

# Article Beyond Permanent Residences: Measuring Place Attachment in Tempo-Local Housing Arrangements

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Abstract: Current societal shifts, including increased mobility, advances in information technologies, and diverse lifestyles, are driving postmodern housing arrangements that prioritize mobility and flexibility. The traditional view of housing as fixed and stable is evolving to encompass temporary forms, including multi-locality, which are often underestimated due to measurement challenges. Recognizing and integrating the potential of transient populations into urban societies is crucial to enhancing community cohesion and reducing social fragmentation. Therefore, the development of rootedness, emotional connection, and spatial identity should be analyzed in the context of temporary housing practices. Data collected through a representative survey in two major German urban regions in 2023 enable the validation of a four-dimensional place attachment scale, which includes the dimensions of place identity, place dependence, ambient bonding, and social bonding. Each dimension includes distinct elements of place-making constructions. The classification of four tempolocal housing types serves as the foundation for measuring how the temporal and spatial structure of housing arrangements influences emotional attachment to one's place of residence. Interestingly, spatial mobility, when paired with temporal stability in each location, can cultivate deep connections, revealing an often-overlooked potential within this group. The results emphasize the significance of incorporating spatio-temporal dimensions of housing to foster inclusive, comprehensive, and diverse urban development.

**Keywords:** temporality; multi-locality; housing dynamics; validation; empirical testing; classification; urban regions; community development

# 1. Introduction

Current societal shifts, such as individualized and diverse lifestyles, advancements in information and communication technologies, and increasing mobility demands, are contributing to the rapid pace of social transformation significantly impacting housing practices [1]. The findings of phenomenological research suggest that traditional housing practices, which are characterized by permanence and often tied to a fixed location, are expanding to accommodate new forms of residence [2,3]. Temporary housing arrangements are increasingly prevalent due to individuals seeking customized and self-directed lifestyles, reflecting a shift toward postmodern living and housing norms. Such arrangements include housing types with an envisaged endpoint as well as multi-local living arrangements involving the regular use of two or more places of residence. Today, these lifestyles are practiced across various social strata in many societies, making them a widespread phenomenon [4].

Sheller and Urry [5] previously addressed the shifting dynamics and structures of mobility in their New Mobilities Paradigm, which provides a theoretical framework for understanding the complex and layered forms of movement in contemporary society. In light of these developments, there has been a growing interest in theoretical and empirical studies that specifically examine the concept of emotional belonging in the context of



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**Copyright:** © 2024 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https:// creativecommons.org/licenses/by/ 4.0/). mobile living realities. However, this area of research is still in its early stages and primarily emphasizes multi-local living arrangements [6,7].

Several concepts explore the emotional connection people have with their living spaces. While both place attachment and emotional attachment describe similar aspects of bonding to places, place attachment pertains to the cognitive and emotional connection arising from interactions with the physical environment. Conversely, emotional attachment places greater emphasis on individual emotional reactions and the resulting appreciation of a place or object [8,9]. Approaches that measure place attachment provide a robust framework for exploring the intricate connections individuals form with a particular place [10]. This paper takes a comprehensive approach by considering the multiple aspects of these concepts.

By examining theoretical concepts that explore various temporalities in contemporary housing practices, particularly in light of the increasing prominence of place-based belonging, a more nuanced understanding of how individuals establish emotional connections and a sense of home can be developed. Previous research on the effects of specific housing and living arrangements has predominantly employed qualitative approaches, e.g., [11]. These methods have been instrumental in exploring the depth and complexity of individual emotional experiences. However, while qualitative methods provide rich detail, they are often limited in terms of generalizability and the ability to capture broader patterns across larger populations. A quantitative approach, in contrast, enables the statistical measurement of variables related to place attachment. This method allows for the identification of specific correlations that can help describe causal relationships, which may not be as evident in qualitative studies. The empirical component of this study is based on data collected in 2023 using a standardized survey instrument. Through this tool, four distinct housing types are defined, distinguished by their spatio-temporal structure. Drawing from Raymond et al. [10], place attachment is measured using four dimensions—place identity, place dependence, ambient bonding, and social bonding-comprising a validated scale. Building upon this data-driven model, the study examines the impact of the temporal and spatial structure of housing situations on the formation of emotional connections to urban living spaces. Building upon this data-driven model, the study examines how the temporal and spatial structures of housing situations impact the formation of emotional connections to urban living spaces. Specifically, the overarching research question guiding this investigation is the following: how do different types of housing, each with its own unique spatial and temporal characteristics, differ quantitatively in fostering emotional attachment to one's place of residence?

This aligns with Blunt et al. [12], who states that "Both home and the city have been important sites for conceptualizing the interconnections between space and time". The work aims to establish a robust framework for understanding emotional connections within temporary housing contexts before delving into the nuances of socio-demographic influences in subsequent research.

## 2. Theoretical Framework: Temporalities and Home

# 2.1. The Temporal Structure of Housing Arrangements

The theoretical premise of time geography, based on Hägerstrand's [13] research, highlights the inseparable link between space and time. According to this concept, individuals move along distinct trajectories within the space–time continuum while simultaneously being bound by spatial-temporal constraints. These constraints shape certain practices, which, according to Bourdieu [14], are within time and generate temporalities. Within this framework, housing, as an everyday practice, encompasses various activities like household management, reproduction, and recreation, shaping residents' interactions and adaptations to their living spaces [15,16]. Housing can also be defined as a spatiallyand temporally-specific social practice that occurs within interconnected contexts [1,17]. However, both in academia and in everyday life, housing is often perceived as static [18]. This static perspective contrasts with a theoretical framework that considers housing as a dynamic and ongoing process [19], particularly within the realm of multi-local housing arrangements. From this perspective, housing is viewed as simultaneously immobile and mobile, even though it may appear static, objectified, and enclosed [20].

