

Michał Dębek, Bożena Janda-Dębek¹
University of Wrocław

Perceived Residential Environment Quality
and Neighborhood Attachment (PREQ & NA)
Indicators by Marino Bonaiuto, Ferdinando Fornara,
and Mirilia Bonnes – Polish adaptation²

Abstract:

There have been increasing calls in environmental psychology for the standardized instruments measuring people's subjective perception of urban environment quality. One such tool is a commonly accepted and oft-cited questionnaire for measuring perceived urban environmental quality, the Perceived Residential Environment Quality & Neighborhood Attachment (PREQ & NA) Indicators, developed by a team of Italian researchers: Ferdinando Fornara, Marino Bonaiuto, and Mirilia Bonnes. This article presents the results of the PREQ & NA's adaptation study that we conducted in Poland. The adaptation project was divided into several qualitative and quantitative stages spanning April 2013 to December 2014. A total of 200 participants were examined, 99 women and 101 men aged between 18 and 89. We cooperated with six English and Italian translators. The results of our study demonstrated a factorial validity of the tool's Polish language version relative to both the Italian original and its recent Iranian adaptation, which we used for comparisons with the data obtained in a non-European cultural area. In addition to describing the entire adaptation procedure and presenting its results, we propose that a number of minor but necessary modifications be made in the Polish version, as indicated by our analyses. Following a positive verification and discussion of the Polish adaptation's convergent, discriminant, and criterion validity, we propose the final Polish version of the adapted questionnaire.

Keywords:

residential satisfaction; neighbourhood attachment; perceived residential environmental quality; urban neighborhood; Polish urban context; adaptation and validation of the instrument

¹ Michał Dębek, Bożena Janda-Dębek, University of Wrocław, Faculty of Pedagogical and Historical Sciences, Institute of Psychology, ul. Dawida 1, 50–527 Wrocław; michal.debek@uwr.edu.pl

² The authors gratefully acknowledge their translators: Tomasz Brzozowicz, Monika Dębek, Anna Machel, Daniel Słapek, Magdalena Szczepańska, and Michał Włosik for the contribution they have made to this research. We also would like to thank Professor Leszek Berezowski, from the Department of English Studies of the University of Wrocław, as well as Ferdinando Fornara from the Department of Pedagogy, Psychology and Philosophy of the Università degli studi di Cagliari for their invaluable support of this project.

Streszczenie:

W psychologii środowiskowej coraz częściej pojawiają się postulaty ujednolicenia narzędzi do pomiaru subiektywnego odzwierciedlenia jakości środowiska zurbanizowanego. Jednym z takich narzędzi jest powszechnie akceptowany i często cytowany na całym świecie kwestionariusz do pomiaru spostrzeganej przez ludzi jakości środowiska zamieszkania: Perceived Residential Environment Quality & Neighbourhood Attachment (PREQ&NA) autorstwa włoskich badaczy: Ferdinando Fornary, Marino Bonaiuto i Mirilli Bonnes. W tym artykule referujemy wyniki przeprowadzonych przez nas polskich badań adaptacyjnych tego narzędzia. Projekt adaptacyjny był podzielony na kilka jakościowych i ilościowych etapów. Prace badawcze trwały od kwietnia 2013 do grudnia 2014 roku. Przebadaliśmy łącznie 303 osoby – 163 kobiety i 130 mężczyzn, w wieku od 18 do 89 lat. Współpracowaliśmy z sześcioma tłumaczami języka angielskiego i włoskiego. Wyniki ujawniły trafność czynnikową polskiej wersji językowej w stosunku do włoskiego oryginału oraz adaptacji irańskiej, służącej nam jako materiał porównawczy z innego kręgu kulturowego. W tym artykule, poza opisem całej procedury i przedstawieniem wyników adaptacji, zasugerowaliśmy konieczność nieznacznych modyfikacji polskiej wersji PREQ&NA w stosunku do włoskiego oryginału, wynikającą z przeprowadzonych przez nas analiz. Zaproponowaliśmy także finalną wersję polskiej wersji kwestionariusza. Pozytywnie zwerifikowaliśmy i omówiliśmy trafność zbieżną, różnicową i kryterialną polskiej wersji.

Słowa kluczowe:

satysfakcja z miejsca zamieszkania; przywiązanie do okolicy zamieszkania; adaptacja narzędzia; pomiar jakości środowiska; jakość życia w miastach.

Introduction

An urban environment, as any other type of environment, has its own objective characteristics and, as such, can be described by using a variety of measures, including objective physical, social, functional, and contextual features (e.g. Aiello, Ardone, & Scopelitti, 2010; Marans, 2012). However, as they are based on the most objective possible description of environment and its quantitative characteristics (e.g. facts: there are two tram lines connecting the neighborhood with other parts of the city; there are two kindergartens and 10 ha of green areas in this neighborhood), such traditional evaluations do not allow for examining people's attitudes toward these environments. Furthermore, the objective description alone is insufficient to predict people's behavior and psychological states related to their environment (Dębek & Janda-Dębek, 2013; Marans & Stimson, 2011; van Kamp, Leidelmeijer, Marsman, & Hollander, 2003). Urban environments, like the entire world they belong to, are of course experienced and evaluated according to their relatively objective features, although these experiences are also influenced by people's subjective traits, expectations, and needs (Dębek, 2014). From a psychologically environmental perspective, however, it is only when that objective reality is confronted with individuals' subjective perception of it that significant psychological states can emerge (such as subjective life quality, place attachment, and identity). This subjective

environmental evaluation is emphasized by a substantial majority of researchers exploring human-environment relations (see, e.g., Bell, Greene, Fisher, & Baum, 2004; Gifford, 2007). Nevertheless, a review of existing research, for example, on the relationship between how individuals evaluate environmental quality and how they assess life quality (e.g. Dębek & Janda-Dębek, 2013; van Kamp et al., 2003) shows that several significant methodological problems prevail.

Some issues that prove most problematic today pertain to non-uniform definitions of quality of life, environment quality, residential satisfaction, and numerous other concepts (Dębek, 2014; Dębek & Janda-Dębek, 2013), causing fundamental ambiguities as to how these phenomena can be measured and gauged. In other words, researchers studying how individuals relate to their urban environment fail to agree on what needs to be measured and, indeed, how to do it. Against this backdrop, multiple attempts have been made to investigate phenomena like residential satisfaction (e.g. Ramkissoon, Graham Smith, Liam David, & Weiler, 2013; Smith, 2011; Stedman, 2002), place attachment (e.g. Lewicka, 2005, 2008, 2011, 2012; Manzo & Devine-Wright, 2014; Scannell & Gifford, 2010), sense of place (Campelo, Aitken, Thyne, & Gnoth, 2014; Easthope, 2004; Hay, 1998; Jackson, 1994; Jorgensen & Stedman, 2001; Moslemi & Ayvazian, 2014), place identity (e.g. Hernández, Martín, Ruiz, & Hidalgo, M. del Carmen, 2010; Kalandides, 2011; Lalli, 1992; Stedman, 2002), and quality of urban life (Dębek & Janda-Dębek, 2013; Marans & Stimson, 2011; van Kamp et al., 2003). In a great number of cases, however, researchers employ their own conceptual apparatus and instruments for measuring particular indicators that are deemed significant for a given, specifically defined research project. Such investigations are therefore often fragmentary in their scope and limited by a specifically conceptualized take on people-environment relationships. Still more problematic is the fact that such-obtained results frequently escape direct comparison with results from other studies, even though they might have investigated very similar, if not virtually the same, phenomena (e.g. neighborhood satisfaction and residential satisfaction). It is mainly for this reason that environmental psychologists still experience difficulties generalizing their conclusions and, consequently, expanding and transferring systematic and relatively universal knowledge on person-environment relationships.

Fortunately, this has begun to change and researchers now have at their disposal a number of fairly universal conceptualizations of selected aspects of person-environment relationships to select from that have received sound empirical verification and have also been commonly accepted. One such empirically-verified conceptualization is used in the questionnaire *Perceived Residential Environment Quality & Neighborhood Attachment (PREQ & NA)* Indicators developed mainly by an Italian research team: Marino Bonaiuto, Antonio Aiello, Marco Perugini, Mirilia Bonnes, Anna Paola

Ercolani, and Ferdinando Fornara (Bonaiuto, Aiello, Perugini, Bonnes, & Ercolani, 1999; Bonaiuto, Fornara, Ariccio, Ganucci Cancellieri, & Rahimi, 2015; Bonaiuto, Fornara, & Bonnes, 2003; Bonaiuto, Fornara, & Bonnes, 2006). The original PREQ & NA questionnaire (Bonaiuto et al., 1999) is a popular and oft-cited international instrument for measuring people's perceived urban environmental qualities. Complemented with place attachment indicators, the questionnaire is a reliable, multidimensional tool for evaluating residents' subjective perception of their urban environment. The original papers on PREQ & NA have received at least the following annual citations (Harzing, 2007): Bonaiuto, Aiello, Perugini, Bonnes, & Ercolani (1999) – 18 annual citations (a.c.); Bonaiuto, Fornara, & Bonnes (2003) – 14 a.c., Bonaiuto, Fornara, & Bonnes (2006) – 6 a.c.; Fornara, Bonaiuto, & Bonnes (2010) – 5 a.c. Since 1999, when the authors presented one of their first versions, the papers have received a minimal 550 citations (Harzing, 2007).

