was measured through 8 items composing the *Neighborhood Attachment Scale* (NAS) [53]. This scale measures place attachment in terms of the inclusion of the neighborhood in the self, the perceived level of integration, and the desire not to leave the current place of residence. Responses ranged from 1 (strongly disagree) to 5 (strongly agree);
- *Awareness of neighborhood environmental problems* was measured using another ad hoc scale [89] composed of 11 items, which we will refer to here as the *Problem Awareness Scale* (PAS). Participants were asked to indicate the extent to which they believed their neighborhood was affected by the same list of specific environmental problems mentioned in the RES scale. Responses ranged from 1 (not at all) to 5 (very much);
- *Descriptive local norms* (DLN) regarding the neighborhood were measured using items referring to the same 11 neighborhood issues mentioned in the RES and the PAS scales [89]. However, in this case, participants were asked to estimate (and report) the approximate number of people they knew in their neighborhood who were personally engaged in addressing such issues.

Table 1. Eigenvalues (λ), Cronbach's Alpha (α), Means (M), Standard Deviations (SD), and Factor loadings (*Loads*) for the items of all scales considered in the analyses.

Scale/Items	λ	α	M	SD	*Loads*
Residential Engagement Scale (RES)	*5.63*	*0.90*			
1. Clogged manholes when it rains			1.68	1.14	0.79
2. Trees cut without acknowledging the reason			1.71	1.15	0.79
3. Unpruned and unkept trees			1.78	1.20	0.73
4. Green areas (parks) unkempt			2.34	1.33	0.69
5. Unkept streets			1.81	1.16	0.68
6. Separate waste collection service malfunctioning			2.50	1.47	0.68
7. Street garbage cans overflowing			2.56	1.48	0.67
8. Garbage on the streets (bags of garbage in one or more neighborhood streets)			2.84	1.44	0.65
9. Dirty sidewalks			2.75	1.36	0.64
10. Problems with public transportation			1.96	1.24	0.61
11. Separate garbage collection not done by everyone			3.15	1.34	0.51
PREQUI-(GA) Green Areas	*4.76*	*0.88*			
1. There are enough green areas			3.55	1.28	0.75
2. Going to park means travelling to other parts of the city (*R*)			4.17	1.22	0.73
3. There are green areas for relaxing			3.94	1.21	0.72
4. The green areas are too small (*R*)			3.18	1.28	0.69
5. There is no park where children can play freely (*R*)			3.91	1.02	0.68
6. Green areas are in good condition			2.98	1.18	0.64
7. There is at least a garden/park where people can meet			4.08	1.12	0.61
8. Many green areas are disappearing (*R*)			3.36	1.30	0.59
9. Most green areas are closed to the public			4.26	1.06	0.52
10. The green areas are well-equipped			2.71	1.17	0.48
PREQUI-U&C (Upkeep and Care)	*4.16*	*0.82*			
1. Residents avoid dirtying the places			2.54	0.98	0.68
2. Residents show care for their neighborhood			2.64	1.04	0.61
3. Many buildings are in poor condition (*R*)			3.19	1.11	0.61
4. Streets are regularly cleaned			2.68	1.17	0.55
5. Residents do not respect the environment (*R*)			2.72	1.04	0.54
6. There are too many abandoned areas (*R*)			3.39	1.19	0.54
7. Street lighting is often insufficient (*R*)			3.16	1.10	0.54
8. There are signs of incivility on too many walls (*R*)			3.14	1.31	0.49
9. There are too many holes in the neighborhood streets (*R*)			2.20	1.08	0.49
10. Cars are parked properly			2.65	1.27	0.48
11. Road signs are well-kept			3.38	0.95	0.46
12. The refuse collection service is efficient			2.69	1.28	.43
Neighborhood Attachment Scale (NAS)	*5.21*	*0.92*			
1. It would be very hard for me to leave this neighborhood			3.20	1.37	0.84
2. I would willingly live in another neighborhood (*R*)			3.20	1.25	0.80
3. This is the ideal neighborhood for me			3.21	1.13	0.78
4. This neighborhood is by now part of me			3.72	1.19	0.79
5. I have nothing in common with this neighborhood (*R*)			3.95	1.14	0.76
6. I do not feel integrated in this neighborhood (*R*)			3.69	1.18	0.75
7. I recognize myself in the people of this neighborhood *			2.81	1.18	0.76
8. I do not subscribe to this neighborhood's lifestyle (*R*)			3.26	1.25	0.70
Problems Awareness Scale (PAS)	*5.33*	*0.89*			
1. Separate garbage collection not done by everyone			3.66	1.26	0.76
2. Garbage on the streets (bags of garbage in one or more neighborhood streets)			3.37	1.33	0.74
3. Street garbage cans overflowing			3.72	1.33	0.73
4. Dirty sidewalks			3.80	1.14	0.72
5. Separate waste collection service malfunctioning			3.29	1.39	0.68
6. Unpruned and unkept trees			2.89	1.13	0.68
7. Unkept streets			3.74	1.08	0.68
8. Clogged manholes when it rains			3.21	1.28	0.63
9. Green areas (parks) unkempt			3.01	1.16	0.58
10. Problems with public transportation			3.25	1.31	0.51
11. Trees cut without acknowledging the reason			2.86	1.31	0.47