In present-day society, it is not uncommon to encounter housing and lifestyles that are temporally limited, while also being intentionally designed and rhythmized. In fact, such arrangements are often deliberately chosen as a lifestyle, influenced by broader trends such as changes in work organization, evolving family structures, and shifting patterns of leisure and travel. In this study, temporary housing practices are understood as including both those that are predictably temporary due to external conditions (such as fixed-term educational, employment, or living arrangements) and long-term temporary housing practices that anticipate or desire a change in location at a later stage of life (e.g., upon retirement). Additionally, multi- or trans-local housing practices, which involve the active use of more than one place of residence [4], are considered temporary in two dimensions. These include the rhythms inherent in this housing practice with its time-limited stays in different locations and the potential to design the multi-local lifestyle as either long-term or temporally limited. Until now, there has been limited research addressing predominantly self-selected temporary housing arrangements and their impact on emotional connections to the housing environment. Often, temporary or flexible housing solutions are associated with specific interest groups such as refugees, migrants, or homeless individuals, for whom these arrangements are established as responses to their precarious housing and living situations and are not self-chosen [21,22]. In such cases, these housing solutions are a result of necessity rather than a deliberate lifestyle choice, contrasting with those who seek flexible housing for reasons of autonomy or mobility.

When considering self-selected temporary housing practices, the duration of residence is a crucial factor in relocation decisions and has long-term implications for future relocations. Previous studies have largely neglected the duration of residence approach, indicating a disregard for the temporal and spatial dimensions of housing [23]. According to the life-course approach, various factors such as the "timing, sequence, and duration of what are crucial and mutually determined life events, transitions, and states [24]". Ref. [25] makes a significant contribution to research on the decision-making process involving relocation. Research has shown that the willingness to move increases up to the fifth year of residence and declines rapidly thereafter [25,26]. Relocation arises from ongoing individual and collective evaluations of competing housing environments, where the cost of remaining in the current location is weighed against the cost of moving to an alternative location [27]. This cost-benefit model should include non-material and social costs, and it can also be applied to the decision to adopt a multi-local living arrangement. Additionally, emerging research highlights that temporary housing practices are increasingly influenced by economic conditions and shifting cultural meanings of home [28]. The interdependence between the economy, homemaking practices, and the evolving meanings of home shows how housing decisions and relocation behaviors are shaped not only by practical factors such as cost and duration of residence but also by broader socio-economic and cultural shifts.

# 2.2. Conceptualization of Belonging to (the) Home Place(s)

There is a consensus in research that long-term residence often leads to the development of a strong place-based identity, in which the place of residence is considered home [29]. Proshansky et al. [30] emphasize that home is regarded as the "place" of utmost personal significance in the study of place-identity. In the academic literature, "home" is defined not merely as a physical location but as a place that holds significant social, psychological, or emotional importance for individuals or groups [31]. Penfold et al. [32] describe the dynamic interplay of relational connections grounded in cultural, social, and environmental dimensions that transform a house into a home. The connections between family, community, and the land convert the materiality of a house into a living co-created space of belonging and spiritual connection.

Recent studies have begun to examine the temporal aspects of the home or domestic sphere [33]. Blunt et al. [12] argue that "the temporalities of home over multiple, co-existing

scales are also closely intertwined with its spatialities, spanning memories, nostalgia, history, and heritage, the domestic rhythms and routines of everyday life, and dreams and fears for the future [34,35]". In this context, the concept of home is not solely limited to a place associated with the past. It also encompasses the temporality of individuals, organizations, and discourses, and is connected to future orientation [36]. This perspective highlights that home is no longer confined to a fixed location in time and space, representing a sense of belonging and intimacy for its occupants. Instead, it is intricately intertwined with a multifaceted form of cohabitation that surpasses the familiar linear progression of the domestic realm. Within households, various temporalities that manifest through different schedules, routines, and long-term plans regarding the social and material aspects of managing the household exist. These temporalities are also experienced within the emotionally complex spaces that characterize the domestic sphere [37].

Originally rooted in a humanistic perspective that emphasized sedentism as a prerequisite for human-place relationships, current studies are now exploring the effects of a multi-local lifestyle, characterized by its temporary dimensions, and emotional belonging [38]. A multi-local lifestyle, characterized by the interplay between mobility and stability, involves the use of multiple residences for different purposes [11]. This lifestyle can be associated, on one hand, with rootedness and deterritorialization, and on the other hand, with a disruption of emotional connections to place(es). Gustavson [39] introduces the concept of "routes" to describe positively valued relationships to places while being on the move, contrasting with the notion of "roots". According to Di Masso et al. [38], mobility between two places of residence can serve as a supplement to fulfilling certain housing needs and compensate for a lack of place attachment. However, if there is no deep attachment and identification with the second place, this connection tends to be merely functional. Nevertheless, the term "multi-centred integration" refers to the idea of multiple everyday places to which individuals feel deeply attached, forming a network comprising significant nodes connected through movement. The majority of existing research linking the concept of place attachment to multi-local lifestyles has been qualitative and conceptual in nature. This study aims to provide a complementary perspective by quantitatively assessing the relationship between spatio-temporal housing arrangements and the formation of place attachments across various dimensions.