It appears that further verifying instruments that have already garnered research community acclaim, as well as working to expand and promote their use, should likely lead to promising conceptual and measuring unification for driving at least some aspects into current person-environment relationships.

For these reasons, we undertook to conduct a Polish adaptation. Apart from contributing naturally to the wider use of this doubtless valuable instrument, we wanted specifically to create an opportunity for international comparative studies aiming to compare how Poles and people inhabiting cities around the world perceive their urban environments.

Theoretical basis of PREQ & NA

One of the first PREQ & NA questionnaires comprised 126 statements concerning perceived residential environment quality (Bonaiuto et al., 1999). Its authors assumed that residential satisfaction is a multidimensional construct, an assumption grounded on the transactional-contextual approach to person-environment relationships proposed by Altman, Rogoff, and Stokols (1987). In line with this concept, subjective evaluation of a place of residence is formed by the interaction of the residents' traits and their multidimensional assessment of the place's physical quality.

Following in-depth qualitative exploration and theoretical deliberations, Bonaiuto et al. (1999) established 11 significant residential environment dimensions that need to be given subjective evaluation: (1) architectural and town-planning space, (2) organization of accessibility and roads, (3) green areas, (4) people and social relations, (5) punctual social-health-assistance services, (6) punctual cultural-recreational services, (7) punctual

commercial services, (8) non-punctual (in-network) services (transportation), (9) lifestyle, (10) pollution, and (11) maintenance/care. Subjective environmental evaluation is strongly related to place satisfaction – a construct defined by PREQ & NA’s creators as “the experience of pleasure or gratification derived from living in a specific place” (Fornara et al., 2010, p. 172) and operationalized as the classical three-facet attitude. According to Fornara et al. (2010), while the behavioral component may be examined in terms of people’s intentions to stay in or move from their current residence, the cognitive and affective satisfactory residential aspects may be studied by analyzing declarative residential quality assessments (Bonaiuto, 2004). Hence, apart from the 11 dimensions of residential environment, the PREQ questionnaire also comprised items for diagnosing both a specific behavioral intention to move out and a general evaluation about that environment.

The authors of the PREQ & NA questionnaire (Bonaiuto et al., 1999) posited that place satisfaction is significantly and positively related to the temporal aspects of residential experience – i.e., to how long residents live in a given place and how often they experience it (see Bonnes, Bonaiuto, & Ercolani, 1991; Bonnes, Bonaiuto, Ercolani, & De Rosa, 1991). This led to place attachment – perceived as theoretically related to the temporal dimension of people-environment relationships – being included in the studies. It was defined as the “positively experienced bonds, sometimes occurring without awareness, that are developed over time from the behavioural, affective, and cognitive ties between individuals and/or groups and their socio-physical environment” (Bonaiuto et al., 1999, p. 332). Altogether, the questionnaire comprised 11 indexes of perceived environment quality (interchangeably called “scales” by the authors), and an additional place attachment index (scale).

The PREQ & NA creators acknowledged that theoretical analyses and empirical studies in environmental psychology traditionally examined place of residence on the three levels – the city, district, and home (Bonaiuto et al., 1999; Fornara et al., 2010). Nevertheless, they consistently used the neighborhood as the basic “territorial unit”, which is why the questionnaire is most accurate when used to assess the neighborhood, but it can also be effectively used for evaluating other similar-scale residential area types, such as the housing estate and the complex of districts. This also makes PREQ & NA’s current form unsuitable for exploring the perceived quality of places whose scale is much greater (towns, communes, districts, and larger units) or much smaller (homes and residential complexes).

The PREQ & NA Polish adaptation

Original instrument and its abbreviated version

As mentioned above, the original PREQ & NA questionnaire comprised 126 statements (Bonaiuto et al., 1999). It had good statistical properties (Bonaiuto et al., 2003; Bonaiuto et al., 2006), although due to the large number of questions, the instrument did not prove to be very well suited for conducting a convenient screening of large population cohorts, in particular for on-street surveys, and similar research methods.

For this reason, Fornara et al. (2010) presented an abbreviated version called the Abbreviated Perceived Residential Environment Quality and Neighborhood Attachment Indicators. For clarity's sake and to avoid the different versions being confused, the abbreviated version is referred to as APREQ & NA in our paper. As was the case with the original PREQ & NA questionnaire (Bonaiuto et al., 1999), the new instrument was also divided into 11 thematic scales related to perceived environment quality (PREQ) and one neighborhood attachment scale. The researchers cut items from the original 126 down to 66, where three or four statements (the response format was a 7-point Likert-type scale) formed each of the 20 indexes that were indicators in the 12 scales of perceived urban environment quality and place attachment (11 PREQ + 1 NA). The 12 scales remained essentially the same as in the original instrument presented by Bonaiuto et al. (1999).

Additionally, APREQ & NA grouped the scales into five general dimensions: (1) architectural/urban planning, (2) sociorelational, (3) functional, (4) context, and (5) neighborhood attachment. Such a developed instrument was subjected to verification conducted on a quota sample of nearly 1,500 Italians from 11 urban areas of the country (Agrigento, Bologna, Cesena, Florence, Grosseto, L'Aquila, Latina, Matera, Palermo, Pescara, Salerno), which showed the APREQ & NA as having satisfactory statistical properties, only slightly below par as compared with the original – which was over twice as long and inconvenient to use beyond laboratory conditions (Fornara et al., 2010).

The version subject to adaptation

The Polish adaptation was APREQ & NA, that is, the 66-item abbreviated version. Launched in December 2013, the works on the Polish version were based on the English version published by Fornara et al. (2010), and on the original Italian questionnaire, which we received directly from its co-creator, Ferdinando Fornara.

Developing the Polish language version

The English version was translated into Polish individually by three translators, while the original Italian questionnaire was translated into Polish by two advanced Italian users and a professional Italian translator. All translations turned out to be very similar. The

English versions of the PL-APREQ items along with their Polish translations are given in Table A1.

Choice of translations

The first adaptation stage consisted of choosing two or three Polish translations for each item (depending on the how much divergence there was between the six available translations – three from English and three from Italian) that we thought (a) sounded most natural in the Polish language, (b) corresponded with the terms used by the Polish participants in our previous exploratory study, and (c) best captured the essence of the studied phenomena. Next, 13 Polish raters (4 women and 9 men aged 21–65) were asked to “choose from among the two or three following questions (descriptions or statements) the one that [they thought was] most unambiguous, natural, and that should be clear to most people”.

Participants

Participants were 24 English Studies students at the University of Wrocław – 18 men and 6 women aged between 21 and 26 (*Mdn*=24), who were asked to participate in the study twice: in March 2014 when they filled out the English APREQ & NA version, and two weeks later when they completed the Polish version compiled of the translations chosen by the raters. Participants were not compensated financially for their involvement in the study.

Method, tools, and procedure

The study comprised two stages. In Stage 1, participants filled out the English APREQ & NA questionnaire version that comprised 66 statements concerning 11 perceived of residential environment quality and neighborhood attachment dimensions. They were to respond to these statements on a 7-point Likert-type scale. In addition, participants were asked to answer (on a 0–6 response scale) an additional question about how they generally assessed their neighborhood: “Generally, how satisfied are you with the neighborhood where you currently live?”, and to declare whether they would recommend the neighborhood as a good place to live to their friends (on a 7-point Likert-type scale). Finally, participants completed a short demographic form. The study took between 10 and 12 minutes to complete. In Stage 2, which was conducted two weeks later, the entire procedure was repeated, with the only difference that participants filled out the Polish version.

