MEASURING SENSE OF PLACE: A NEW PLACE-PEOPLE-TIME-SELF MODEL

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ABSTRACT

Many models of place attachment and sense of place have proliferated in the last decades, and a consensus on the conceptualisation and operationalisation of these constructs is yet to be reached. We aim to contribute to this discussion, by proposing a new model and measurement of sense of place as an overarching construct, using exploratory and confirmatory analyses. Results suggested that sense of place is a second-order factor with four first-order factors: 'place', 'people', 'time', and 'self'. The 'place' dimension integrates emotional content associated with the place and can be loosely compared to the unidimensional place attachment in other models. The 'people' dimension corresponds to the sense of community construct, whereas the 'time' dimension reflects the importance of length of residence and intergenerational transmission. Finally, the 'self' dimension is more internally focused than the other dimensions, reflecting the role of the place for an individual's distinctiveness and self-esteem. Our 32-item Sense of Place Scale is thus a valid and reliable measure based on a quadripartite structure of the sense of place construct.

Keywords: Place Attachment, Sense of Place, Scale Development, Length of Residence, Sense of Community, Exploratory Analysis.

JEL Classification: C83

1. INTRODUCTION

1.1 Place Attachment, a Puzzling Construct

Place attachment, the emotional bond between people and specific places (such as houses, neighbourhoods, cities, regions, countries, etc.), is a current topic in the social sciences, and it has been so for the last 40 years. However, perusing the literature on place attachment can be a cumbersome endeavour. First, place attachment has been studied and theorized across disciplines, including environmental psychology, sociology, human geography, cultural anthropology, urban studies, architecture and planning, economics, leisure sciences and tourism, among others (Lewicka, 2011). More recently, the concept of place attachment has been used in the environmental and natural sciences, particularly focusing on its role as predictor of conservation behaviours (e.g., Poe, Donatuto, & Satterfield, 2016; Admiraal et al., 2017; Jones et al., 2018). Second, a multitude of somewhat differing conceptualisations of place attachment and related constructs can be found in the literature. For instance, place attachment is frequently simply referred to as an affective bond between people and places, but Altman and Low (1992) provided a broader definition of the construct, suggesting an

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interplay between the emotional content and beliefs, knowledge, behaviours, and action in relation to the place. Third, expressions such as place attachment and sense of place are often used interchangeably, but different meanings can be allocated to each, as sense of place may be considered an overarching concept that includes place attachment and other place-related constructs (Jorgensen & Stedman, 2001). Fourth, the multitude of terminological and conceptual ambiguity is reflected in many different operationalisations of the constructs (Hidalgo, 2013). Hidalgo (2013) proposed a consensus regarding the measurement of place attachment by classifying the different available measures (also reviewed by Giuliani, 2003; Lewicka, 2011; Hernández, Hidalgo, & Ruiz, 2013) and integrating them in the well-established person-place-process model of Scannell & Gifford (2010). Despite the standardization attempts, place attachment is still a puzzling construct to study.

1.2 Place Attachment, Identity, Dependence, and Sense of Place

Place attachment has been loosely defined as an affective bond between people and specific places. Drawing from the attachment theory (Bowlby, 1969; Ainsworth & Bell, 1970), Hidalgo and Hernández (2001) suggested that the main distinctive characteristic of place attachment is the desire to maintain closeness to the object of attachment, redefining place attachment as a positive affective bond between an individual and a specific place, characterized by the desire to maintain closeness to that place. Scannell and Gifford (2010) proposed a person-place-process model that defines place attachment as a bond between an individual or a group and a place with specific social and physical characteristics, and is manifested through affective, cognitive, and behavioural processes.

Besides place attachment, two other concepts appear frequently in the people-place literature: place identity and place dependence. Earlier models considered these constructs as distinct conceptualisations of place attachment. Place dependence was first theorized as an individual's perceived strength of association between them and specific places (Stokols & Shumaker, 1981). It is considered a type of functional attachment, reflecting the importance of the place in providing conditions that sustain specific activities and goals (Stokols & Shumaker, 1981; Williams & Roggenbuck, 1989; Williams & Vaske, 2003).

Place identity was described as a substructure of the self-identity that includes cognitions about the physical world surrounding the individual (Proshansky et al., 1983). It is usually considered as a dimension at the same level as attachment or dependence, but it has also been conceptualized as a driver of place dependence and attachment, rather than an element that is formed at the same temporal plane (Kyle, Jun, & Absher, 2014). Other scholars, however, have found that place identity develops after place attachment (Hernández et al., 2007). Twigger-Ross and Uzell (1996) operationalized place identity following Breakwell's four identity principles, namely distinctiveness, continuity, self-esteem, and self-efficacy (Breakwell, 1993). According to Twigger-Ross and Uzell (1996), distinctiveness is the desire to maintain personal uniqueness, summarizing a person's lifestyle; distinctiveness is evidenced when the individual uses an identification to distinguish them from people from other places. Continuity refers to the desire to preserve continuity of the self-concept; continuity can be divided into place-referent continuity, when the place becomes a marker for emotionally significant past events and actions, and place-congruent continuity, when the individual feels that a particular place fits with aspects of the self (Twigger-Ross & Uzell, 1996). Self-esteem refers to the fact that one's self-identity is linked to the places that are important for the individual; it is observed when the individuals have a positive feeling about themselves related to their place of attachment (Twigger-Ross & Uzell, 1996; Scannell & Gifford, 2014). Finally, self-efficacy refers to the ease that the individual may

feel in carrying out their daily activities in the place; self-efficacy is maintained if the place facilitates or does not hinder a person's everyday lifestyle (Twigger-Ross & Uzell, 1996).