## 2.3. Measuring Place Attachment: Concepts and Dimensions of the Scale

Tuan [40] conceptualized the emotional connection between individuals and places, with a special emphasis on the home. He highlights how individuals naturally establish roots in their homes through extended periods of residence and familial connections. In this context, the concept of place attachment, as introduced by Altman and Low [41], becomes relevant. It focuses on the cognitive–emotional bond that individuals develop with significant places in their lives. This bond reflects individuals' sense of connection to a specific place and underscores the importance of environments that are central to one's well-being and identity. Place attachment can be understood across multiple scales, extending beyond small geographic units. This broader perspective acknowledges that individuals can form emotional bonds not only with their immediate surroundings but also with entire cities and regions. It reflects the diverse ways in which people connect to their environments at different spatial levels [42]. The concept encompasses the relationship between individuals and their physical and social environments as well as the process of place-making. This process applies to both enduring locations or establishments and spaces that are temporarily imbued with significance [43].

Arguably, the most fundamental dimensions of place attachment include place identity and place dependence. These dimensions encompass both the symbolic and functional aspects of individuals' emotional connections and relationships with a specific place [44,45]. Place identity involves the symbolic meanings and personal significance that individuals associate with a place. It reflects their emotional and cognitive connections, shaped by experiences, memories, and interactions with the environment. This concept is often linked to rootedness, where individuals feel a profound connection to a place due to their history and experiences within that location [30]. On the other hand, place dependence pertains to the practical or utilitarian dimensions of individuals' connection to a place. It emphasizes their reliance on a particular location to fulfill practical requirements such as social interactions, recreational pursuits, or livelihood [46]. While place identity and place dependence are essential dimensions of place attachment, they may not fully capture the complexity and depth of individuals' connections to a place.

The Actor–Network Theory (ANT) is a widely used concept in geography that seeks to elucidate the complex relationships between humans and non-humans, including technologies, artifacts, and institutions. It emphasizes the importance of empirical research into concrete interactions and practices to develop a comprehensive understanding of networks [47]. This theory provides a framework for exploring the significant role those non-human environments play in shaping place attachment. Research suggests that individuals develop attachments to specific natural settings based on their interactions with the environment [48]. In the urban context, parks and gardens serve as vital green spaces that promote place attachment. These areas not only offer recreational opportunities but also foster social interactions that enhance the sense of community. Studies indicate that individuals who regularly spend time in green spaces develop a stronger connection to their residential area [49]. Place attachment in urban spaces is often strengthened by the presence of historical or cultural elements, which foster a sense of belonging and identity. Integrating cultural features into the built environment can enhance emotional connections to a place, particularly in multicultural urban areas [50]. This aligns with findings that suggest that familiar landscapes help people build and strengthen place bonds in new environments, even in areas they have never visited before. Additionally, emotional bonds formed in one location can be transferred to a new place through memories of past experiences, further deepening the sense of attachment [51]. Therefore, studying the impact of urban spaces on the development of place attachment is crucial. The research underscores the significance of architectural design and place-making in considering urban areas as places that foster a sense of belonging and emotional attachment [52].

Social bonding, which refers to the sense of belonging or affiliation with a group (e.g., family or friends), is significant for establishing emotional connections based on shared history, interests, or concerns [53,54]. Research has shown that, particularly in urban environments, social interactions play a crucial role in the development of place attachment and vice versa [55,56]. Community events, neighborhood activities, and the design of public spaces that promote social encounters all contribute to strengthening this attachment. This relationship is particularly evident in low-income or deprived quartiers, where the lower quality of the physical environment makes social connections even more essential. Consequently, the social context becomes a crucial factor in improving place attachment, with communal bonds playing a key role in enhancing the overall sense of belonging and identity [50]. When studying social attachments, it is crucial to consider the social and geographical context by integrating concepts such as "membership" and "engagement" [57,58].

Understanding both the physical and social dimensions of place attachment is essential for comprehending individuals' relationships with urban spaces and the dynamics between individuals and their environments [59].

# 2.4. Formation of Hypotheses

The primary objective of this study is to explore how spatio-temporal housing arrangements influence the formation of emotional connections. This exploration will be guided by the concept of place attachment, which will inform the formulation of specific hypotheses. To achieve this objective, a unique four-dimensional scale, based on the model proposed by Raymond et al. [10], was developed and validated using the collected data. Previous studies, e.g., [60], suggest that place identity and place dependence are likely to constitute validated dimensions of this place attachment scale, as they encompass both the symbolic and functional aspects of individuals' emotional connections and relationships with a particular place. A dimension termed "ambient bonding" was introduced to capture the connection individuals have with urban spaces such as the built neighborhood or frequently used infrastructural locations, recognizing the significant role that the immediate environment plays in fostering place attachment [59]. It is hypothesized that this dimension can be validated as part of the place attachment scale. The data also explores emotional connections through friends, family members, and social engagement. These data are expected to validate a social bonding dimension that represents these social connections. The final constructed place attachment scale comprises four dimensions: place identity, place dependence, ambient bonding, and social bonding.

Bailey [23] criticizes the common oversight in studies that fail to consider the temporal and spatial aspects of housing practices by neglecting to account for the duration of residence. The duration of residence is regarded as a crucial factor in shaping spatial identity [29] and is significantly related to all dimensions of the place attachment scale.

Using the four-dimensional place attachment scale, this study aims to empirically assess the impact of the spatial and temporal aspects of housing on emotional connection. It is hypothesized that the developed spatio-temporal housing types are significantly correlated with the four dimensions of place attachment. Despite the persistence of traditional views portraying housing as a static concept [61,62], it is important to consider the diverse spatio-temporal housing arrangements and mobility associated with homing [11,39]. This suggests that housing types with distinct spatial and temporal structures may exhibit varying levels of emotional attachment to a place of residence compared to conventional housing types.

It is important to emphasize that this study primarily focuses on describing the spatial and temporal aspects of housing arrangements and their influence on emotional connections at different dimensions. The goal is to establish a foundational understanding of how these spatio-temporal structures impact emotional bonds to living spaces. The findings of this research will serve as a basis for future studies investigating, whereby socio-demographic variables significantly shape place attachment within various tempo-local housing arrangements.