Results

The results showed a high correlation between the English (test) and the Polish (retest) versions. A high correlation was observed when comparing each of the 66 paired items, with statistically significant Wilcoxon signed-rank test results present only in six cases. This minor variance did not prove problematic after we developed 20 joint indexes based on the Italian original, all of which demonstrated statistical correlations (non-significant

results in both Wilcoxon signed-rank tests and a repeated measures ANOVA with an intra-subject design). Test-retest comparisons for all indexes along with their correlations are shown in Table 1.

Table 1

Test of differences between English version of APREQ & NA and its Polish counterpart – within-subject design

	Index EN	Indeks PL	F	p	η^2	Z	p	r_s
1.	Building Aesthetics	Estetyka Budynków	2.37	>.10	ns			.84
2.	Building Density	Gęstość zabudowy	.87	>.30	ns			.84
3.	Building Volume	Wielkość budynków	2.41	>.10	ns			.85
4.	Commercial Services	Handel i usługi	.38	>.50	ns			.63
5.	Discretion	Dyskrecja-wścibskość	3.20	>.05	ns			.70
6.	Environment Health	Czystość środowiska	2.81	>.10	ns			.66
7.	External Connection	Komunikacja okolicy z miastem	1.12	<.30	ns			.77
8.	Green Areas	Zieleń	1.05	>.30	ns			.82
9.	Internal Functionality	Funkcjonalność okolicy	.13	>.70	ns			.81
10.	Relaxing vs Distressing	Relaks i stres	2.98	>.10	ns			.51
11.	School Services	Szkolnictwo	1.02	>.30	ns			.72
12.	Security	Bezpieczeństwo	3.12	<.05	ns			.90
13.	Sociability	Potencjał więzi międzyludzkich	.19	>.60	ns			.78
14.	Social Care Services	Usługi społeczne	.68	>.40	ns			.27 ^{ns}
15.	Sociocultural Activities	Kultura i rozrywka	.18	>.70	ns			.67
16.	Sport Services	Sport	.03	>.80	ns			.71
17.	Stimulating vs Boring	Stymulacja i znudzenie	3.26	>.05	ns			.72
18.	Transport Services	Komunikacja publiczna	.00	1	ns			.77
19.	Upkeep	Zadbanie okolicy	1.03	>.30	ns			.64
	Neighbourhood Attachment	Przywiązanie do okolicy				-1.47	.14	.60

Note. N=24

r_s =Spearman's Rho in repeated measurement

Z=Wilcoxon Signed-Rank test (due to non-normality distribution)

All correlations are significant at $p < .01$, except marked as ns

One index that did prove problematic was “Social care services / Usługi opieki społecznej”, with a non-significant English version correlation at $r = .27, p = .19$. A potential problematic source was that the English index wording comprised double negative examples in its questions-answers. The most substantial discrepancies were observed between the English version “Social services are inadequate in this neighborhood” (original wording:

“I servizi sociali del quartiere sono inadeguati”) and its Polish equivalent: “Usługi społeczne są niewystarczające w tej okolicy” ($r = -.27, p = .19$). Similar was the English “The local health service is inadequate in this neighborhood” (original: “In questa zona l’Azienda Sanitaria Locale non è adeguata alle esigenze degli abitanti”) and the Polish equivalent: “Okoliczna służba zdrowia jest niewystarczająca dla zaspokojenia potrzeb mieszkańców” ($r = .08, p = .68$). At the same time, it is worth emphasizing that while the entire “Social care services” index demonstrated an unacceptably low reliability, but with Cronbach’s $\alpha = .44$, its Polish equivalent, “Usługi opieki społecznej”, had reliability at a higher level $\alpha = .63$. Similarly, the original index version also yielded relatively coherent data ($\alpha = .62$) in the Italian study (Fornara et al., 2010). Given that the Polish and Italian index versions produced almost identical reliability levels, and that all the items included in the Polish version corresponded with the translations from Italian, we concluded these problems likely originated in either the English items themselves or possibly in insufficient language skills displayed by the English Studies Department students. For this reason, we decided to subject the Polish version to more detailed statistical testing in our study’s further stages.

Verifying the measurement model in the Polish language version

In May and June 2014, we conducted a study to verify the statistical properties of the APREQ & NA Polish version (hereinafter referred to as the PL-APREQ & NA). The aim of our study was to test the Polish version for reliability of its indexes and dimensions, and to evaluate its factorial, criterion, and convergent validity.

Participants

To test the Polish version’s data distribution within indexes and their reliability, we carried out a study involving 110 participants – 55 men and 55 women aged between 19 and 89 ($Mdn = 25$). They were part-time students in the Higher School of Banking in Wrocław, Department of Finance and Management ($N = 27$); part-time students the University of the Third Age (the University of Wrocław; $N = 28$); full-time students University of Wrocław in the Psychology Department ($N = 12$) and the English Studies Department ($N = 12$); and full-time students Wrocław University of Technology, Faculty of Architecture ($N = 18$). Asked about their marital status, 37% declared they were single, 31% lived in a stable relationship, 16% were married, 10% widowed, while five out of 100 participants were separated after a divorce. Nearly half the sample (45%) declared that they had completed secondary education, 40% held a bachelor’s degree, and 15% a master’s degree. Two participants held a university degree above the master’s level. In each subgroup, male and female participants constituted 50%.

Method, tools, and procedure

Participants were asked to fill out the PL-APREQ & NA questionnaire that comprised 66 statements concerning 11 dimensions dealing with perceived residential environment quality and neighborhood attachment. They were to respond to these statements on a 7-point Likert-type scale. Furthermore, participants were asked to answer (on a 0–6 response scale) an additional question about their general assessment of their neighborhood: “Generally, how satisfied are you with the neighborhood where you currently live?”, as well as to declare whether they would recommend the neighborhood as a good place to live to their friends, and whether they would like to move from their neighborhood in the near future (both on 7-point Likert-type scales). In addition to completing the PL-APREQ & NA, participants were asked to fill out the WHOQOL-BREF – a 27-item questionnaire for assessing quality of life (World Health Organization, 1998). Finally, participants completed a short demographic form, which included information about their approximate residence (so as to pinpoint the Wrocław neighborhood where they lived). The entire process took around 20 minutes to complete.

Measurement reliability – preliminary assessment in the Polish version

The Polish version demonstrated 13 of its 20 indexes to have acceptable reliability, including 10 at levels above Cronbach’s $\alpha = .80$. The remaining seven indexes showed reliability below the usual level $\alpha = .70$ recommended by Kline (2000) (see Table 2). These were the indexes of discretion, transport services, internal functionality, sociocultural activities, social care services, school services, and upkeep. An index’s low reliability, as measured by the α parameter, may result from a variety of causes, including (1) a small sample, (2) a low number of indicators in a given index, or (3) poor answer interchangeability, that is, a case where there is a possible heterogeneity of constructs that are theoretically measured by a particular index (see Bedyńska & Cypryńska, 2013; Field, 2009).

Some indexes could perhaps yield higher reliability levels in a study using a larger sample ($N > 1000$); admittedly, in the Italian study (Fornara et al., 2010), where the sample included nearly 1,500 participants, some indexes demonstrated slightly higher reliability levels. On the other hand, some had reliability at even lower levels than those observed in our study (see Table 2). It is also worth pointing out that Fornara et al. (2010) chose to accept three indexes with reliability levels below $\alpha = .70$: internal functionality (reliability below $\alpha = .70$ in both the Polish and Italian versions), socio-cultural activities (reliability as above), and stimulating versus boring (reliability at $\alpha = .67$ and $\alpha = .76$ in the Italian and Polish versions, respectively).

Table 2

APREQ & NA: comparison of reliabilities of basic indexes in Italian and Polish version of the instrument

Index EN ^{a,1}	Indeks PL ²	N _o	α PL	α IT
1. Building Aesthetics	Estetyka Budynków	3	.82	.72
2. Building Density	Gęstość zabudowy	3	.89	.85
3. Building Volume	Wielkość budynków	3	.87	.83
4. Commercial Services	Handel i usługi	4	.84	.88
5. Discretion	Dyskrecja-wścibskość	3	.59	.79
6. Environment Health	Czystość środowiska	4	.83	.86
7. External Connection	Komunikacja okolicy z miastem	3	.66	.82
8. Green Areas	Zieleń	4	.71	.87
9. Internal Functionality	Funkcjonalność okolicy	3	.66	.67
10. Relaxing vs Distressing	Relaks i stres	3	.81	.71
11. School Services	Szkolnictwo	3	.48	.79
12. Security	Bezpieczeństwo	3	.91	.78
13. Sociability	Potencjał więzi międzyludzkich	3	.74	.73
14. Social Care Services	Usługi społeczne	3	.50	.62
15. Sociocultural Activities	Kultura i rozrywka	3	.67	.71
16. Sport Services	Sport	3	.80	.82
17. Stimulating vs Boring	Stymulacja i znudzenie	3	.76	.67
18. Transport Services	Komunikacja publiczna	4	.83	.81
19. Upkeep	Zadbanie okolicy	4	.66	.70
Neighbourhood Attachment	Przywiązanie do okolicy	4	.84	.82

Note. ¹N = 1488, ²N = 110

N_o = number of items; α PL = Cronbach's alpha of Polish version; α IT = Cronbach's alpha of Italian version

^a reliabilites in Italian version of PREQ indexes reported by Fornara et al. (2010)

All indexes yielded higher reliability levels in the first, longer version of the PREQ & NA (Bonaiuto et al., 1999), in which they comprised on average twice as many items as in the abbreviated version. In this light, it appears safe to argue that the cause behind the overall low reliability of at least seven indexes (in both the Italian original and the Polish version) may likely be the sensitivity – often mentioned in the literature on the subject – of the α parameter to the items in a scale, irrespective of whether the indexes represent only one or many theoretical dimensions (Bedyńska & Cypriańska, 2013; Field, 2009).