Sense of place is another expression that frequently appears in the environmental psychology and human geography literature, and it is usually considered a more general concept or umbrella term that may include other constructs (Shamai, 1991). Drawing from the tripartite framework of attitudes, Jorgensen and Stedman (2001) described sense of place as an attitude towards a spatial setting, encompassing place attachment, place identity, and place dependence, which correspond to the affective, cognitive, and conative components of attitudes, respectively. Sense of place appeared as a general dimension expressed through emotions, thoughts and behavioural beliefs of individuals, rather than a multidimensional construct comprising three univariate dimensions (attachment, identity and dependence) (Jorgensen & Stedman, 2001). Although both place attachment and sense of place can be used as overarching, second-order factors, sense of place is more inclusive and allows for negative relationships with the place, while attachment implies a positive relationship (Trentelman, 2009). In addition, the term place attachment is more frequently used in studies conducted in recreational contexts with visitors/non-residents, whereas sense of place has been more used with individuals, usually residents, with an extensive history with the place in question (Kyle, Graefe, Manning, & Bacon, 2004). In our study, we retained Jorgensen and Stedman's (2001) conceptualisation of sense of place as an overarching construct that includes other dimensions such as place attachment, and allows for both positive and negative attitudes towards the place.

1.3 Other Recurring Constructs in the People-Place Literature

Many other constructs related to place attachment can be found in the literature, such as topophilia, community attachment, place congruence, or urban identity. Rootedness, community attachment, and sense of community are three of the most addressed variables in the context of place attachment research. Rootedness is a time-related concept described as a psychological state that results from long habitation at one locality (Tuan, 1980). It is associated with residence length, and it may be reinforced by memories, intergenerational transmission, and heritage (McAndrew, 1998; Kelly & Hosking, 2008; Michel-Guillou & Meur-Ferec, 2017; Poljanec-Borić et al., 2018). Lewicka (2013) suggested that rootedness might be equivalent to place attachment, as research consistently shows that place attachment is predicted by length of residence, strength of neighbourhood ties, and home ownership, i.e., factors that root a person in a place. The concept of rootedness has also been included in Hummon's (1992) typology of people-place relationships, which includes five different types of community attachment or sentiment. According to Hummon (1992), everyday rootedness and ideological rootedness are positive attachments to residence place, whereas alienation, place relativity, and placelessness describe lack of attachment.

Sense of community reflects the connections to local social networks and the interactions between them (Kasarda & Janowitz, 1974); it can be considered one of four dimensions of place attachment, along with place identity, place dependence and nature bonding (Raymond et al., 2010). Another theoretical framework considers sense of community as a feeling of belonging and connectedness to a group, comprising four distinct elements, namely membership, influence, integration and fulfilment of needs, and shared emotional connection (McMillan & Chavis, 1986). Membership is the feeling of belonging or of sharing a sense of personal relatedness, and influence refers to the sense that the individual matters to the group and the group matters to its members; integration and fulfilment of needs expresses the feeling that members' needs will be met through the community, and the

belief that members share history, common places, time together, and similar experiences defines the shared emotional connection (McMillan & Chavis, 1986).

1.4 Dimensions of Place Attachment

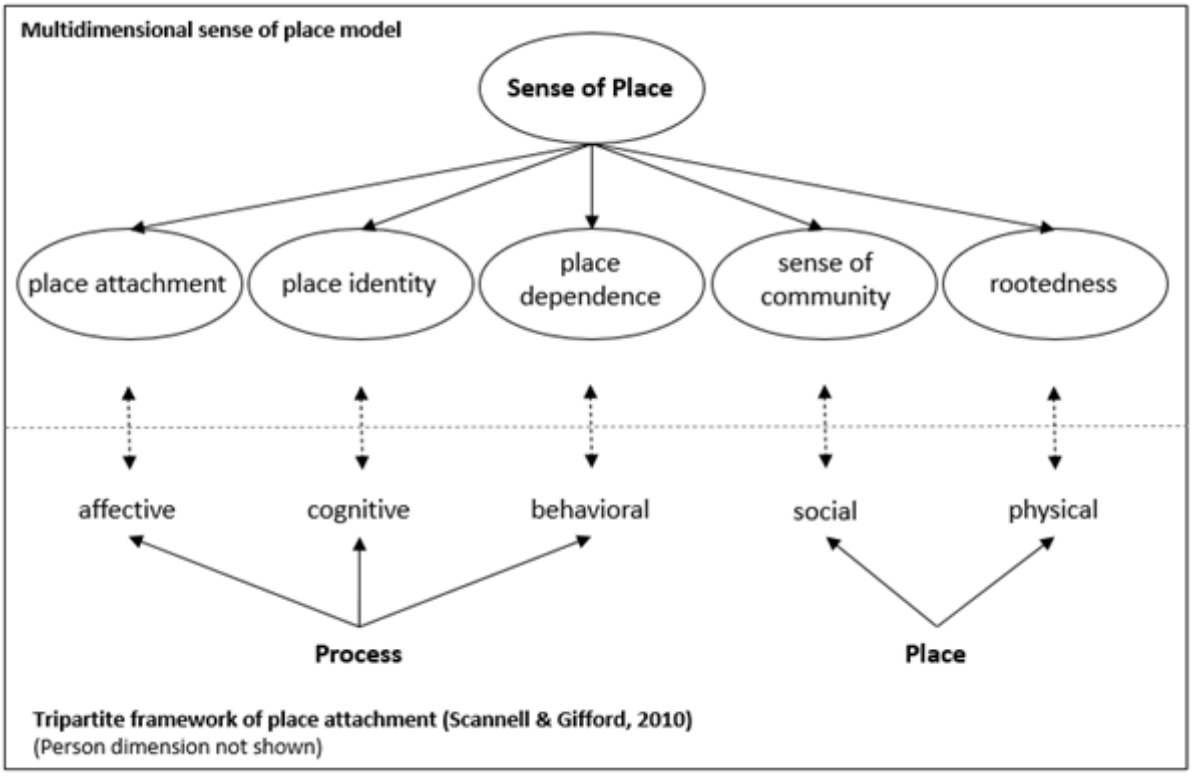
This wealth of concepts related to place attachment translates, as seen above, into different structures of this construct, namely 1) a unidimensional construct related with place identity and place dependence; 2) a multidimensional construct with three to five factors; or 3) a dimension of a more general concept, such as sense of place (see Hidalgo, 2013 and references therein). Despite the multitude of approaches to conceptualize and operationalize place attachment, systematic theories of place attachment are still largely missing. To fill that gap, Scannell and Gifford (2010) reviewed and synthetized the various definitions of place attachment into a three-dimensional organizing framework that considers person (individual or group level), place (social and physical characteristics), and process (place attachment expressed as affect, cognition, or behaviour) as the primary dimensions of place attachment.