## 3. Materials and Methods

#### 3.1. Research Design

This article presents findings derived from research conducted as part of a study on temporary housing arrangements and their implications for daily routines. Data collection took place in the spring of 2023 in the urban areas of Frankfurt am Main and Leipzig, Germany, along with two surrounding municipalities for each city: Hofheim (Taunus) and Neu-Isenburg for Frankfurt and Taucha and Schkeuditz for Leipzig. The two selected cities are characterized by their substantial size and the presence of international companies and universities, which allow for a diverse range of temporary housing arrangements without being dominated by a single function, such as tourism or a large student population. These municipalities maintain close connections to the nearby metropolis while also establishing a distinct profile as places to live, work, and enjoy leisure in the metropolitan region.

A three-part stratified random sampling method was employed, utilizing data from the residents' registration offices on their residence status (either sole residence, two residences, or secondary residence). To gather data, a standardized questionnaire was distributed via mail. Respondents had the option of completing the questionnaire on paper or online by scanning a QR code or using a link. The questionnaire was available in multiple languages, including German, English, and Turkish. Utilizing the registration form as a survey instrument resulted in an uneven distribution of addresses, leading to unequal selection probabilities of individual survey units (stratified by stratum) within the sample. Consequently, potential deviations may occur in estimated values from corresponding influencing variables within the population. To address this issue, design weighting was implemented to ensure an accurate estimation of the pertinent population size. Given the

intention to draw general conclusions about the underlying population from the survey data, it is imperative to assign standardized design weights to the target individuals [63].

## 3.2. Sample Description

A total of 1589 individuals participated in the survey, resulting in a response rate of approximately 16%. Suburban areas near metropolises exhibit a slightly lower response rate at 14% compared to major cities, which had a response rate of 18%. However, there was no significant difference in participation rates between the urban regions of Frankfurt and Leipzig. The gender distribution in the sample was balanced between males and females. This study elected to classify gender as binary due to the low percentage of nonbinary respondents (<0.4%), which made it challenging to calculate percentages accurately. The age distribution in the sample closely mirrored that of the study area's population of 1.2 million individuals. In age groups up to 45 years, the proportion of women was slightly higher than that of men, by approximately 3%. However, in older age brackets, men outnumbered women, especially in the 55-64 age group, which comprised 19% women and 26% men. Overall, 65% of respondents were employed, 19% were retirees, 10% were students, and 7% fell into other categories such as homemakers, trainees, and unemployed individuals. The proportion of highly educated individuals in our sample (51%) is significantly higher than the national average in Germany, which is approximately 24% [64]. Regarding household income, our sample is distributed as follows: 33% fall within the lower net household income range (<2500 EUR/month), 45% have a middle household income (2500–5000 EUR/month), and 21% belong to the higher income bracket (>5000 EUR/month). Within the research region, slightly over half of the sample (57%) resided in urban areas, while 43% lived in suburban areas. The figures show a slight bias, which is common in written surveys [65]. It is important to note that the survey was conducted within a Central European context, adhering to specific cultural and social norms. Nevertheless, the sample accurately reflects the societal structure, making it suitable for the calculations described. This will be demonstrated in detail with supporting figures in the following sections.

#### 3.3. Classification of Tempo-Local Housing Types

This article aims to statistically measure the impact of temporary housing arrangements on emotional attachment to home place(s). In this survey, respondents define temporary housing practices based on their own perception of the limited timeframe of their housing arrangement, whether short- or long-term. This approach helps to distinguish this self-selected lifestyle from groups such as refugees or homeless individuals, whose temporary housing situations are often involuntary. In this study, we included the following question (Q1) to assess multi-local housing scenarios: "In addition to your place of residence, are there other places (other postcodes) where you regularly stay overnight?". The respondents had the option of answering either yes or no. This additional place of residence does not necessarily imply having a private living space there; it may also include accommodations such as hotels, Airbnb rentals, or staying with friends or family. The duration of time spent in this location can vary significantly; however, the emphasis is not on the length of stay at each place but rather on the regular alternation between them.

We also asked the following question to identify the temporal dimension of their current housing situation: "Would you describe yourself as a person who only resides in this place for a certain period of time?". The respondents could answer either yes or no. The unique aspect of this type of questioning is that the evaluation of housing temporality relies on individuals' self-attribution, rather than predetermined categories used in traditional surveys. The advantage of this approach lies in its simplicity and direct relevance to the dimensions of time and space that are central to this study. By using straightforward yes or no answers, four clear categories are created, reflecting respondents' housing situations without imposing predefined classifications. In contrast to categorical

systems where researchers select and assign meanings to categories, this method avoids such external biases.

The classification illustrated in Figure 1 was determined based on the combination of the following answer options:

- Standard Type (mono-local and permanent): Has no additional place of residence and does not describe themselves as temporary (Q1: no—Q2: no);
- Double Type (multi-local and permanent): Has an additional place of residence, but does not describe themselves as temporary (Q1: yes—Q2: no);
- Nomad Type (mono-local and temporary): Has no additional place of residence, but describe themselves as temporary (Q1: no—Q2: yes);
- Flexible Type (multi-local and temporary): Has an additional place of residence and describe themselves as temporary (Q1: yes—Q2: yes)—On one hand, the multi-local arrangement can be considered temporary, while on the other hand, residing at the first or second place of residence can also be viewed as temporary.

Standard Type mono-local & permanent			
Proportion in the sample: 58%			
Double Type multi-local & permanent			
Proportion in the sample: 18%			
Nomad Type	1		
mono-local & temporary Proportion in the sample: 12%			-
Flexible Type multi-local & temporary			
Proportion in the sample: 12%			
	present situation	imaginable future	unimaginable futur

Figure 1. Visualizing the four tempo-local housing types.