The third possible reason for the low reliability may be the already-mentioned possible heterogeneity of constructs that are theoretically measured by an individual index. Given the above, apart from testing index reliability, we also decided to verify the theoretical assumptions underlying the measurement model accepted by Fornara et al. (2010) and chosen for the Polish adaptation.

Factorial validity of the indexes and thematic scales

Both PREQ and APREQ rely on 11 consistent thematic scales for assessing environment quality. We performed principal component analysis (PCA) for each scale in order to verify how valid this theoretical assumption would be. Each analysis included relevant questionnaire items, which constituted the primary indicators for each of the 11 individual thematic areas. The theoretical assumptions underlying established and well-documented measurement models are often tested through confirmatory factor analysis. Although ours is a less popular method, we chose PCA because it was recently used in Iran to adapt APREQ & NA, as described by Bonaiuto et al. (2015). This was done to allow us not only to compare our results with Italian study, but also with the data obtained in a non-European cultural area (Table A2).

Architectural and Urban Planning Space

In the questionnaire's original version, this scale comprised nine items that formed three indexes: (1) Building Aesthetics, (2) Building Density, and (3) Building Volume.

In line with the theoretical assumptions, three factors were distinguished in the PCA's Polish version: they corresponded with the hypothetical indexes where total variance accounted for 72%. These factors were moderately correlated ($r = .42$; $r = -.44$). Eight out of nine items were almost uniquely loaded on the factors that corresponded with their respective indexes. However, even though the scale of Architectural and Urban Planning Space proved to have an excellent total reliability factor ($\alpha = .86$), an analysis of the communalities and the correlation between the scale and its individual items showed that some items were only moderately correlated with the scale ($r \sim .50$). It follows that in order to create the most possibly consistent measure of Architectural and Urban Planning Space and, at the same time, to limit the its items to the extent possible (which is usually desired), at least several items could very well be eliminated from the scale – BD1, BV2, BV3, BA1, and BA3 (Table 3). Such a composed four-item one-factor index of Architectural and Urban Planning Space 1F would have reliability at the $\alpha = .82$ level, which is higher compared with its three-index equivalent. Importantly, this created new index would still include questions about the three key aspects of physical space that the authors perceived as significant in the original scale. Table 3 provides more detail on the indexes and the scale, in both the original and abbreviated questionnaire versions.

Table 3

Factorial Structure and Reliability of Architectural and Urban Planning Space

	Factor ^a λ			h ²	R _{CC}
	BD	BV	BA		
† BD1 Buildings are too close together in this neighborhood*	.92			.72	.50
BD2 There is enough space between houses in this neighborhood	.84			.74 (†.74)	.64 (†.71)
BD3 There is little space between buildings in this neighborhood*	.84			.85 (†.81)	.74 (†.77)
† BV2 The volume of buildings is too big in this neighborhood*		.90		.75	.53
† BV3 Buildings are too tall in this neighborhood*		.87		.75	.58
BV1 The dimension of buildings is oppressive in this neighborhood*		.78		.72 (†.50)	.65 (†.50)
† BA1 Buildings are beautiful in this neighborhood			.93	.75	.46
† BA3 Buildings have unpleasant colors in this neighborhood*			.70	.52	.51
BA2 It is pleasant to see this neighborhood	(.56)		.65 (.77)	.66 (†.57)	.69 (†.58)
Eigenvalues by factor	4.07	1.31	1.09		
Variance explained by factor	45%	14%	12%	Σ 72% (†64% ^a)	
Index Cronbach's α	.89	.89	.82		
Scale Cronbach's α					.86 (.82a)

Note. K-M-O = .78; Bartlett Test of Sphericity $\chi^2(36) = 598.39, p < .001$

Extraction Method: PCA and Principal Axis Factoring. Rotation Method: Promax with Kaiser Normalization. Pattern matrix is reported except loadings in brackets, which are reports of structure matrix whenever respective loadings are above .50

BA – Building Aesthetics; BD – Building Density; BV – Building Volume

h² – communalities (PCA); R_{CC} – corrected item-total correlation (item-rest correlations);

† – item removed from index due to low communality weakening the measurement reliability;

(†..) – results after removal of weakening item.

^a After removal of items indicated by † the scale was unidimensional.

* inversed measures.

In the recent Iranian adaptation, Bonaiuto et al. (2015) performed PCA to distinguish two factors concerning Architectural and Urban Planning Space – (1) Building Volume, and (2)

Building Aesthetics and Building Density (Table A2), that were correlated at $r = .10$. This shows that our results clearly differ from those obtained in Iran. Furthermore, in the Polish version we stand for using the one-factor measure of Architectural and Urban Planning Space 1F.

Commercial Services

In the original instrument, this was a single four-item index. In line with the theoretical assumptions, only one factor was distinguished in the PCA, which accounted for 68% total variance. An analysis of covariance and common variance showed that the weakest item – CS4 (“Stores are not well distributed in this neighborhood”) – could very well be eliminated from the index. This increased the index’s already high reliability only further, up to $\alpha = .86$, and improved its consistency. Once CS4 was eliminated, the CS factor accounted for nearly 80% of total variance (Table 4).

Table 4
Factorial Structure and Reliability of Commercial Services

	Factor λ	h^2	R_{cc}
	CS		
CS1 There are all kinds of stores in this neighborhood	.83	.68 (†.75)	.68 (†.71)
CS2 Anything can be found in the neighborhood’s stores	.88	.79 (†.83)	.77 (†.79)
CS3 This neighborhood is well served with stores	.88	.79 (†.78)	.77 (†.74)
† CS4 Stores are not well distributed in this neighborhood*	.68	.46	.50
Eigenvalues	2.72 (†2.37)		
Variance explained	68% (†79%)		
Index Cronbach’s α	.84 (†.86)		

Note. K-M-O = .77; Bartlett Test of Sphericity $\chi^2(6) = 197.22, p < .001$

Extraction Method: PCA

CS – Commercial Services

h^2 – communalities (PCA); R_{cc} – corrected item-total correlation (item-rest correlations);

† – item removed from index due to low communality weakening the measurement reliability;

(†..) – results after removal of weakening item.

* inversed measures.

Green Areas

In the original instrument, this was a single four-item index. In line with the theoretical assumptions, only one factor was distinguished in the PCA, although it accounted for only 42% total variance. Despite the four-item index’s reliability at an acceptable $\alpha = .71$

level, an analysis of covariance and common variance clearly indicated that the problematic GA3 item (“Going to a park means travelling to other parts of the city”) be eliminated from the index. This substantially improved the index’s consistency and increased its reliability up to $\alpha = .77$. Once GA3 was eliminated, the Green Areas factor accounted for nearly 70% total variance (Table 5).

Table 5
Factorial Structure and Reliability of Green Areas

	Factor λ	h^2	R_{CC}
GA1 There are green areas for relaxing in this neighborhood	.80	.48 (†.57)	.75 (†.51)
GA2 There are enough green areas in this neighborhood	.69	.64 (†.79)	.62 (†.70)
† GA3 Going to a park means travelling to other parts of the city*	<.50	.16	.74
GA4 In this neighborhood, green areas are in good condition	.65	.43 (†.70)	.55 (†.62)
Eigenvalues	1.71 (†2.06)		
Variance explained	42% (†69%)		
Index Cronbach’s α	.71 (†.77)		

Note. K-M-O = .63; Bartlett Test of Sphericity $\chi^2(6) = 117.24, p < .001$

Extraction Method: PCA

GA – Green Areas

h^2 – communalities (PCA); R_{CC} – corrected item-total correlation (item-rest correlations);

† – item removed from index due to low communality weakening the measurement reliability;

(†..) – results after removal of weakening item.