1.5 The Present Study: Objectives and Rationale

Hidalgo (2013) has advised that researchers in this field should halt the proliferation of proposals and attempt to reach a consensus on place attachment conceptualisation and operationalisation. However, we aim to contribute further to the discussion on the structure and measurement of place attachment, by developing and testing a new instrument to measure sense of place as an overarching multidimensional construct. Our rationale for doing so was to expand on Scannell and Gifford's (2010) tripartite framework of place attachment and Jorgensen and Stedman's (2001) tripartite model of sense of place, given that concepts such as sense of community and rootedness have not been well defined or operationalised in these models.

Our hypothetical model is based on Jorgensen and Stedman's (2001) model of sense of place, but we added rootedness and sense of community as dimensions on the same level as place attachment, place identity, and place dependence (Figure 1). The latter three dimensions can be considered as the affect, cognitive, and behaviour components of the process dimension in Scannell and Gifford's (2010) tripartite model. Sense of community and rootedness were added to express the place dimension in the tripartite model, in accordance with Riger and Lavrakas (1981), who suggested a social bonding dimension consisting of social ties, as well as a physical rootedness dimension predicted by length of residence and plans to stay. Therefore, in our study, rootedness is conceptualized as a time-related dimension influenced by residence length, memories, and intergenerational transmission (Michel-Guillou & Meur-Ferec, 2017), and sense of community as a feeling of belonging and connectedness to a group (McMillan & Chavis, 1986). Specific constructs that could be incorporated on Scannell and Gifford's (2010) person dimension were not included in our model, so as not to over-represent it, as most indicators for each construct are already on the individual level, and some on the group level.

Figure 1. Hypothetical Multidimensional Model of Sense of Place and Comparison with the Tripartite Framework of Place Attachment Proposed by Scannell and Gifford (2010)



Source: Own Elaboration

Our approach involved three studies with Portuguese samples. In study 1, we developed the Sense of Place Scale to measure the five proposed dimensions of sense of place (place attachment, place identity, place dependence, sense of community, and rootedness) and explored its dimensionality using principal component analysis. In study 2, we tested different measurement models based on the factorial structure obtained in study 1, using confirmatory factor analysis. Finally, in study 3 we assessed the test-retest reliability of the final Sense of Place Scale.

2. STUDY 1: DIMENSIONALITY OF THE SENSE OF PLACE SCALE

The first study aimed to develop a new instrument to measure sense of place, conceptualized as an overarching construct consisting of five dimensions: place attachment, place identity (distinctiveness, self-esteem, self-efficacy, place-referent continuity, place-congruent continuity), place dependence, sense of community (membership, influence, integration and fulfilment of needs, shared emotional connection), and rootedness (temporality, memories, heritage, and intergenerational transmission) (Figure 1). The factorial structure was investigated using factor analysis with varimax rotation.

2.1 Methods

2.1.1. Instrument, Participants, and Procedure

A 42-item scale in Portuguese was created to evaluate sense of place in non-specific places, i.e., the questionnaire asked respondents to consider in their answers the place to which they feel an emotional connection, be it a neighbourhood, a location, or a city. Some

questionnaire items were created for this study, whereas others were modified from previous research (Williams & Vaske, 2003; Stokburger-Sauer, 2011; Sakip et al., 2012). Replicate and positive/negative items were included to detect random answers and to prevent acquiescence bias. A back-translation procedure was used to adapt items into Portuguese. Item order was randomized and a 5-point rating scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used. Participants were recruited through non-probability sampling techniques, using a snowball sample obtained through social media; no compensation was given to participants for their participation in the study. Participants responded to an online version of the questionnaire where responses to all items were mandatory. A total of 466 participants completed the online questionnaire; after removal of multivariate outliers (see next section), a final sample of 432 participants was obtained. Of these, 94.9% are female and 5.1% male, with a mean age of 39.2 ± 8.6 years, ranging between 18 and 73 years old. More than 87% of respondents have higher education studies and the majority lives in Lisbon (35.4%), Porto (13.7%) and Setúbal (10.0%) districts (includes urban, suburban, and rural dwellers).

2.1.2 Data Analyses

Before proceeding to factor analysis using the principal components method, several data screening methods were used to evaluate data's appropriateness for a factor analysis. Data normality was assessed by computing skewness and kurtosis for each scale of SoPS; absolute values higher than 2 for skewness and 7 for kurtosis are indicative of significant deviations from normality (West et al., 1995). Multivariate outliers were identified and subsequently removed using Mahalanobis distance. Descriptive statistics (mean, standard deviation, skewness, and kurtosis) were calculated for SoPS and each sub-scale. Scale reliability was evaluated using Cronbach's alpha; alpha coefficients higher than 0.80 indicate good reliability or internal consistency (Nunnally & Bernstein, 1994). Mean inter-item correlations (MIIC) were also calculated to assess homogeneity; MIIC between 0.20 and 0.40 suggest acceptable homogeneity (Briggs & Cheek, 1986).

A factor analysis was conducted to identify underlying dimensions from the data set. Factor rotation was used to help discriminate between factors; given that some components may not be correlated and to maximise the dispersion of loadings within factors (Field, 2009), an orthogonal rotation (varimax) that keeps factors independent was used. Before performing the PCA different criteria were used to evaluate item factorability, namely inter-item correlations, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity. Regarding inter-item correlations, all items should have at least one correlation >.3 with another item (Field, 2009); items that did not meet this criterion were removed. Kaiser's (1974) criteria for KMO values were used to assess data factorability; KMO > 0.7 was considered good. Bartlett's tests the null hypothesis that the original correlation matrix is an identity matrix (Field, 2009), i.e., all correlations are zero, meaning that the variables are not related and factor analysis is not appropriate; therefore, Bartlett's test should be significant ($p < .05$) to proceed with factor extraction.