Table 1. *Cont.*

Scale/Items	λ	α	M	SD	Loads
Descriptive Local Norms (DLN)	*6.77*	*0.92*			
1. Separate waste collection service malfunctioning			3.56	10.32	0.89
2. Garbage on the streets (bags of garbage in one or more neighbordhood streets)			5.09	17.21	0.85
3. Trees cut without acknowledging the reason			2.18	7.86	0.85
4. Street garbage cans overflowing			3.88	16.45	0.83
5. Green areas (parks) unkempt			6.70	19.55	0.79
6. Separate garbage collection not done by everyone			4.33	10.56	0.78
7. Unpruned and unkept trees			2.83	8.11	0.77
8. Dirty sidewalks			4.59	11.54	0.75
9. Clogged manholes when it rains			1.76	6.62	0.69
10. Problems with public transportation			2.71	7.24	0.59
11. Unkept streets			3.69	9.71	0.51

Note: For all scales—N = 185; (R) = Reverse Scored item; * new ad hoc item.

The questionnaire also included items to assess participants' age, gender, and education, as well as other factors not included in the present analysis, which will be (or have been) discussed in other papers.

3. Results

3.1. Data Analysis

First, Exploratory Factor Analyses (EFA) using Principal Axis Factoring (PAF) were carried out on each scale to assess the internal structure of all measures. Aggregated variables for all factors were then computed by averaging responses of the corresponding items. Cronbach's alpha was used to assess the internal consistency of measures. Pearson's r was used to explore bivariate correlations among all factors. Finally, a path analysis, based on Structural Equation Modelling (SEM), was conducted using AMOS to test all our hypotheses regarding the predictive power of PREQUIs on place attachment and problem awareness, as well as the predictive power of the latter (and descriptive norms) on residential engagement.

3.2. Measures Dimensionality and Reliability

3.2.1. Principal Axis Factoring (PAF)

PAF analyses confirmed the plausibility of a unidimensional solution for each and every one of our measures. The items of the RES, PAS, PREQUI-GA, PREQUI-U&C, DLN, and NAS explained, respectively, 46.46%, 43.58%, 42.02%, 28.81%, 58.83%, and 60.16% of the respective overall variances. Descriptive statistics, eigenvalues, factor loadings, and Cronbach's alpha for all measures are reported in Table 1.

3.2.2. Descriptive Statistics and Bivariate Correlations

Bivariate correlations (see Table 2) clearly supported our main hypothesis of an association between PAS and DLN, on the one hand, and RES ENG, on the other. As expected, PAS was correlated with PREQUI-GA and PREQUI-U&C. Contrary to our expectations, NAS was not correlated with RES ENG. However, consistent with the previous literature, it was correlated with both PREQUI-GA and PREQUI-U&C. Particularly relevant to notice was a low, but statistically significant negative (inverse) correlation between NAS and neighborhood problem awareness, suggesting that more attached people perceive fewer environmental problems.