* inversed measures.

Environmental Health

In the original instrument, this was a single four-item index. In line with the theoretical assumptions, only one factor was distinguished in the PCA, which accounted for 67% total variance. An analysis of covariance and common variance clearly indicated that the weakest item – EH4 (“Residents’ health is threatened by pollution in this neighborhood”) – be eliminated from the index. Although it did not significantly alter the index’s already high reliability, with Cronbach’s alpha at $\alpha = .83$, the eliminating the item increased its consistency considerably. Thus the reduced EH factor accounted for as much as 80% total variance (Table 6).

Table 6
Factorial Structure and Reliability of Environmental Health

	Factor λ	h^2	R_{cc}
	EH		
EH1 The air is clean in this neighborhood	.87	.76 (†.89)	.75 (†.70)
EH2 This neighborhood is generally not polluted	.87	.62 (†.87)	.62 (†.65)
EH3 This is a noiseless neighborhood	.78	.75 (†.83)	.74 (†.75)
† EH4 Residents' health is threatened by pollution in this neighborhood*	.73	.53	.55
Eigenvalues	2.67 (†2.26)		
Variance explained	67% (†75%)		
Index Cronbach's α	.83 (†.83)		

Note. K-M-O = .78; Bartlett Test of Sphericity $\chi^2(6) = 170.40, p < .001$

Extraction Method: PCA

EH – Environmental Health

h^2 – communalities (PCA); R_{cc} – corrected item-total correlation (item-rest correlations);

† – item removed from index due to low communality weakening the measurement reliability;

(†..) – results after removal of weakening item.

* inversed measures.

Organization of Accessibility and Roads

Two indexes, each comprising three items, combined to form this scale in the original instrument: (1) Internal Functionality, and (2) External Connections. In line with the theoretical assumptions, two factors were distinguished in the PCA that corresponded with their respective indexes (Table 7). The factors, which accounted for 60% total variance, were not correlated ($r = .03$). Analysing particular items' communalities revealed none of them to have much in common with the remaining hypothetical scale. Thus, the entire Organization of Accessibility and Roads scale would have a relatively low reliability, exactly at $\alpha = .43$. This indicated that, although internally consistent, the two indexes of Internal Functionality and External Connections diagnosed two separate and unrelated phenomena. We hold that in the Polish version these indexes fail to form one consistent scale and ought to be analyzed separately. What is more, it is worth pointing out that both indexes are generally weak: the Internal Functionality index has a low consistency level ($\alpha = .66$), which is similar to its original Italian equivalent; in contrast, the External Connections index (at $\alpha = .66$ in our study) was considerably more consistent in the Italian version ($\alpha = .82$). Eliminating one of the index's items (EC3) improved its consistency to a minimal degree – it produced a slightly more consistent measure ($\alpha = .71$), where the remaining EC1 and EC2 items correlated with the other elements of the scale (that is, with each other) at an acceptable $r = .55$ level.

Table 7

Factorial Structure and Reliability of Organization of Accessibility and Roads

	Factor ^a λ		h ²	R _{cc}
	EC	IF		
EC1 The city center can be easily reached from this neighborhood	.78		.69	.25
EC2 This neighborhood is well connected with important parts of the city	.77		.68	.35
† EC3 This neighborhood is too cut off from the rest of the city*	.76		.48	.10
IP2 There's a good availability of parking spaces		.83	.61	.33
IP1 Parked cars impede walking in this neighborhood*		.81	.60	.28
IP3 It is easy to cycle around in this neighborhood		.66	.60	.21
Eigenvalues by factor	1.91			
Variance explained by factor	31%		Σ 60%	
Index Cronbach's α	.66 (†.71)			
Scale Cronbach's α			.43	

Note. K-M-O = .63; Bartlett Test of Sphericity $\chi^2(15) = 107.43, p < .001$

Extraction Method: PCA and Principal Axis Factoring. Rotation Method: Promax with Kaiser Normalization. Pattern matrix is reported except loadings in brackets, which are reports of structure matrix whenever respective loadings are above .50

EC – External Connections; IF – Internal Functionality

h² – communalities (PCA); R_{cc} – corrected item-total correlation (item-rest correlations);

† – item removed from index due to low communality weakening the measurement reliability;

(†..) – results after removal of weakening item.

* inversed measures.

Also the Iranian authors' questionnaire (Bonaiuto et al., 2015) chose to distinguish two factors, which, however, differed in their structure from both the Italian (Fornara et al., 2010) and Polish versions. Moreover, they demonstrated higher reliability than the factors used in our study. In the Iranian version, Internal Functionality loaded on two items (IP2 and IP3), correlating at $r = .54, p < .01$.

Sociorelational Features

Nine items made up this scale in the original instrument, which was divided into three indexes: (1) Security, (2) Discretion, and (3) Sociability. In line with the theoretical assumptions, three factors were distinguished in the PCA that corresponded with the hypothetical indexes and accounted for 71% total variance (Table 8). The factors were poorly correlated, ranging between $r = .00$ and $.30$. The Discretion index, an internally inconsistent measure, showed no correlation with the remaining two factors. Conversely, the Security and Sociability indexes were correlated, although only moderately ($r = .30$), each being also an internally consistent measure, at $\alpha = .91$ and $.74$, respectively.

Table 8
Factorial Structure and Reliability of Sociorelational Features 3F

	Factor ^a λ			h ²	R _{cc}
	SE	SO	DI		
SE2 Acts of vandalism happen in this neighborhood*	.93			.83	.61
SE3 Here in the night there is the risk of dangerous encounters*	.88			.85	.70
SE1 You can meet bad people in this neighborhood*	.88			.82	.69
SO2 In this neighborhood, it is easy to get to know people		.82		.65	.39
SO1 In this neighborhood, it is difficult to make friends with people*		.82		.68	.36
SO3 In this neighborhood people tend to be isolated*		.63		.64	.52
DI1 People gossip too much in this neighborhood*			.90	.79	.25
DI2 In this neighborhood you feel watched*			.83	.68	.22
DI3 In this neighborhood people are not intrusive			< .40	.39	.15
Eigenvalues by factor	3.32	1.64	1.40		
Variance explained by factor	40%	18%	15%	Σ 71%	
Index Cronbach's α	.91	.74	.59		
Scale Cronbach's α				.76 (.82 ^a)	

Note. K-M-O = .73; Bartlett Test of Sphericity $\chi^2(36) = 379.26, p < .001$

Extraction Method: PCA and Principal Axis Factoring. Rotation Method: Promax with Kaiser Normalization. Pattern matrix is reported except loadings in brackets, which are reports of structure matrix whenever respective loadings are above .50

SE – Security; SO – Sociability; DI – Discretion

h² – communalities (PCA); R_{cc} – corrected item-total correlation (item-rest correlations);

† – item removed from index due to low communality weakening the measurement reliability;

(†..) – results after removal of weakening item.

^a After removal of items indicated by † the scale was unidimensional.

* inversed measures.

The imperfect indicators of the Discretion index were eliminated, which led to a reasonable solution with a scale now comprising only two factors: (1) Security and (2) Sociability; these accounted for 76% total variance (Table 9). The factors were moderately correlated ($r = .40$) and formed a reliable scale. Interestingly, the common variance of all the scale's items and of the corrected item-total correlation indicator for each item in the scale indicated that – relying solely on statistics – at least two further items could be eliminated from the scale without detriment to its mathematical properties. This solution, however, would not be advised for theoretical reasons, as eliminating the two items whose correlation with the scale was the weakest (SO1 and SO2; Table 9) would effectively leave the scale devoid of a crucial research aspect concerning interpersonal relations.

In conclusion, analysis of the Polish Socio-relational Features scale meant that the Discretion index was eliminated from the Polish questionnaire and further analyses altogether. The two remaining indexes (1) Security and (2) Sociability can be analyzed both separately – as reliable measures of their corresponding constructs, and together – within one Socio-relational Features 2F scale (Table 9).