Further analyses included the examination of the diagonals of the anti-image correlation matrix (KMO for individual variables) and the communalities to assess if each item shared common variance with other items. Finally, different criteria (eigenvalue, percentage of variance explained, visual inspection of the scree plot, and interpretability) were taken into consideration to decide on the number of factors to retain. A parallel analysis was also conducted to evaluate the number of factors to be extracted, using Monte Carlo PCA for parallel analysis software (Watkins, 2006). All other analyses were performed with IBM SPSS Statistics v. 25.

2.2 Results

An initial data screening based on skewness and kurtosis of each sub-scale of SoPS suggested no deviations from normality. A total of 34 multivariate outliers were identified and removed from the data set, resulting in a final sample of 432 cases. The factorability of the 42 items of SoPS was then examined. Inspection of the correlation matrix showed that all 42 items correlated >.3 with at least another item. KMO was .904 and Bartlett's test of sphericity was significant ($X^2(946) = 13394.6$, $p < .001$). The diagonals of the anti-image correlation matrix were all >.7.

After a five-factor forced extraction based on the hypothetical model of sense of place with five dimensions (place attachment, pace identity, place dependence, sense of community, rootedness), the communalities of seven of the forty-two items were <.4, indicating that these items did not share common variance with other items; these items were removed, and another extraction was forced. A thorough analysis of the rotated component matrix and factor interpretation suggested the removal of three more items, either because loadings were small (<.5) or to aid interpretation of each factor. The items removed were the three items intended to measure the self-efficacy sub-dimension of place identity (e.g., "*My daily life here is easier than if I live elsewhere*"), two items for the place-referent continuity sub-dimension of place identity (e.g., "*I don't care if I live here or elsewhere*"), two items of the integration and fulfilment of needs sub-dimension of sense of community (e.g., "*I don't identify with the community that lives here*"), one item for place dependence ("*The things I do here I could also do with the same satisfaction elsewhere*"), and two items of rootedness, one for temporality ("*I don't even know what it is like to live elsewhere*") and one for memories ("*I don't have good memories of this place*").

A final four-factor structure with 32 items explained 61.57% of the total variance; items and respective factor loadings are presented in Table 1. However, this solution is different from the initially proposed structure of sense of place (Figure 1); four dimensions were identified as place, people, time, and self (Table 1). Items for distinctiveness and self-esteem sub-dimensions of place identity were included in the factor *self*, items for temporality and intergenerational transmission of rootedness were placed in the *time* factor, and items of sense of community were included in the *people* factor. The *place* factor is the largest and includes items of place attachment, place identity (continuity), place dependence, and rootedness (memories).

Descriptive statistics and internal reliability for the final, 32-item Sense of Place Scale are presented in Table 2 (the Portuguese items can be found in the Appendix 5). Overall, the scale and its sub-scales (people, place, time, self) presented high internal consistency, with Cronbach's alpha >0.8. MIIC varied between 0.2 and 0.6, indicating that some scales exceeded the recommended upper limit of 0.4. Skewness and kurtosis absolute values (<2.00) indicated no deviations from normality.

Table 1. Principal component analysis of the Sense of Place Scale (English version; see Supplementary Material for the original Portuguese version), with factor loadings for each item, eigenvalues and percentage of variance explained for each factor, and indication of the dimension and sub-dimension in which each item was initially included according to the proposed hypothetical five-factor model of sense of place (see Figure 1). R = reverted item.

Factor/item	Factor loading	Item previously included in
Place (eigenvalue = 10.06; variance explained = 31.43%)		
1. I am very attached to this place.	.77	place attachment
2. This place is important to me.	.74	place attachment
3. I feel more comfortable here than in any other place.	.77	place attachment
4. I want to keep living here.	.79	p. identity – continuity
5. I feel well integrated in this place.	.76	p. identity – continuity
6. I feel that I fit in here.	.81	p. identity – continuity
7. I feel that this place is a part of me.	.79	p. identity – continuity
8. This place is the best place for what I like to do.	.70	place dependence
9. I get more satisfaction out of being here than in any other place.	.77	place dependence
10. I have good memories of this place.	.62	rootedness-memories
11. This place brings me bad memories. R	.61	rootedness-memories
People (eigenvalue = 4.32; variance explained = 13.50%)		
12. I know the name of most of the people who live near me.	.73	SC – membership
13. I feel like everyone knows each other here.	.63	SC – membership
14. I don't know the name of most of the people who live near me. R	.67	SC – membership
15. I value the opinion of my neighbors and community.	.60	SC – influence
16. Whenever there are problems regarding this place, the neighbors/community join to solve the problems.	.74	SC – influence
17. The community doesn't come together to try and solve the problems. R	.78	SC – influence
18. I can trust the members of this community.	.69	SC – integrat. fulfil. needs
19. People here care about each other.	.69	SC – emotional connection
20. Here, we help each other.	.81	SC – emotional connection
21. In this community, it's every man for himself. R	.82	SC – emotional connection
Time (eigenvalue = 2.99; variance explained = 9.36%)		
22. I've been living here for a long time.	.71	rootedness – temporality
23. I feel life all my life was spent here.	.77	rootedness – temporality
24. I live here because my family (parents, grandparents) also live here.	.88	rootedness – intergen. trans.
25. Most of my family is from here.	.86	rootedness – intergen. trans.
26. Most of my family also lives here.	.86	rootedness – intergen. trans.
Self (eigenvalue = 2.33; variance explained = 7.29%)		
27. I am more similar to the other people who live here, than people from other places.	.76	p. identity – distinctiveness
28. People who live in other places are very different from me.	.75	p. identity – distinctiveness
29. People who live here are more similar to me than people who live in other places.	.82	p. identity – distinctiveness
30. When someone criticizes the place where I live, it feels like a personal insult.	.56	p. identity – self-esteem
31. When someone praises the place where I live, it feels like a personal compliment.	.46	p. identity – self-esteem
32. I really don't like when I hear someone criticizing the place where I live.	.47	p. identity – self-esteem

Source: Own Elaboration

Table 2. Internal consistency (Cronbach's alpha), homogeneity (mean inter-item correlations, MIIC) and descriptive statistics (mean, standard deviation SD, skewness, and kurtosis) for the Sense of Place Scale (SoP) and sub-scales (place, people, time, self), obtained in Study 1. n = 432.