The significance of examining various types of housing in terms of space and time becomes apparent when considering their distribution within the entire sample. The analysis clearly shows that only 58% of respondents identify with the standard housing type that is permanently located in one specific physical location. In contrast, 42% of respondents have housing arrangements that deviate from this type in terms of space and/or time. Specifically, 24% of respondents classify themselves as temporary residents, while 30% have multiple places of residence and are therefore considered multi-local.

## 3.4. Evaluating Place Attachment: The Measurement Approach

The research emphasized the need for further exploration of place attachment in urban and peri-urban populations to expand the understanding of this concept beyond the rural contexts that many studies in this area focus on. This study aims to fulfill this requirement by using the proposed items and dimensions [10] for data analysis while adapting them to the specific study area and population. This necessitates re-validating the place attachment scale measurement instrument. In this study, emotional attachment is measured through items that cover various key areas of the place attachment concept. Some items are derived from studies that have demonstrated their internal consistency [66]. To assess an individual's sense of emotional belonging, the items were evaluated using a Likert scale. Likert scales are considered reliable for measuring opinions, perceptions, and behavior [67]. The survey included the following instructions preceding the Likert scales: "How connected do you feel to the city? Please decide spontaneously to what extent you agree or disagree with the following statements". Items were presented on a 4-point Likert scale, with "1 = Strongly Disagree", "2 = Disagree", "3 = Agree", and "4 = Strongly Agree".

In this research, we used confirmatory factor analysis (CFA) and ordinal logistic regression to analyze the data effectively. CFA was employed to validate the measurement model and assess the relationships between observed variables and their underlying latent constructs, ensuring that our measures of place attachment were robust. Following this, we applied ordinal logistic regression to explore the relationships between these constructs and the four tempo-local housing arrangements. This allowed us to understand how different factors influence residents' emotional connections to their living environments.

Specifically, the confirmatory factor analysis (CFA) examines whether the collected data (items) conform to a hypothetical measurement model derived from previous analytical research. The developed model comprises four dimensions, each with several indicator variables that collectively represent the construct of place attachment. The CFA function from lavaan (SEM model in R-Studio) is used for model estimation. The latent factors are standardized with fixed variances of 1. The Comparative Fit Index (CFI; >0.95), Root Mean Square Error of Approximation (RMSEA; <0.06), and Standardized Root Mean Square Residual (SRMR; <0.08) are used as quality criteria to evaluate the overall fit of the model to the data [68]. The model is refined using modification indices, and the likelihood ratio test assesses whether there has been a significant improvement. This approach helps to determine the optimal number of items per dimension, ensuring that the model achieves the best possible fit while maintaining a meaningful alignment of the items with their respective dimensions. Consequently, the model remains both statistically robust and conceptually coherent.

The respective items for each dimension are summed and divided by the number of items within that dimension to ensure comparability. This process results in variables that are scaled ordinally. To measure the relationship between the metric variable "duration of residence" and the nominal variable "tempo-locality types" with the dimensions of the place attachment scale, Spearman's rank correlation coefficient and the Phi coefficient were employed. As described before, the relationship between the tempo-locality types as predictor variables and the ordinally scaled dimensions of the place attachment scale were explored using ordinal logistic regression as the modeling approach.

## 4. Results

## 4.1. Testing the Four-Dimensional Place Attachment Scale

CFA was employed to determine whether the four-dimensional place attachment scale, designed to measure emotional attachment based on housing type, aligned with the survey data. The model was adjusted using modification indices, and the likelihood ratio test indicated a significant improvement in the model's performance. This improvement identifies the number of items for each dimension. The fit indices demonstrated that the global model aligned well with the data: the CFI value was 0.981, the RMSEA was 0.056, and the SRMR value was 0.026 [68]. The modification indices (none > 30) indicated that the measured variables effectively represented the underlying constructs (local fit).

The standardized covariances revealed a strong correlation between most dimensions (Table 1,  $r \ge 0.781$ ). However, the correlation between ambient bonding and social bonding fell within the medium to high range (0.691). These statistical findings provide support for the representation of place attachment through the four dimensions.

Latent Variables (Items) <sup>1</sup>	Std. lv.	Std. All	Grand Mean	Item Mean
Place Identity			3.10	
I feel attached to the city.	0.688	0.872		3.27
The city means a lot to me.	0.791	0.907		3.07
I identify with the city.	0.779	0.869		2.97
Place Dependence				
I feel like I belong in the city.	0.733	0.829	2.94	3.03
The city is my home.	0.735	0.781		3.38
I don't have a similar emotional connection to any other place.	0.700	0.669		2.42
Ambient Bonding			3.25	
In my neighbourhood, I feel good.	0.386	0.559		3.38
I feel good when I walk through the streets of the city.	0.504	0.686		3.12
Social bonding			2.69	
I live here because my family is close by.	0.530	0.433		2.75
My friendships here connect me to the city.	0.678	0.656		2.86
It is important for me to volunteer in the city.	0.551	0.607		2.47
Covariances	Std. lv.			
Place Identity~~Place Dependence, Ambient bonding, Social bonding	0.927, 0.781, 0.817			
Place Dependence~~Ambient bonding, Social bonding	0.809, 0.947			
Ambient bonding~~Social bonding	0.691			

Table 1. Results of confirmatory factor analysis (SEM-Model: Lavaan in R-Studio).

<sup>1</sup> CFA Results: CFI = 0.981, RMSEA = 0.056, SRMR = 0.026 (N = 1495). All standardized factor loadings are significant (<0.01), Place attachment items were measured on a scale ranging from 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree.