Table 9

Factorial Structure and Reliability of Socio-relational Features 2F

	Factor λ		h ²	R _{cc}
	SE	SO		
SE1 You can meet bad people in this neighborhood*	.92		.84	.71
SE2 Acts of vandalism happen in this neighborhood*	.95		.84	.64
SE3 Here in the night there is the risk of dangerous encounters*	.88		.85	.77
SO1 In this neighborhood, it is difficult to make friends with people*		.86	.69	.40
SO2 In this neighborhood, it is easy to get to know people		.88	.74	.46
SO3 In this neighborhood people tend to be isolated*		.62	.63	.61
Eigenvalues	3.27	1.32		
Variance explained	54%	22%		Σ 76%
Index Cronbach's α	.91	.74		
Scale Cronbach's α				.83

Note. K-M-O = .79; Bartlett Test of Sphericity $\chi^2(15) = 325.08$, $p < .001$

Extraction Method: PCA and Principal Axis Factoring. Rotation Method: Promax with Kaiser Normalization.

SE – Security; SO – Sociability

h² – communalities (PCA); R_{cc} – corrected item-total correlation (item-rest correlations)

* inversed measures.

Also in the recent Iranian adaptation (Bonaiuto et al., 2015), the Socio-relational Features scale was employed in a different form from how it was originally designed in the Italian study (Table A2). In the Iranian case, it was a one-factor scale that comprised seven items diagnosing three theoretical traits of the environment – Security, Discretion, and Sociability. By and large, this appears to be one of the most problematic scales in the questionnaire.

Welfare Services

Two indexes, comprising six items, combined to form this scale in the original instrument: (1) School Services and (2) Social Care Services. In line with the theoretical assumptions, two factors were distinguished in the PCA that corresponded with their respective indexes, and accounted for 53% total variance (Table 10). The factors correlated

poorly ($r=.20$). The weak correlation of items within both indexes (ranging between $r=.17$ and $.30$, a result that translated into similarly low reliability levels) rendered it questionable to equip the Polish version not only with the scale itself but also with the two indexes – School Services and Social Care Services – that would hypothetically combine to form that scale. More details on the scale’s items are given in Table 10.

Table 10
Factorial Structure Of Welfare Services.

	Factor λ		h^2	R_{cc}
	SS	SC		
SS3 Schools are generally good in this neighborhood	.75		.55	.22
SS1 This neighborhood has good school facilities	.68		.61	.46
SS2 Schools can be easily reached on foot in this neighborhood	.58		.36	.25
SC3 The local health service is inadequate in this neighborhood*		.88	.76	.21
SC1 Social services are inadequate in this neighborhood*		.63	.53	.46
SC2 Elderly care services are lacking in this neighborhood*		.53	.38	.34
Eigenvalues	2.00	1.19		
Variance explained	33%	20%	Σ 53%	
Index Cronbach’s α	.48	.50		
Scale Cronbach’s α			.58	

Note. K-M-O = .60; Bartlett Test of Sphericity $\chi^2(15) = 74.38, p < .001$

Extraction Method: PCA and Principal Axis Factoring. Rotation Method: Promax with Kaiser Normalization. Pattern matrix is reported except loadings in brackets, which are reports of structure matrix whenever respective loadings are above .50

SS – School Services

SC – Social Care Services

h^2 – communalities (PCA); R_{cc} – corrected item-total correlation (item-rest correlations)

* inversed measures.

Unlike the case here in Poland, the indexes had high reliability levels in both the Italian study (Fornara et al., 2010) and the recent Iranian adaptation (Bonaiuto et al., 2015). In that light, we recommend that both indexes be excluded from the Polish version, much less so since they both diagnose phenomena that were virtually absent in the narratives collected in our previous exploratory study (unpublished) aiming to find out what Poles found important in their residential environments.

Recreational Services

Two indexes, comprising a total of six items, combined to form this scale in the original instrument: (1) Sport Services and (2) Social-Cultural Activities. In line with the theoretical assumptions, two factors were distinguished in the PCA that corresponded with their hypothetical indexes and accounted for 67% total variance. The factors moderately correlated ($r=.41$). More details on the items in this scale are given in Table 11. An item-

rest correlation analysis showed that, despite having acceptable reliability, the scale was not entirely consistent. Eliminating the SA2 and SA3 items (low communality, see Table 11) led to the creation of a one-dimensional, consistent Recreational Services 1F scale that replaced the two former Sport Services and Social-Cultural Activities indexes (Table 12). This was additionally motivated by an unacceptably low reliability of the individual Social-Cultural Activities index, also in the Italian original barely exceeding the accepted threshold $\alpha = .71$

Table 11

Factorial Structure and Reliability of Recreational Services 2F.

	Factor λ		h^2	R _{cc}
	SP	SA		
SP3 There are areas where you can do outdoor sports in this neighborhood	.91		.75	.60
SP1 You can do various sports in this neighborhood	.85		.72	.56
SP2 The neighborhood is well equipped with sports grounds	.78		.68	.62
SA2 In the evening, this neighborhood offers various attractions		.93	.74	.36
SA3 This neighborhood is not well equipped to host cultural events*		.66	.52	.46
SA1 Entertainment activities for residents are lacking in this neighborhood*	(.53)	.65(.76)	.64	.58
Eigenvalues	2.91	1.14		
Variance explained	48%	19%	Σ 67%	
Index Cronbach's α	.80	.67		
Scale Cronbach's α			.78	

Note. K-M-O = .76; Bartlett Test of Sphericity $\chi^2(15) = 193.85, p < .001$

Extraction Method: PCA and Principal Axis Factoring. Rotation Method: Promax with Kaiser Normalization. Pattern matrix is reported except loadings in brackets, which are reports of structure matrix whenever respective loadings are above .50

SP – Sport Services; SA – Social-Cultural Activities

h^2 – communalities (PCA); R_{cc} - corrected item-total correlation (item-rest correlations)

* inversed measures.

Eliminating SA2 and SA3 allowed for the creation of a reasonable one-dimensional solution that accounted for 62% total variance. The common variance of all the scale's items and of the corrected item-total correlation indicator for each item in the scale indicated that the scale was far from perfect, its consistency slightly reduced by the SA1 item related to residents' entertainment activities. As we decided to keep this item for its capacity to diagnose recreational aspects related to broadly defined entertainment, while simultaneously wanting to acquire a consistent measure, we chose to reduce the scale's aspect concerning sport-related recreation. This is why we eliminated the weakest "sport" items – SP3, thus creating a more consistent Recreational Services 1F scale.

Table 12
Factorial Structure and Reliability of Recreational Services 1F

	Factor λ RE	h ²	R _{cc}
SP1 You can do various sports in this neighborhood	.83	.70	.60
SP2 The neighborhood is well equipped with sports grounds	.82	.67	.57
SA1 Entertainment activities for residents are lacking in this neighborhood*	.77	.60	.51
Eigenvalues	1.97		
Variance explained	65%		
Index Cronbach's α	.74		

Note. K-M-O = .68; Bartlett Test of Sphericity $\chi^2(3) = 71.78, p < .001$

Extraction Method: PCA

RE – Recreational Services

h² – communalities (PCA); R_{cc} – corrected item-total correlation (item-rest correlations);

* inversed measures.

The Iranian adaptation's authors (Bonaiuto et al., 2015) chose otherwise and distinguished two factors: Sport Services and Socio-Cultural Activities, which, however, differed in their structure from the Italian original (Fornara et al., 2010). What is more, the adaptation had the Sport Services factor reach the reliability level $\alpha > .90$ (Table A2), which may indicated item redundancy. In addition, the Socio-Cultural Activities factor comprises two items correlated at $r = .36, p < .01$, which, in turn, proves that it is not a reliable measure.

Pace of Life

Two indexes, comprising six items, combined to form this scale in the original instrument: (1) Relaxing versus Distressing and (2) Stimulating versus Boring. In line with the theoretical assumptions, two factors were distinguished in the PCA that corresponded with their hypothetical indexes and accounted for 73% total variance (Table 13). The factors were not correlated ($r = .05$). However, item-total correlations (item-rest correlations) analysis for individual items of the potential Pace of Life scale indicated these items to be very weakly correlated with the scale ($r = .26$ to $.51$). In this light, even though it could reach an acceptable $\alpha = .67$ reliability, we held that this scale ought not to be analyzed as a whole. The step to reject the aggregated scale is also warranted by the Kaiser-Meyer-Olkin measure, which demonstrated that the total data from the six items merely averaged for factor analysis. In contrast, the items to be potentially included in the hy-

pothetical Pace of Life scale exhibited high internal consistency and reliability levels, whereas aggregating them as one scale would inevitably reduce the reliability of the entire measure. More details on this scale and its indexes are given in Table 13.