Scales	Alpha	MIIC	Mean	SD	Skewness	Kurtosis
SoP	.915	.267	3.10	0.60	-0.04	0.03
Place	.935	.567	3.63	0.82	-0.47	-0.31
People	.900	.488	2.81	0.76	0.05	-0.48
Time	.897	.629	2.85	1.26	0.28	-1.25
Self	.803	.402	2.82	0.75	-0.02	0.03

Source: Own Elaboration

3. STUDY 2: CONFIRMATORY FACTOR ANALYSIS

Study 2 aimed to test different measurement models of sense of place based on the 4-factor structure obtained in study 1, using confirmatory factor analysis with maximum likelihood estimation. Three measurement models were tested: model 1) four first-order factors (place, people, time, self) and one second-order factor (sense of place); model 2) four correlated first-order factors; and model 3) one first-order factor (sense of place). The three models were tested unconstrained (A) and modified according to modification indices (B).

3.1 Methods

3.1.1 Participants and Procedure

The 32-item Sense of Place Scale (SoPS) obtained in study 1 was administered to a different sample of participants. The Oviedo Infrequency Scale was interspersed in the SoPS to detect and remove participants that may have responded randomly, pseudorandomly, or dishonestly to the questionnaire (Fonseca-Pedrero et al., 2009). A snowball sample was collected through social media and participants responded to an online version of the questionnaire, where responses to all items were mandatory. Paper-and-pencil questionnaires were also administered to University students. A total of 359 participants completed the questionnaire (161 online and 198 in paper); after removal of multivariate outliers (n = 36) and participants who responded randomly, pseudorandomly, or dishonestly (n = 2), a final sample of 321 respondents was obtained. Of these, 72.6% are female and 27.4% male; 52.8% of respondents were between 18 and 35 years old, and 32.1% were between 36 and 50. More than 58% of respondents have higher education studies and the majority lives in Faro (47.5%) and Lisbon (16.1%) districts (includes urban, suburban, and rural dwellers).

3.1.2 Data Analysis

Data screening to examine the shape of data distribution and the presence of multivariate outliers was conducted prior to the CFA. Skewness and kurtosis were calculated to evaluate normality, and multivariate outliers were identified and removed, as described in section 2.1.2. As CFA requires complete data sets, missing values (0.26%) in the paper questionnaires were estimated through multiple imputation using the expectation maximization algorithm (McLachlan & Krishnan, 1997).

Several fit indices were used to test model fit, namely the normed chi-square (X^2/df), the root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMR), the comparative fit index (CFI), and the consistent akaike information criterion (CAIC). X^2/df between 1 and 5 (Jöreskog, 1970), RMSEA < 0.06 and SRMR < 0.08 (Hu & Bentler, 1999), and CFI ≥ 0.90 (Carlson & Mulaik, 1993) are considered as indicators of good model fit. When comparing models, lower CAIC values reflect the better-fitting one (Schermelleh-Engel et al., 2003). In addition, confidence intervals for RMSEA were computed to assess the precision of the estimates.

Finally, the factors' convergent related validity and discriminant validity were also assessed. The average variance extracted (AVE) and composite reliability (CR) were computed to evaluate convergent related validity, i.e., to assess if the items of each factor converge on that factor; AVE ≥ 0.5 and CR ≥ 0.7 are indicative of construct convergent related validity (Hair et al., 2005; Marôco et al., 2014). Discriminant validity was evaluated as proposed by Fornell and Larcker (1981), to assess if different factors evaluate different constructs; two constructs show discriminant validity if both AVE are higher than the determination coefficient between them. All analyses were performed with IBM SPSS Statistics v. 25 and AMOS v. 22.

3.2 Results

Skewness and kurtosis values suggested no deviations from normality. Fit indices for the three measurement models tested are presented in Table 3. Unconstrained models 1A, 2A and 3A presented unacceptable fit. Post-hoc modifications, based on the modification indices, were performed to obtain better fitting and parsimonious models. Model fit was improved by adding co-variances to pairs of errors in the same factor. For models 1B, 2B and 3B, seventeen, fifteen and forty-nine co-variances were added, respectively. These modifications improved fit indices for all models, but model 1B (Figure 2) presented the best fit, with X^2/df (2.362), SRMR 0(.0792), RMSEA (0.065) and CFI 0(.02) values within acceptable ranges. Fit indices for models 2B (X^2/df = 2.502, SRMR = 0.1042, RMSEA = 0.069, CFI = 0.892) and 3B (X^2/df = 2.857, SRMR = 0.1055, RMSEA = 0.076, CFI = .875) suggest a poorer fit. Comparison of CAIC values between the three models (model 1B = 1622.103; model 2B = 1684.053; model 3B = 1946.759) further indicate the model 1B is the most adequate.

Composite reliability for each of the four factors (place, people, time, self) was >0.8, and the average variance extracted was >0.5, suggesting a good convergent-related validity (Table 4). Comparison of AVE for each factor and determination coefficients between factors indicated divergent validity between all factors, given that AVE (range 0.43 - 0.67) was higher than R^2 (range 0.070 - 0.329, n = 321) for all cases.

Table 3. Fit indices for different measurement models of the Sense of Place Scale. Model 1) four first-order factors (place, people, time, self), one second-order factor (sense of place); model 2) four correlated first-order factors; model 3) one first-order factor (sense of place). Model A) unconstrained, model B) modified according to modification indices. The better-fitting model is in bold.