In the place identity dimension, all three items displayed relatively high standardized factor loadings (Table 1,  $\geq$ 0.688), as did the place dependence dimension (Table 1,  $\geq$ 0.700). This indicated that the observed items effectively measured their respective latent factors (dimensions), confirming the hypothesis that both dimensions could be validated as components of the place attachment scale.

The ambient bonding dimension comprises two items capturing the emotional connection with everyday places or paths and the neighborhood. The standardized factor loadings, falling within the intermediate range (Table 1,  $\geq$ 0.386), indicated a somewhat weaker correlation between the observed items and the underlying dimension compared to the first two dimensions but remained significant. This supported the inclusion of ambient bonding as an important content dimension in the place attachment scale, as initially hypothesized.

In the social bonding dimension, it was observed that the loading for the item "My friendships here connect me to the city" (0.678) was significantly higher than that of the other items ( $\leq$ 0.551). This indicates that this dimension primarily focused on the emotional connection through friendships, while proximity to family (0.530) played a lesser role. Additionally, correlations between the items and the intended factor were significant. Therefore, the four-dimensional place attachment scale, including the social bonding dimension, was confirmed as an appropriate model for further analysis of the data.

## 4.2. Measurement of Place Attachment through the Four-Dimensional Scale

Based on the four-dimensional model, this study empirically investigates the influence of temporary and spatial structuring of housing situations on emotional attachment to home place(s). Before delving into this, the study explores the impact of residence duration on the development of spatial attachment using the available data. The experience of living is intricately linked to a spatio-temporal framework characterized by the duration of residence. This duration is considered a crucial factor in shaping spatial identity. To assess the relationship between residence duration and the four dimensions of the place attachment scale (Table 2), a bivariate correlation analysis was conducted. As anticipated, a significant correlation was found between residence duration and all four dimensions ( $r \ge 0.11$ ), with the strongest positive correlation observed between residence duration and place dependence (r = 0.36). The correlation between the duration of residence and emotional attachment, as observed here, aligns with the consensus in the literature, e.g., [29,69]. The Phi coefficient was employed to assess the relationship between the categorical variable of tempo-locality types, which encompass all four characteristics, and the four dimensions of the place attachment scale (Table 2). As expected, a significant correlation was discovered between tempo-locality types and all four dimensions ( $r \ge 0.28$ ), with the highest correlation observed between tempo-locality types and place dependence (r = 0.49).

Table 2. Correlation between (respondent) variables and the four dimensions place attachment.

Variable <sup>1</sup>	Place Identity	Place Dependence	Ambient Bonding	Social Bonding
Duration of residence (0–89 years) Spearman's Correlation	0.28 **	0.36 **	0.11 **	0.27 **
tempo-locality types Phi coefficient	0.43 **	0.49 **	0.28 **	0.37 **

<sup>1</sup> \*\* Correlation is significant at the 0.01 level (2-sided), Place attachment items were measured on a scale ranging from 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree.

The confirmation of a statistical correlation between the tempo-locality types and the four dimensions of place attachment provides the foundation for further examination of this relationship across all four housing types and each of the four dimensions. The results of the ordinal regression analysis are utilized to highlight significant variations among the housing types. The standard type serves as the reference category, meaning that the numbers for each type indicate how strongly they differ from this category. Negative numbers indicate that all spatio-temporal housing types have lower approval ratings for the items representing the dimensions. It becomes evident that the spatio-temporal housing types, in particular, exhibit notable differences in their emotional connection when compared to the standard type (Table 3).

Table 3. Results of the ordinal regression model.

Variables <sup>1</sup>	Place Attachment Dimensions			
Tempolocality-Types	Place Identity n = 1533	Place Dependence n = 1525	Ambient Bonding n = 1539	Social Bonding n = 1531
Standard Type (mono-local & permanent)	0 <sup>a</sup>	0 a	0 a	0 a
Double Type (multi-local & permanent)	-0.158 (0.121)	-0.453 (0.121) **	-0.091 (0.124)	-0.192 (0.120)
Nomad Type (mono-local & temporary)	-1.559 (0.148) **	-2.040 (0.152) **	-0.976 (0.148) **	-1.200 (0.144) **
Flexi Type (multi-local & temporary)	-1.528 (0.148) **	-2.180 (0.151) **	-0.961 (0.148) **	-1.564 (0.146) **
Ordinal regression model Model Fitting Information x <sup>2</sup> (p)	190.254 (0.000)	333.993 (0.000)	75.091 (0.000)	157.652 (0.000)
Linking function: Logit Pseudo R-Square: Nagelkerke	0.119	0.199	0.050	0.099

<sup>1 a</sup> Parameter is set to zero, because it is the reference category, Standard errors in parentheses, \*\* Correlation is significant at the 0.01 level, Place attachment items were measured on a scale ranging from 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree.

The double type is similar to the standard type on a temporary level, as it is designed to be permanent despite including multiple places of residence. However, the primary differences between the double type and the standard type lie in the dimension of place dependence. This dimension emphasizes the uniqueness of a place in terms of emotional connections and a sense of home. Interestingly, a multi-local living arrangement, if permanent, does not negatively affect the development of strong feelings of attachment, connection to one's immediate surroundings, or social relationships. It is evident that the temporal structure of the housing situation primarily influences the development of emotional attachment to the place(es) of residence.

Housing types that are limited in time (nomad and flexible type) display significant differences in all four dimensions compared to the standard type. The most notable distinction is observed in the place dependence dimension, suggesting that temporary housing arrangements result in a diminished sense of home and a specific dependence on that particular place. In the dimension of place identity, the deviation from the standard type is smaller but still indicates that temporary housing arrangements negatively impact the development of profound connections and identification with a place(s). However, the flexible type exhibits a somewhat lesser form in this dimension compared to the nomad type.