Table 13
Factorial Structure and Reliability of Pace of Life

	Factor λ		h ²	R _{cc}
	RD	SB		
RD3 Living in this neighborhood is quite distressing*	.87		.76	.49
RD1 There is a calm atmosphere in this neighborhood	.86		.74	.31
RD2 This neighborhood is still livable if compared with the chaos of other areas	.82		.70	.51
SB2 Every day there is something interesting in this neighborhood		.88	.77	.38
SB1 This neighborhood is full of activity		.87	.76	.26
SB1 This neighborhood is full of activity		.74	.61	.45
Eigenvalues	2.32	2.03		
Variance explained	39%	34%	Σ 73%	
Index Cronbach's α	.81	.76		
Scale Cronbach's α				.67

Note. K-M-O = .67; Bartlett Test of Sphericity $\chi^2(15) = 227.06, p < .001$

Extraction Method: PCA and Principal Axis Factoring. Rotation Method: Promax with Kaiser Normalization.

RD – Relaxing Versus Distressing; SB – Stimulating Versus Boring

h² – communalities (PCA); R_{cc} – corrected item-total correlation (item-rest correlations)

* inversed measures.

Transport Services

In the original instrument, this was a single four-item index. In line with the theoretical assumptions, only one factor was distinguished in the PCA, which accounted for 67% total variance (Table 14). An analysis of covariance and common variance clearly indicated that the weakest item – TS3 (“Buses are too uncomfortable in this neighborhood”) – be eliminated from the index. Eliminating the item increased the index’s reliability up to $\alpha = .87$, and improved its consistency. This was hardly surprising: the question refers to the bus quality as such, whereas the remaining items in this index ask about the quality of the neighborhood’s public transport services in general. Eliminating the TS3 item, the TS factor then accounted for 79% total variance (Table 14).

Table 14
Factorial Structure and Reliability of Transport Services

	Factor λ	h^2	R_{cc}
	TS		
TS1 In this neighborhood, public transport provides good connections with the rest of the city	.90	.81 (†.83)	.79 (†.79)
TS2 In this neighborhood, the frequency of public transport is adequate for residents' needs	.86	.68 (†.86)	.67 (†.70)
† TS3 Buses are too uncomfortable in this neighborhood*	.83	.44	.49
TS4 Bus stops are well distributed in this neighborhood	.67	.75 (†.89)	.73 (†.76)
Eigenvalues	2.70 (†2.37)		
Variance explained	67% (†79%)		
Index Cronbach's α	.83 (†.87)		

Note. K-M-O = .78; Bartlett Test of Sphericity $\chi^2(6) = 187.42, p < .001$

Extraction Method: PCA

TS – Transport Services

h^2 – communalities (PCA); R_{cc} – corrected item-total correlation (item-rest correlations);

† – item removed from index due to low communality weakening the measurement reliability;

(†..) – results after removal of weakening item.

* inversed measures.

Upkeep

In the original instrument, this was a single four-item index. In line with the theoretical assumptions, only one factor was distinguished in the PCA, which accounted for 50% total variance. It was a weak measure with low internal consistency and debatable reliability. Eliminating its weakest item – UP3 (“Residents show care for their neighborhood”) – only minimally reduced the index’s reliability, down to $\alpha = .65$, while at the same time making it account for greater total variance – at 60% (Table 15). The elimination also appears to lend itself to logical justification – this question requires participants to assess the behavior of other residents inhabiting the neighborhood (specific people and their specific actions), whereas the remaining items in this index ask them to evaluate actions of indeterminate institutions responsible for street maintenance. For this reason – bearing in mind Cronbach’s alpha measure limitations, such as the tendency to decrease with further item reduction, notwithstanding the actual level of the measure’s consistency – we decided to reduce the index down to three relatively consistent items before including it in the Polish version. At the same time, we believe it is advisable that the index be used with full awareness that it has shortcomings.

Table 15
Factorial Structure and Reliability of Upkeep

	Factor λ UP	h^2	R_{cc}
UP1 Streets are regularly cleaned in this neighborhood	.78	.61 (†.52)	.55 (†.43)
UP2 Road signs are well kept in this neighborhood	.71	.51 (†.58)	.47 (†.46)
† UP3 Residents show care for their neighborhood	.70	.40	.36
UP4 There are too many holes in the neighborhood's streets*	.64	.48 (†.66)	.42 (†.52)
Eigenvalues	2.02 (†1.77)		
Variance explained	50% (†60%)		
Index Cronbach's α	.66 (†.65)		

Note. K-M-O = .59; Bartlett Test of Sphericity $\chi^2(6) = 76.36, p < .001$

Extraction Method: PCA

UP – Upkeep

h^2 – communalities (PCA); R_{cc} – corrected item-total correlation (item-rest correlations);

† – item removed from index due to low communality weakening the measurement reliability;

(†..) – results after removal of weakening item

* inversed measures.

The Upkeep and Care index proved different in the Iranian adaptation (Bonaiuto et al., 2015) and was treated otherwise: the UP3 item appeared highly correlated with the scale, and the UP4 item was chosen for elimination (Table A2). However, while the index's reliability, at $\alpha = .93$, indicates very high consistency, one should bear in mind that reliability indicators over $\alpha = .90$ could arouse suspicion that the scale comprises redundant items and that it measures only a portion of the entire construct.

Factorial validity of Neighborhood Attachment

In the original instrument, this scale was treated on par with the other environment quality dimensions. Going against this assumption, we held that Neighborhood Attachment (NA) does not logically belong with the remaining residential quality dimensions, for which there are three reasons. First, NA is a purely mental construct, one that is built theoretically and based on introspection. Second, contrary to the remaining environmental quality dimensions, NA is not directly related to specific objects and states of the residential environment's physical reality; as such, it also does not constitute their material assessment. Third, which we feel is most important, being a mental state, NA appears to result from the perceived quality (among others) rather than from its constituted quality. For these reasons, we chose to treat and analyze this construct independently.

In the original instrument, NA was diagnosed with a single four-item index. In line with the theoretical assumptions, one factor was distinguished in the PCA, which accounted for 67% total variance. An analysis of covariance and common variance clearly indicated that the weakest item – NA4 (“I do not feel integrated in this neighborhood”) – be eliminated from the index. Although it did not alter the index’s already high reliability, with Cronbach’s alpha at $\alpha = .83$, the elimination of the item increased its consistency considerably. Thus the reduced NA factor accounted for as much as 76% total variance (Table 16).

Table 16
Factorial Structure and Reliability of Neighbourhood Attachment

	Factor λ	h^2	R_{cc}
	NA		
NA1 This neighborhood is part of me	.85	.73 (†.67)	.55 (†.62)
NA2 It would be very hard for me to leave this neighborhood	.85	.72 (†.79)	.47 (†.72)
NA3 This is the ideal neighborhood for me	.85	.72 (†.82)	.36 (†.77)
† NA4 I do not feel integrated in this neighborhood*	.73	.53	.42
Eigenvalues	2.70 (†2.28)		
Variance explained	67% (†76%)		
Index Cronbach’s α	.84 (†.84)		

Note. K-M-O = .70; Bartlett Test of Sphericity $\chi^2(6) = 200.85, p < .001$

Extraction Method: PCA

NA – Neighbourhood Attachment

h^2 – communalities (PCA); R_{cc} – corrected item-total correlation (item-rest correlations);

† – item removed from index due to low communality weakening the measurement reliability;

(†..) – after removal of weakening item

* inversed measures.

Conclusions from the factorial validity of the indexes and thematic scales

The above analyses of the basic dimensions concerning residential quality showed that significant differences exist between the results obtained in the Polish and Italian studies. The 12 Italian scales were replaced by 14 structurally changed and more precise measures (Tables 17 and 18). Furthermore, of the 12 originally developed scales, only five received positive verification in the Polish study, and this was after they had undergone some modification. Likewise, of the original multifactorial scales, only one – Socio-Relational Features – was positively verified, although this scale also differs structurally from its Italian equivalent. Moreover, we recommend that in the Polish version the scale’s (reliable) Security and Sociability indexes be treated as individual measures that diagnose two distinct residential environment aspects.