Table 2. Means (*M*), Standard Deviations (*SD*), and bivariate correlations among the factors considered in this study.

	M	***SD***	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1. PREQI-GA (green areas)	3.61	0.83	1	0.39 **	−0.26 **	0.10	0.56 **	0.01	−0.07	0.04
2. PREQI_U&C (upkeep and care)	2.87	0.66		1	−0.83 **	0.02	0.30 **	−0.15 *	−0.05	−0.06
3. Problem Awareness (PA)	3.33	0.86			1	0.03	−0.18 *	0.24 **	−0.03	−0.01
4. Descriptive Local Norms (DLN)	3.77	8.97				1	0.17 *	0.26 **	0.01	0.03
5. Neighborhood Attachment (NAS)	3.38	0.98					1	0.10	0.02	0.14 *
6. Residential Engagement (RES ENG)	2.27	0.93						1	0.06	0.05
7. Education	2.46	0.81							1	0.15 *
8. Age	30.92	15.07								1

Note: $N = 185$; * $p \leq 0.05$; ** $p \leq 0.01$.

Moreover, it is worth noticing how PREQUI-GA was more strongly related to place attachment than PREQUI-U&C, while PREQUI-U&C was more strongly related to problem awareness than to PREQUI-GA.

Age and education showed a low but statistically significant correlation only with NAS, consistent with previous studies. No statistically significant differences in response means were found for gender, except for PREQI-U&C ($t = 2.083$; $p = 0.039$), indicating that women in our sample (M = 2.94; *SD* = 0.69) showed slightly higher perceived maintenance levels than men (M = 2.74; *SD* = 0.60).

3.2.3. Structural Equation Modelling (SEM)

The Structural Equation analysis, which tested the direct paths from PREQUI–GA and PREQUI–U&C to PAS and NAS, as well as the effects of PAS (and Descriptive Norms) on RES ENG, showed good fit indexes ($\chi^2_{(18)} = 20.178$; $p = 0.323$; RMSEA = 0.03; SRMR = 0.05; CFI = 0.99; NNFI = 0.99), thus confirming our hypotheses (H2, H3, and H4) regarding the relationships among these factors. However, although PREQUI-GA correlated with PAS, and PREQUI-U&C correlated with NAS, they did not show an independent effect on these factors. These paths confirmed that the two types of residential environmental perception may play different roles in the prediction of outcome factors such as problem awareness and place attachment. The path from NAS to RES ENG was non-significant, thus confuting our H1. The final model is presented in Figure 1. No statistically significant (direct or indirect) effects of gender, age, or education on the independent variable were detected. However, as anticipated by the descriptive analyses, age predicted NA, while gender correlated with PREQUI_U&C.