The development of profound social relationships and social engagement is also significantly lower in temporary housing arrangements compared to the standard type. In the dimension of social bonding, there is also a notable disparity between the nomad and flexible types, highlighting the significant role that additional multi-locality plays in the development of profound social relations. The degree of rootedness in neighborhoods and the immediate urban environment, as depicted in the dimension of ambient bonding, shows the smallest but still significant differences between the standard type and the two temporary housing types (nomad and flexible types).

## 5. Discussion

Previously, geographical research had not explored the relationship between selfdetermined, spatio-temporal housing arrangements, and the development of emotional attachment. In this study, a temporary housing arrangement is defined as lasting for varying durations, ranging from several months to several years. This definition is based on the individual's perception of its temporariness, which adds a unique dimension to the study. The aim is to validate and apply a measurement tool to determine whether individuals with specific tempo-local housing arrangements differ in their emotional attachment. This could establish a foundation for future research to explore more thoroughly how different housing arrangements contribute to the formation of emotional bonds.

As expected, a significant correlation was found between the duration of residence and all four dimensions of the place attachment scale. The dimension with the strongest correlation is place dependence, which addresses the sense of home and the attachment to just one place. It is evident that the longer someone has been living in a place, the stronger their sense of belonging and the significance of that place as their home becomes. The least significant correlation is found in the dimension of ambient bonding, which suggests that attachment to the neighborhood and immediate urban environment is influenced less by the duration of residence.

Evidently, a permanent multi-local arrangement does not hinder the development of strong emotional attachments, connections to the immediate environment, or the formation of social relationships. This finding challenges the traditional assumption that being mobile and residing in multiple locations weakens territorial identification [70], as it excludes the consideration of temporal extension. Instead, it suggests that even in the context of mobility, individuals can establish deep connections to their surroundings, as long as the arrangement remains stable over time. The results support previous studies suggesting that place attachment is more dynamic and resilient, not diminished by mobility, but rather, diversified [11]. This indicates that spatial mobility, when combined with temporal stability in each locale, can foster meaningful connections and reshape the broader understanding of belonging within a multi-local context. The notable variance in the dimension of place

dependence highlights that the development of feelings of dependency and belonging is negatively influenced by recurrent stays in an alternative place of residence, irrespective of whether this arrangement is permanent or not. Furthermore, this dimension incorporates emotional connections to more than one place of residence, which are likely to be more pronounced in the double type.

In the sample, the majority of people who belong to the double type are middleaged and employed, reflecting the common association of multi-locality with work-related factors [71]. Additionally, the proportion of retirees is significantly higher in the double type compared to other tempo-local housing types. Numerous studies have described multi-local living arrangements among retirees, such as the use of vacation apartments [72], suggesting that such arrangements are typically permanent. The socio-demographic structure of the double type indicates that as a result of the higher age demographics, the processes of deep attachment formed through identification and social relations, or with the immediate surroundings, whether in one or multiple places of residence, have already taken place. Ownership of a second dwelling, such as a vacation home, can also contribute to the formation of profound attachments to multiple places [11], although only 18% of those classified as a double-type report owning their additional residence.

When a housing arrangement is perceived as temporary, emotional attachment is significantly lower in all four dimensions compared to the standard type. One possible reason for the similar results in calculations for the nomad type and the flexible type could be the similar socio-demographic structure of these temporary housing types. The nomad type has a fixed place of residence but perceives their residency as temporary. Those who belong to this housing type are predominantly individuals in the early stages of their family or professional life who plan to change their place of residence in the future. Additionally, the nomad type includes a higher proportion of students compared to permanent housing types. However, the flexible type includes the highest proportion of students, who are also referred to in the literature as "typical multi-locals" [73]. In general, this type is characterized by young adults and working individuals. This indicates that many young working people perceive themselves to be in a phase of professional and/or personal transition, which is often accompanied by an anticipated change in their housing situation in the future.

The following paragraphs explain the specific dimensions of the place attachment scale and their varying degrees of deviation based on the tempo-local housing type. The most notable disparity lies in the dimension of place dependence. Individuals who consider their living situation temporary tend to have fewer attachments to their place of residence, including a sense of belonging or the feeling of being at home. It can therefore be assumed that these individuals are less likely to make long-term plans or commitments that would tie them to a specific location. However, all tempo-local housing types differ significantly from the standard type in this dimension.

The dimension of place identity reflects strong feelings of connection and identification with a place. However, this connection is significantly weaker in temporary housing arrangements, as the two types hardly differ from one another. It is expected that temporary housing types, where the decision to move has already been made, do not provide sufficient time or capacity to develop a deep identity-forming relationship with the place of residence [30,60].

The social bonding dimension exhibits notable disparities between the nomad/flexible type and the standard type. It is important to consider the primary differences between the two temporary housing types. It is evident that, in addition to the temporary nature of the housing situation in the nomad and flexible types, utilizing multiple residences also makes it more challenging to develop deep friendships or become socially involved. A valuable insight deduced from these findings is the need for individuals in temporary and/or multi-local living situations to facilitate access to social engagement. This could be achieved by allowing them to undertake tasks that can be completed remotely or by recognizing the value of short-term assistance.

The smallest difference between the standard type and the two temporary housing types is observed in the dimension of ambient bonding. This suggests that certain aspects of neighborhoods and the immediate urban environment play a significant role in creating a sense of connectedness [50], despite the temporary nature of the housing situation. Examples of these aspects include the opportunity for short-term social interaction with neighbors, participating in local events, and access to facilities and services in the area. Moreover, the individual spatial characteristics of the study regions—such as the size and structure of the metropolis, the close proximity of the municipalities, and their unique settings—also significantly influence the development of place attachment among participants [52]. By acknowledging the significance of these factors, the study highlights how the physical characteristics of housing environments, along with the distinctive attributes of the regions, influence residents' relationships with their surroundings, ultimately shaping their place attachment.