Model	X^2/df	SRMR	RMSEA (90% CI)	CFI	CAIC
1A	3.923	.103	.096 (.091-.100)	.781	2266.398
1B	**2.364**	**.079**	**.065 (.060-.070)**	**.902**	**1631.671**
2A	3.935	.103	.096 (.091-.100)	.782	2276.214
2B	2.502	.104	.069 (.063-.074)	.892	1684.053
3A	7.623	.146	.144 (.139-.148)	.500	3971.430
3B	2.857	.106	.076 (.071-.081)	.875	1946.759

Note: X2/df – chi-square/degrees of freedom; SRMR – standardized root mean square residual; RMSEA – root mean square error of approximation; CFI – comparative fit index; CAIC – consistent Akaike information criterion; 90% CI – 90% confidence interval

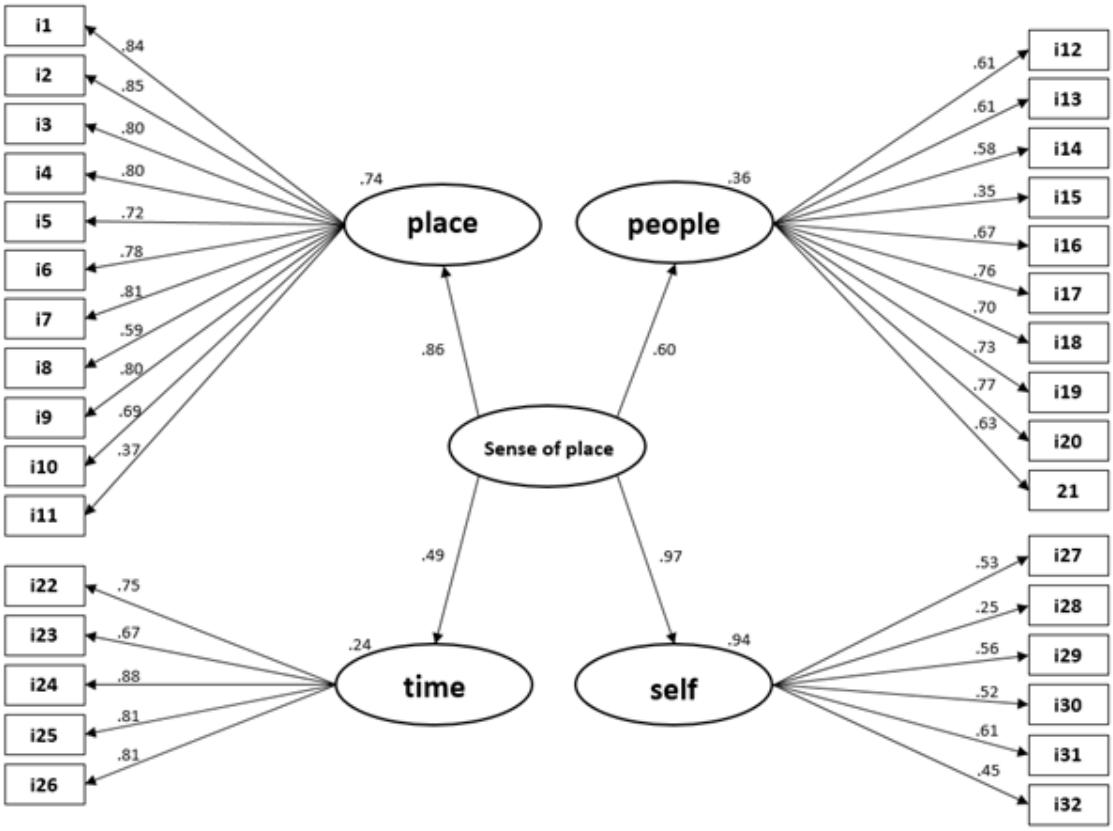
Source: Own Elaboration

Table 4. Composite reliability (CR) and average variance extracted (AVE) for each factor of SoPS

Factor	CR	AVE
place	.93	.54
people	.91	.51
time	.91	.67
self	.81	.43

Source: Own Elaboration

Figure 2. Standardized estimates for the better-fitting model of sense of place (model 1B), consisting of four first-order factors (place, people, time, and self) and one higher-order factor (sense of place), obtained through confirmatory factor analysis.



Source: Own Elaboration

4. STUDY 3: TEST-RETEST RELIABILITY OF THE SENSE OF PLACE SCALE

Study 3 aimed to analyse the test-retest reliability and agreement of the 32-item Sense of Place Scale.

4.1 Methods

A 2-month test-retest design was used to evaluate the temporal stability of the 32-item Sense of Place Scale (obtained in study 1), assuming that participants would not remember their previous responses and that their level of emotional bonds with their place of attachment would not change in this time interval. Paper-and-pencil questionnaires were administered to a convenience sample of University students in October and December 2017. On both sampling occasions, participants were asked to identify the questionnaire with a specific code, so that pairing of questionnaires would be possible. A total of 166 students completed the questionnaires at both moments. Participants were asked for how long they have been living in the place they referred to in the questionnaire, given that many are dislocated from their family home and living close to the University temporarily and for a short period of time. For the test-retest, we only considered participants that were living in a given place for 5 or more years. After removal of multivariate outliers (as described in section 2.1.2), a final sample of 97 participants was thus obtained; of these, 78.9% are female and 21.9% male, and the majority (94.3%) are between 18 and 35 years old. Approximately 55% of the

participants reside in Faro district, and 71.9% are undergraduate students and 28.2% are graduate students.

Test-retest reliability and agreement were evaluated as suggested by Berchtold (2016). Pearson's correlation coefficient was used to evaluate reliability between the two moments of questionnaire administration, and Lin's concordance correlation coefficient (Lin, 1989) was used to evaluate agreement, for the whole SoPS and for each of the four dimensions (place, people, time, self). Analyses were performed with IBM SPSS Statistics v. 25.