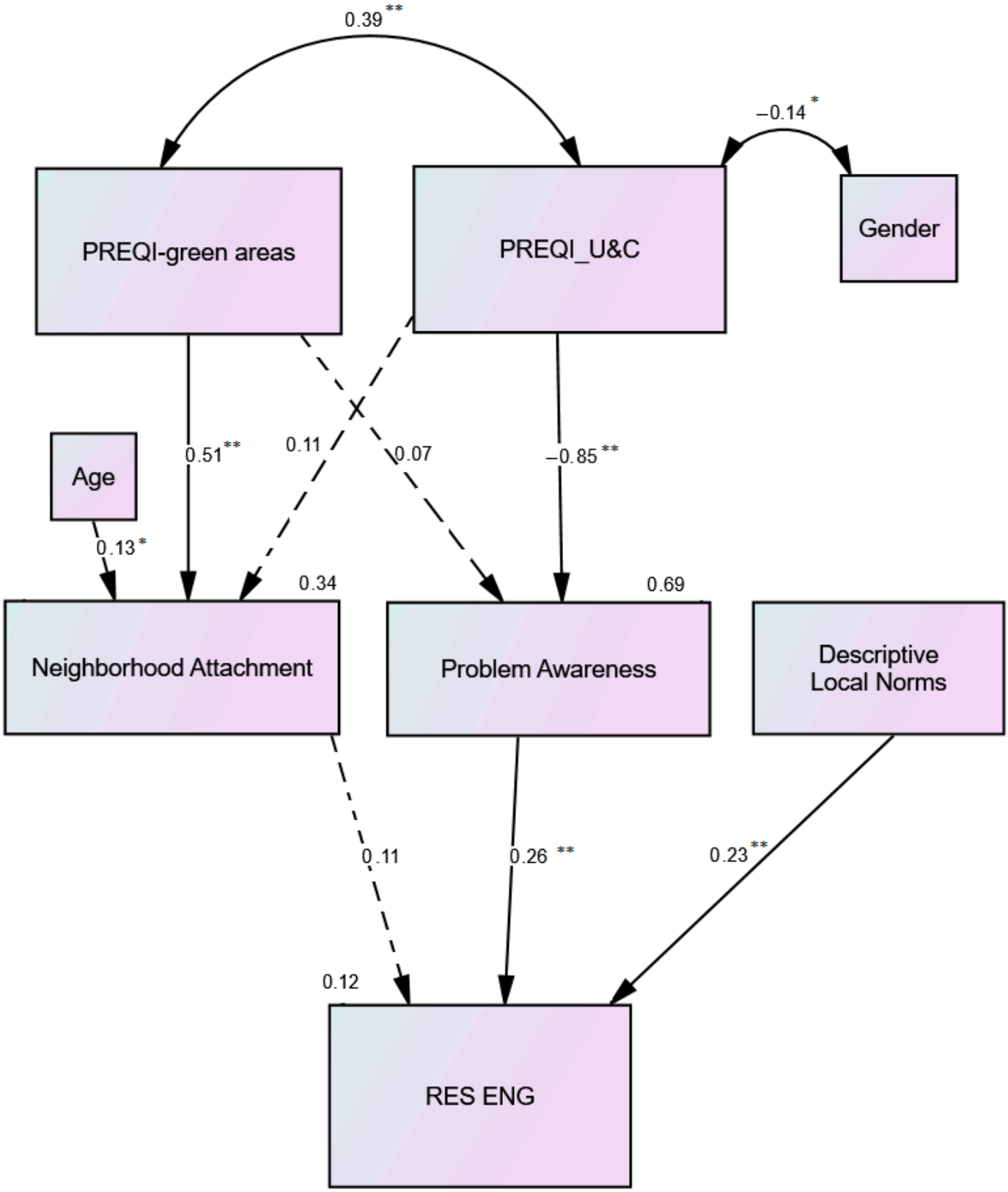

Figure 1. Model of Residential Engagement. Note: * $p < 0.05$; ** $p < 0.001$; dashed lines indicate non-significant paths; standardized estimates are reported in the paths; estimates without asterisks are non-significant; squared multiple correlations are reported for the endogenous and dependent variables.

4. Discussion

This exploratory study aimed to examine some of the potential determinants of individual residential engagement at the neighborhood level, laying the groundwork for the future development of a model of individual residential action in the neighborhood context. In particular, we were interested in deepening the role of some socio-psychological factors (namely, perceived residential environmental quality, place attachment, local descriptive norms, and problem awareness) as potential predictors of the individual's willingness to engage in behaviors that could enhance the environmental quality of one's residential neighborhood. In this sense, we aimed to expand the results of the previous literature on perceived residential environmental quality indicators, which had, so far, dedicated limited attention to the behavioral outcomes of residential quality evaluation. The general goal of our study was thus to shed more light on some of the processes through which the evaluation of the social-physical characteristics of the neighborhood may influence individual behaviors, and, particularly, those behaviors directed at enhancing the environmental quality at a local level.

First, our results confirm previous findings that perceived residential environmental quality may act more as an indirect than a direct predictor of individual residential action, and that it is directly related to place attachment. Moreover, our data confirm the perceived quality of green areas to play a prominent role in predicting place attachment, while the perceived maintenance and service levels of a neighborhood resulted, in this particular case, as a better predictor of problem awareness. While the latter result could be due to a greater consistency in the corresponding measures, the former deserves particular attention as it would indicate that the perceived quality of green areas tends to be more strongly related to the individual attachment to residential places.