Overall, it can be said that housing arrangements that deviate from the standard in terms of space and time are no longer uncommon (as observed in 42% of this sample) but are increasingly becoming a part of a contemporary society characterized by high mobility and individualization. These alternative housing arrangements are being embraced not only by young people, who have traditionally been perceived as more flexible and spontaneous but also by individuals of various other age demographics, e.g., for employment or leisure purposes. Modern lifestyles often involve diverse spatial and temporal structures, resulting in frequent changes in location and emotional connections being established with multiple places in a shorter time span. This choice of lifestyle is often deliberate and has numerous advantages, making it the "new normal" for many individuals today.

## Limitations

The findings of this study must be interpreted within the specific socio-cultural and economic contexts in which the research was conducted. Much of the literature referenced, as well as the housing and urban dynamics explored, are rooted in cities of the Global North, where housing markets, economic conditions, and social structures significantly shape residential patterns and place attachment. It is important to recognize that experiences of home, housing practices, and emotional connections to place are not universal; they vary greatly across different geographical, cultural, and socio-economic contexts. For instance, the relationship between mobility and place attachment may manifest differently in regions experiencing distinct housing crises, varying levels of economic stability, or differing cultural understandings of home. While this study focuses on tempo-local housing arrangements in a specific context, further research is necessary to explore how these findings may apply to other settings.

A critical examination of the methodology is also necessary to properly interpret the results. It should be noted that the study was conducted in only two urban areas in Germany. In order to strengthen the validity of the findings, it is crucial to include additional study locations. Increasing the sample size significantly and expanding the number of items used could enhance the statistical analysis, particularly in achieving a more accurate model fit for the place attachment scale. Despite using design weighting to approximate the total population, there is still a bias in the sample. Completely eliminating this bias presents a challenge, as individuals of German heritage and those with higher levels of education are more likely to participate in such studies compared to those facing language barriers or with lower education levels. Additionally, this study neglects to explore the specific negative associations that individuals might harbor toward particular places, particularly in urban environments where exposure to violence and insecurity may impact attachment. Nevertheless, it is important to recognize that our dataset is appropriately equipped to address relevant questions and can provide valuable insights into the complex and diverse effects of spatio-temporal housing structures on emotional attachment.

# 6. Conclusions

This study, focusing on measuring place attachment in tempo-local housing arrangements, aims to shed light on the evolving nature of housing in modern society. Traditional notions of permanent residence are being redefined by increasing mobility, technological advancements, and diverse lifestyle preferences. Temporary housing arrangements, including multi-locality, are becoming more prevalent and significant, challenging our understanding of the concept of "home" and attachment to a specific place. The research conducted a comprehensive survey in urban regions of Germany and successfully validated a four-dimensional model to assess place attachment in tempo-local housing scenarios. This model includes dimensions of place identity, place dependence, ambient bonding, and social bonding, providing a nuanced understanding of how individuals form emotional connections to their living spaces in temporal and locational contexts.

The findings indicate that housing types that deviate from the standard (mono-local and permanent), particularly in terms of the temporal structure, tend to form a weaker emotional bond with their place of residence. This highlights the need to consider the dynamic interplay between space, time, and individual perceptions in shaping place attachment. Interestingly, when designed to be permanent, multi-local living arrangements do not exhibit any significant differences in three out of the four dimensions of the place attachment scale compared to the standard type. This suggests that in long-term multi-local arrangements, individuals can develop strong emotional connections to multiple locations. Based on studies demonstrating that participation and social engagement in the city are directly related to place attachment [55,56], the results indicate that there is an underestimated potential for urban communities in permanent multi-locals. These individuals, who are often perceived as not belonging to urban society due to their mobility, have significant potential to contribute to community dynamics and social cohesion, thereby enhancing the vibrancy and resilience of urban environments.

By recognizing the complexity of tempo-local housing arrangements and the subjective nature of temporal perceptions, this classification contributes to a more comprehensive understanding of contemporary housing practices and their implications for individuals' sense of belonging and attachment to places considered "home". One of the key findings of this research is the importance of recognizing and accommodating the needs of temporary residents within urban communities. By understanding the emotional and social dynamics of place attachment in tempo-local contexts, cities can devise more responsive and sustainable housing policies to meet the evolving needs of residents. For example, they could implement flexible housing regulations, such as adaptive zoning laws for short-term rentals and co-living arrangements, which would expand housing options for temporary residents like students and foreign professionals. Additionally, cities can encourage community engagement initiatives by creating programs that include cultural events, language exchanges, and neighborhood gatherings, thereby facilitating the integration of temporary residents into local communities and promoting social cohesion. Furthermore, cities should consider transit-oriented development (TOD), which involves increasing the number of transit hubs and enhancing access to public transport options. This approach ultimately facilitates improved connectivity and mobility for residents, addresses their mobility needs, and reduces reliance on private vehicles, thereby enhancing overall sustainability [74]. Together, these strategies not only address immediate housing demands but also help cultivate a sense of belonging and community, fostering meaningful connections between residents and their environments.

Additionally, studying tempo-local contexts emphasizes the importance of multipurpose infrastructure that accommodates both short-term and long-term residents, promoting inclusivity and sustainability. Future research could investigate how factors such as socio-economic status, cultural background, and urban infrastructure impact individuals' choices and experiences within tempo-local housing arrangements. Understanding how these variables intersect with tempo-locality types can provide a more nuanced perspective on the complexities of contemporary housing practices and their implications for social cohesion and community well-being.

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