4.2 Results

Test-retest reliability at 2 months for SoPS was good, with $r = 0.790$ ($p < 0.001$). Test-retest reliability for the four dimensions of SoPS were all significant (p <0 .001), and excellent for the *place* dimension (0.833), good for *people* (0.765) and *time* (0.646) dimensions, and moderate for the *self* dimension (0.544). Lin's concordance correlation coefficient for SoP was 0.813 for the whole scale, 0.833 for *place*, 0.768 for *people*, 0.710 for *time*, and 0.786 for *self*.

5. DISCUSSION

In this study, we developed a new multidimensional model of sense of place, an overarching construct with four dimensions: place, people, time, and self. We also validated a 32-item self-report questionnaire to measure this construct and its quadripartite structure.

The *place* dimension had the highest explanatory power; this factor is comprised of eleven items that reflect different facets of the relationship between the individual and the place. Items 1 to 7 express the emotional attachment to the place and the desire to never leave it, in accordance with Hidalgo and Hernández's (2001) definition of place attachment as an affective bond characterized by the desire to maintain closeness to the place of attachment. Indeed, items 1-3 were intended to measure the emotional bond, whereas items 4-7 were meant to measure continuity as a sub-dimension of place identity. However, all items carry emotional content, globally expressing the affective bond between the individual and the place. Functional attachment is measured by item 8, which reflects the importance of the place in supporting important or desired activities and goals. Item 9, adapted from Williams and Vaske's (2003) place dependence questionnaire, was intended to measure place dependence, but this item seems to be more similar to items with emotional content (items 1-7) rather than expressing a functional attachment to the place. The attachment measured by items 1-9 is associated with the memories of the place, measured by items 10 and 11, as these items refer specifically to good/bad memories, hence bringing up emotional content. Inter-item correlations are high for the eleven items, further suggesting that the different theoretical concepts of attachment, dependence, and continuity are closely related and should form one dimension expressing the relationship between the individual and a specific place. Overall, this *place* dimension is equivalent to place attachment as an emotional bond between people and specific places.

Other models have considered place attachment as a unidimensional construct that expresses an emotional connection with the place. The components of this connection, however, vary among authors. For instance, Lewicka (2005) included feelings of security in the place, missing the place, and being proud of the place in a unidimensional place attachment scale. Another unidimensional model of place attachment included general, social and physical attachments to the house, to the neighbourhood and to the city (Hidalgo & Hernández, 2001). Contrasting with these and other models that consider place attachment, place identity and place dependence as separate dimensions (Jorgensen

& Stedman, 2001; Hammitt et al., 2006; Raymond et al., 2010), our analysis suggests that place attachment, identity and dependence may exist as facets of a place-related dimension, rather than independent constructs.

The *people* dimension includes items that were intended to measure specific facets of sense of community, namely membership, influence, integration and fulfilment of needs, and shared emotional connection, according to McMillan and Chavis' (1986) model. Only two of the original twelve items were removed, as suggested by the principal component analysis. Other than that, the *people* factor coincides with the sense of community construct, reflecting a feeling of familiarity and closeness to the members of the community (items 12-14), a feeling of valorisation of the community (items 15-17), a feeling of trust between community members (item 18), and a sense of concern for community members (items 19-21).

Although many models of people-place relationships emphasize a bi-dimensional view of place attachment, with identity and dependence as dimensions, many others have included a social-cultural dimension that refers to the characteristics of the inhabitants of the place and how those people influence place attachment. For instance, Riger and Lavrakas (1981) have identified a sense of community comprised by social bonding between individuals and their neighbours, and behavioural rootedness, associated with length of residence. Raymond et al. (2010) included items to measure friend bonding/belongingness that reflect social ties between the individual and other people from the place. McMillan and Chavis' (1986) model of sense of community has provided a framework for the evaluation of this construct, either independently from place attachment or as a dimension of place attachment. For instance, Peterson, Speer, and McMillan (2008) provided empirical support for a sense of community scale based on the multidimensional model of sense of community. Other studies have used scales based on this model to evaluate sense of community in specific settings (Sakip et al., 2012; El-Ekhteyar & Furlan, 2016). McMillan and Chavis' (1986) sense of community model is indeed very robust, expressing a well differentiated construct that, in our proposed model, can be considered as a dimension of sense of place.

The social context of place attachment has been conceptualized and operationalized in different ways; many models include rootedness and time-related variables as components of community attachment. However, our results suggest that a *time* dimension is separate from the community or *people* dimension. This temporal dimension is related not only to the length of residence at the place, expressed by items 22 and 23, but also to an intergenerational transmission, assessed by items 24-26. The importance of length of residence and intergenerational transmission for the development of place attachment has also been suggested by other scholars. For instance, Lin and Lockwood (2014) observed that locals and long-term non-local visitors of protected areas in Australia developed strong emotional bonds when their families had resided in or visited the areas for generations. Positive correlations between length of residence and place attachment and identity were found in Israeli cities' residents (Casakin et al., 2015), and in natives and non-natives of the Canary Islands (Hernández et al., 2007). A family bonding dimension was also considered by Raymond et al. (2010), reflecting the importance of intergenerational transmission for the development of place attachment; for instance, family bonding item "*I live in the Adelaide and Mount Lofty Ranges because my family is here*" is similar to our items 24-26. Other authors have considered length of residence as a predictor of place attachment (Anton & Lawrence, 2014; Scannell & Gifford, 2014; Karacor & Parlar, 2017) rather than its component; nonetheless, strong relationships between the two variables are repeatedly found (see review by Lewicka, 2011 and references therein).