Second, our results add to the existing literature by suggesting a mediating role for problem awareness in the relationship between perceived environmental quality and residential engagement. This implies that the perceived quality of the residential environment can motivate a person to take action only if it is recognized as problematic. Future studies should, thus, attempt to increase our understanding of what may foster or moderate such awareness. For example, our data confirm that place attachment could play a role in this process. Indeed, we found a low (but statistically significant) negative correlation between place attachment and problem awareness, indicating that, in some circumstances, people highly emotionally attached to their neighborhood of residence may also be led to minimize the seriousness of the problems affecting it. This result seems consistent with the previous literature showing place identity (a factor strictly related to place attachment) to lead people to overlook the environmental problems of local beaches [90] as well as with studies showing how place attachment could either foster or limit environmental action regarding one's own residential areas, depending on the particular way issues were interpreted by citizens [86]. It is also consistent with research indicating that higher levels of place attachment are related to the perception of lower levels of incivility and crimes in one's neighborhood [91] as well as to rejecting place changes in general [92]. Our data are, thus, consistent with the existing literature and may explain why, contrary to our expectations, place attachment did not correlate with (and did not directly predict) residential engagement in this particular case. In turn, this also suggests that more studies are needed to deepen the complex role that place attachment may play in urban residential actions.

Our results also add to the existing literature by producing some preliminary evidence of the influence of local descriptive norms on self-reported residential actions at the neighborhood level. This factor has already been shown to affect pro-environmental behaviors at the neighborhood level (e.g., Refs. [31,32]), while it has been overlooked by the literature on civic engagement. Our study suggests that the perceived behavior of people living in

the immediate surrounding environment may directly influence environmental behavior rather broadly by also affecting their residential engagement.

All in all, despite its preliminary nature, our study brought some new insights into some of the possible determinants of individual residential engagement at the neighborhood level and showed that it was possible to draw a model of the inter-relationships among the factors involved in this complex type of processes.

Such findings can also have important practical relevance for public policies directed at promoting residential engagement. Most investigations on the topic have so far pointed out the role of factors at the community level (associative/institutional) and the importance of implementing strategies directed at strengthening social ties (e.g., Ref. [22]). However, recent investigations in pro-environmental behaviors have shown that not all people are sensitive to these types of strategies, and that, in some cases, actions at the community level may be promoted by leveraging particular types of self-centered motivations or values as well ([93,94] (see also Ref. [95])). This could be particularly relevant in the case of urgent actions (for example, for health, security, or safety problems) often needing a rapid active response by the population. More in general, our results confirm that we could and should deepen individual motivations in the case of residential engagement also, as they could increase policy makers' ability to enhance community participation even among people (or social contexts) where, for some reasons, self-centered (individualistic) factors tend to prevail in the decision-making processes [96–99].

Limits of This Study

This investigation presents several limitations that need to be discussed.

First of all, the model proposed here is clearly in the early stages of development. The factors considered in this study manifestly represent only a portion of the possible predictors of residential engagement. Future research could seek to expand the model by incorporating other potential predictors, such as, for example, well-known determinants of neighborhood collective action. These may include, for instance, trust in institutions, sense of community, and perceived personal and/or collective efficacy. The impact of the normative influence from local collective associations (religious and non-religious), as well as the institutional prescriptions and practices regarding the city environment, together with crime rates, could also be included in new tests of the model. More generally, a model combining individual and community-based motivations could indeed provide a better understanding of local contexts, thus enhancing its practical relevance.

Moreover, the relatively small sample size, the convenience sampling methods adopted, and the particular demographic composition eventually obtained (including a majority of women, students, and residents of Rome city) may have limited the generalizability of the findings to other socio-physical contexts and sector of the populations and call for future studies with broader, more heterogeneous, and more representative samples of the population.

Furthermore, while our study was implicitly focused on urban neighborhoods, it did not include urbanization and urbanicity levels (e.g., Refs. [100–103]) as design variables. Future studies could, thus, evaluate whether the model holds validity in samples of people living in different types (and sizes) of urban contexts or when confronting rural–urban residents' responses. However, researchers will have to bear in mind that recent investigations have suggested the necessity to study these types of factors using greater caution than in the past [104,105]. This is because, in many cases, it could become very difficult to distinguish their effects from those of other co-related factors (e.g., culture, gentrification, social networking, etc.), all of which could be strongly rooted in the socio-physical places examined.

In addition, some studies indicated that the perceived quality of the urban environment may vary substantially across neighborhoods [5], while others highlighted that the evaluation of city neighborhoods tends to occur on a comparative basis, that is, by confronting its qualities with those of other areas/neighborhoods of the city [5,47]. These aspects, too, could be evaluated by future investigations.

Future studies could also dedicate greater attention to assessing the relationship between actual (directly observed or observable) and self-reported residential engagement. The focus on the latter, as in the case of our investigation, might have limited the potential of this and the other studies on this topic to fully seize the actual boundaries of the phenomenon and its correlates. It is, thus, likely that the use of more sophisticated methodological approaches to measure residential engagement could, in the future, play a relevant role in shedding more light on these phenomena. Particularly, it could be relevant to incorporate more objective behavioral measures, such as direct observations, or triangulation with passive data (e.g., like in the spontaneous social media activity) [106].

5. Conclusions

In sum, despite its explorative nature and generalizability limitations, we believe that this paper presents several aspects of novelty:

- It discusses the personal determinants of residential engagement (often neglected by the existing literature);
- It brings some initial insights regarding the processes through which such factors might affect individual behavior (identifying potential direct and indirect pathways);
- It suggests the importance of understanding personal factors along with collective ones for designing more effective policies (because not all people are sensitive to community-based strategies alone).

More generally, while some particular outcomes (especially regarding place attachment) remain complex to understand and deserve further attention, others suggest promising avenues for theory-building and practical interventions.

In particular, the finding that perceived residential environmental quality could act more as an indirect predictor, primarily through its relationship with problem awareness, offers a more nuanced understanding than the simple direct-effect models often seen in previous research. The identification of problem awareness as a potential key intervening factor, if confirmed by future studies, could revea revealparticularly valuable. It would advance the notion that perceiving one's environment as of high vs. low quality could not be sufficient to inspire engagement; people must also recognize existing issues as needing attention.

Another important contribution is the preliminary evidence supporting the influence of local descriptive norms on residential engagement. While this factor has been explored in the context of pro-environmental behavior, its extension into civic and residential engagement is quite a novelty. The finding that the observation of others' behavior (in the neighborhood) can influence one's own engagement levels highlights the importance of focusing on visible community participation and social modeling processes in promoting individual residential action.

Finally, our results were successful in showing that a better understanding of factors at the individual level could and should be reached, for example, in order to identify new strategies for addressing participation defection (as well as apathy and inaction) from particular types of individuals (not responding to community-based strategies). It could also be of help for understanding residential engagement in individualistic cultures and/or within particular city neighborhoods, where individualistic perspectives might tend to root.

Future studies could, thus, build on these insights by refining the model, testing it with broader and more heterogeneous samples of the population, confronting it in relation to different urbanicity factors, and by exploring how the broader social, physical, and institutional contexts may combine to shape individual engagement at the neighborhood level.

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Institutional Review Board Statement: The authors declare that the study described herein was carried out by complying with the Ethical Code of Sapienza University (D.R., n°1636, 23/5/2012; Prot. N° 0032773) and that the research was also in line with Sapienza New Ethical Code (D.R., n. 3430/2022, prot. 107441 of 28 November 2022). However, this study was not subject to a binding opinion from an ethics commission, as this is not mandatory for this type of research, based on Sapienza regulations.

Informed Consent Statement: Respondents participated on a voluntary basis; prior to start responding the survey, a sentence introduced them to the general goals of this study, informed that their responses were collected on an anonymous format (with only basic socio-demographics recorded), that they could withdraw at any moment, and request their responses to be excluded from the survey. They were given full details of the researcher responsible for data curation and references for contacting them at any moment. They were informed that their responses were to be treated (and results published) in an aggregated form, and were to be used for scientific purposes only. They were informed that by starting to respond to the questionnaire, they automatically agreed to participate in this study.

Data Availability Statement: Data is available from the corresponding author upon request.

Conflicts of Interest: The authors declare no conflicts of interest.

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