Finally, the *self* dimension includes items intended to measure the distinctiveness and self-esteem sub-dimensions of place identity. The six items are more internally focused than

items in the other dimensions, that reflect relationships with the place itself, the people in the place, and the time spent in the place. Items 27-29 compare the self with other people, reflecting the self's desire to be different from others; this emphasis on comparison between different types of people is labelled as place identification by Twigger-Ross and Uzell (1996). Items 30-32 reflect the self-esteem associated with the place, i.e., an individual's positive or negative feelings about themselves associated to the place, rather than a positive or negative evaluation of the place. These items mostly express a sense of pride for the place, identified as the self-esteem component of place identity (Twigger-Ross & Uzell, 1996). The continuity and self-efficacy components of place identity were also measured in the first SoP questionnaire (study 1), but these items were either removed or included in another SoP dimension. Indeed, the three items intended to measure self-efficacy were removed due to their low communalities, suggesting that the feeling of self-efficacy is not associated with attachment to a specific place. Items measuring continuity loaded on the *place* factor, given that these items refer to the relationships between the individual and the place, specifically the fit between the place and the individual, and the desire never to leave the place. These items seem more externally focused than distinctiveness and self-esteem items, hence their high loadings on the *place* factor.

The identification of an overarching sense of place construct with four dimensions has some important implications for place-people research, in agreement with other theoretical frameworks that consider sense of place an overarching or second-order factor. However, Jorgensen and Stedman (2001) concluded that a one-factor model (sense of place) was better fitting than their initial proposal of a three-factor structure (place attachment, place identity, place dependence) for sense of place. Conversely, our results suggest that sense of place is a second-order factor composed by four first-order factors (place, people, time, self). Analysis of convergent and divergent validity confirmed the empirical distinctions between the four factors, highlighting their inter-independence.

People-place relationships is a highly interdisciplinary field of research, and a myriad of theoretical frameworks of place attachment are available throughout the literature, lacking, however, corresponding empirical advancements (Lewicka, 2011). Other constructs may be components of an overarching "sense of place", and each may increase the explanatory power of people-place models. For instance, a "place discovered" variable that reflects an individual's agency to become attached to the place, which is equivalent to Hummon's (1992) ideological rootedness (Lewicka, 2013b), was not included in our instrument. Our proposal shows other limitations, of which the most striking is probably the strongly biased sample in terms of gender and education, with most respondents being female and highly educated. Nonetheless, the relationship between gender and education, and place attachment and related constructs, is not well established (e.g., Lewicka, 2013b; Bonaiuto, Mao, Roberts, Psalti, & Ariccio, 2016).

6. CONCLUSION

Proposing a new model of sense of place and a new instrument to measure this elusive construct is not a straightforward task. To conclude our article, we will use "the good, the bad and the ugly" framework to address the strengths and limitations of our model and instrument. Firstly, we begin with the good. Contrary to other place attachment/sense of place instruments, our Sense of Place Scale is not location-specific; therefore, this instrument has potential for a broad range of applications, as it can be used as is, or it can be adapted to specific locations. Our model also provides a new factorial structure of sense of place; by

operationalising sense of place in terms of place, people, time, and self, we contribute to its validity as a psychological construct.

Secondly, the bad. Although model fit is within an acceptable range, it is not as good as we would like, and an adequate fit was only obtained with post-hoc modifications. In addition, acquiescence bias might be a problem in the application of the instrument, as most items are worded in the same direction. A cross-cultural validation is also necessary, particularly to corroborate our claim of a broad applicability of the SoP instrument.

Third and last is the ugly. We are aware that a myriad of conceptualisations and operationalisations of sense of place/place attachment are already in place. Despite the important contributions of our study to the arena of people-place research, it also adds more entropy to an already chaotic environment. Nevertheless, it may also spark further discussion on place attachment theory and provide avenues of future research.

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Supplementary Material

Portuguese (original) items of the final 32-item Sense of Place Scale obtained in study 1 and questionnaire instructions. Reverted items are indicated with R.

As questões seguintes relacionam-se com o sítio onde vive. Assim, para responder a estas questões, considere o sítio onde vive; pode ser a sua cidade, bairro, ou uma zona da localidade, mas escolha um sítio ao qual se sinta emocionalmente ligado. Por favor, leia cada frase cuidadosamente e escolha a opção que melhor reflete a sua opinião, usando a escala seguinte:

1 = discordo fortemente
2 = discordo
3 = não concordo nem discordo
4 = concordo
5 = concordo fortemente

Lugar

1. Sinto-me muito ligado a este lugar.
2. Este sítio é muito importante para mim.
3. Sinto-me mais confortável aqui que noutros sítios.
4. Quero continuar a viver aqui.
5. Sinto-me bem integrado neste sítio.
6. Sinto que combino com este sítio.
7. Sinto que este lugar faz parte de mim.
8. Este sítio é o melhor sítio para fazer as coisas de que gosto.
9. Dá-me mais prazer estar aqui do que noutro sítio qualquer.
10. Tenho boas memórias deste sítio.
11. Este sítio traz-me más recordações. R

Pessoas

12. Conheço pelo nome a maioria das pessoas que vivem ao pé de mim.
13. Sinto que nos conhecemos todos aqui.
14. Não sei o nome da maioria das pessoas que vivem ao pé de mim. R
15. Valorizo a opinião dos meus vizinhos e da minha comunidade.
16. Quando temos problemas relativamente a este sítio, os vizinhos/comunidade juntam-se para os resolver.
17. A comunidade não se junta para resolver os problemas. R
18. Posso confiar nos membros desta comunidade.
19. As pessoas daqui preocupam-se umas com as outras.
20. Aqui, ajudamo-nos uns aos outros.
21. Nesta comunidade, é cada um por si. R

Tempo

22. Vivo aqui há muito tempo.
23. Sinto que toda a minha vida foi passada aqui.
24. Vivo aqui porque a minha família (pais, avós) já vivia aqui.
25. A maior parte da minha família é daqui.
26. A maior parte da minha família também vive aqui.

Self

27. Sou mais parecido com as outras pessoas que vivem aqui, do que com pessoas que vivem em locais diferentes.
28. As pessoas que vivem noutros sítios são muito diferentes de mim.
29. As pessoas que vivem neste sítio são mais parecidas comigo do que pessoas que vivem noutros locais.
30. Quando alguém critica o local onde vivo, sinto-me como se me estivessem a insultar.
31. Quando alguém elogia o local onde vivo, sinto-me como se fosse um elogio a mim próprio.
32. Não gosto nada quando ouço alguém a criticar o local onde vivo.