Table 17

Final dimensions and related indexes in Polish version of questionnaire (PL-APREQ & NA)

Macroevaluative dimension (theoretical, negatively verified)	Index (basic dimension, positively verified)	Items	α
Architectural & Urban Planning Features	1. Architectural & Urban Planning Space 1F	BD2 There is enough space between houses in this neighborhood	.82
		BD3 There is little space between buildings in this neighborhood*	
		BV1 The dimension of buildings is oppressive in this neighborhood*	
		BA2 It is pleasant to see this neighborhood	
	2. External Connections	EC1 The city center can be easily reached from this neighborhood	.71
		EC2 This neighborhood is well connected with important parts of the city	
	3. Green Areas	GA1 There are green areas for relaxing in this neighborhood	
		GA2 There are enough green areas in this neighborhood	
		GA4 In this neighborhood, green areas are in good condition	
	4. Internal Functionality	IP2 There's a good availability of parking spaces	.66
		IP1 Parked cars impede walking in this neighborhood*	
		IP3 It is easy to cycle around in this neighborhood	
	Sociorelational Features	1. Security	SE1 You can meet bad people in this neighborhood*
SE2 Acts of vandalism happen in this neighborhood*			
SE3 Here in the night there is the risk of dangerous encounters*			
2. Socialability		SO1 In this neighborhood, it is difficult to make friends with people*	.74
		SO2 In this neighborhood, it is easy to get to know people	
		SO3 In this neighborhood people tend to be isolated*	
Functional Features	1. Commercial Services	CS1 There are all kinds of stores in this neighborhood	.86
		CS2 Anything can be found in the neighborhood's stores	
		CS3 This neighborhood is well served with stores	
	2. Recreational Services 1F	SP1 You can do various sports in this neighborhood	.74
		SP2 The neighborhood is well equipped with sports grounds	
		SA1 Entertainment activities for residents are lacking in this neighborhood*	

	3. Transport Services	TS1 In this neighborhood, public transport provides good connections with the rest of the city	.87
		TS2 In this neighborhood, the frequency of public transport is adequate for residents' needs	
		TS4 Bus stops are well distributed in this neighborhood	
Context Features	1. Environmental Health	EH1 The air is clean in this neighborhood	.83
		EH2 This neighborhood is generally not polluted	
		EH3 This is a noiseless neighborhood	
	2. Relaxing vs. Distressing	RD1 There is a calm atmosphere in this neighborhood	.81
		RD2 This neighborhood is still livable if compared with the chaos of other areas	
		RD3 Living in this neighborhood is quite distressing*	
	3. Stimulating vs. Boring	SB1 This neighborhood is full of activity	.76
		SB2 Every day there is something interesting in this neighborhood	
		SB3 Nothing happens in this neighborhood*	
	4. Upkeep	UP1 Streets are regularly cleaned in this neighborhood	.65
		UP2 Road signs are well kept in this neighborhood	
		UP4 There are too many holes in the neighborhood's streets*	
Neighbourhood Attachment		NA1 This neighborhood is part of me	.84
		NA2 It would be very hard for me to leave this neighborhood	
		NA3 This is the ideal neighborhood for me	

Note. * inversed measures.

α = Cronbach's α

All that being said, the Polish version did diagnose a solid majority of the residential quality aspects that were also measured by the original APREQ & NA questionnaire. This is because the main differences between the two versions pertain to the structure's 12 scales, rather than to their constituent indexes (of the 20 original indexes, as many as 16 received positive verification in our study, and following the final modifications aimed to increase the measures' consistency, we recommend that 14 be used in the Polish version; see Tables 17 and 18).

Table 18

Statistical characteristics of indexes in Polish version of the questionnaire (PL-APREQ & NA)

Index (basic dimension, positively verified)	N _i	Min	Max	M	SD	Sk	Ku	K-S	p	α
1 Architectural& Urban Planning Space 1F	4	.75	6.00	3.53	1.22	-.11	-.51	.65	.79	.82
2 Commercial Services*	3	.00	6.00	3.41	1.47	-.32	-.89	1.44	.03	.86
3 Environmental Health*	3	.33	6.00	3.44	1.37	-.49	-.66	1.74	.00	.83
4 External Connections	2	.00	6.00	4.35	1.24	-.88	.80	1.44	.03	.71
5 Green Areas*	3	1.00	6.00	4.09	1.19	-.60	-.23	1.57	.01	.77
6 Internal Functionality	3	.33	6.00	3.45	1.26	-.19	-.38	.99	.28	.66
7 Recreational Services 1F	3	.67	6.00	2.98	1.22	.08	-.61	.95	.32	.74
8 Relaxing vs. Distressing*	3	1.00	6.00	3.96	1.15	-.68	.05	1.78	.00	.81
9 Security*	3	.00	6.00	3.39	1.45	-.46	-.41	1.41	.04	.91
10 Socialability	3	.33	6.00	3.32	1.06	.04	.09	1.30	.07	.74
11 Stimulating vs. Boring	3	.00	5.67	2.47	1.06	.29	.21	1.12	.16	.76
12 Transport Services	3	.00	6.00	3.94	1.42	-.83	.20	1.35	.05	.87
13 Upkeep	3	.67	6.00	3.56	1.09	-.52	.22	1.36	.05	.65
Neighbourhood Attachment	3	.00	6.00	3.10	1.45	-.28	-.62	1.04	.23	.84

Note. * non-normal distributed data.

N_i = number of items

Min = minimum, Max = maximum, M = mean, Sk = skewness, Ku = kurtosis, K-S = Kolmogorov-Smirnov Z, p = H0 states that the distribution is normal

α = Cronbach's α

To ensure that the terminology remains consistent in the this paper's following sections, the measures called "scales" in the Italian study will hereafter be referred to as "basic dimensions". A scale is a complex variables measurement that is created "by assigning scores to patterns of responses" while also "recognizing that some items reflect a relatively weak degree of the variable while others reflect something stronger" (Babbie, 2006, p. 154). The logic behind scale construction a assumes, therefore, that they "take

into consideration the intensity with which different items reflect the variable being measured” (Babbie, 2006, p. 155). The logic underlying the APREQ & NA Indicators does not take into account such intensity: the indicators – called “scales” in the original study, and “basic dimensions” here – are created through simple arithmetic that averages the degree to which subjects agree or disagree with certain statements about their residential environment. Hence, these indicators are not in fact scales.

Factorial validity: verification of the macroevaluative dimensions

As mentioned in the section discussing the method and its theoretical assumptions, the measurements obtained by using the original Italian APREQ & NA questionnaire (Fornara et al., 2010) showed the 12 basic assessments of residential environment (11 PREQ + 1 NA) to form five general macroevaluative dimensions: (1) Architectural & Urban Planning Features, (2) Sociorelational Features, (3) Functional Features, (4) Context Features, and (5) Neighborhood Attachment.

Following the verification of the 12 basic dimensions in the Polish version, we proceeded to verify the five original macroevaluative dimensions (a term proposed by Fornara et al., 2010). This was motivated by the considerable discrepancies between the Italian and Polish versions, which have already been discussed in the section devoted to the model’s verification measurements. These discrepancies were the reason why we chose to subject the 13 Polish basic dimensions (Neighborhood Attachment was excluded for reasons given above) to exploratory factor analysis rather than confirmatory analysis, which would simply verify the original theoretical model. This allowed us to conduct a thorough investigation into whether the Polish data actually supported the distinction into five macroevaluative dimensions, rather than to presuppose a certain theoretical structure that could eventually prove inadequate to the new, altered conditions that have been shaped by the modified basic indexes and different basic dimensions incorporated into the Polish version.

First and foremost, we wanted to find out whether it was reasonable to perform a factor analysis involving the 13 basic dimensions revealed in the Polish version. At the first examination of the correlation matrix, each basic dimension showed to be correlated with at least one another at the minimum level $r = .40$ – Field (2009) calls for the elimination, performed prior to commencing factor analysis, of the variables which do not correlate with at least one another at the minimum level $r = .30$. Table 19 provides the correlation of the Polish basic dimensions. High adequacy for further analyses was also demonstrated by other measures: the Kaiser-Meyer-Olkin index, at .82, and Bartlett’s sphericity test: $\chi^2(78) = 659.47, p < .001$.

Table 19
Correlations of the Polish basic dimensions

	AU	EC	IF	GA	SE	SO	RE	CO	TR	RD	ST	EH	UP
AU / Architectural & Urban Planning Space 1F			.50	.51	.41					.59		.57	
EC / External Connections								.46	.54				
IF / Internal Functionality	.50			.46	.44							.47	
GA / Green Areas	.51		.46		.44		.47			.66		.62	
SE / Security	.41		.44	.44		.42				.69		.61	
SO / Socialability					.42								
RE / Recreational Services 1F				.47						.43	.54		
CO / Commercial Services		.46					.40		.54		.54		
TR / Transport Services		.54						.54					
RD / Relaxing vs. Distressing	.59			.66	.69		.43					.77	.52
ST / Stimulating vs. Boring							.54	.54					
EH / Environmental Health	.57		.47	.62	.61					.77			.45
UP / Upkeep										.52		.45	

Note. N=110. Intercorrelations of indexes (Spearman's Rho's) are presented below the diagonal.

Absolute correlations below $r=.30$ were removed from table to improve readability.

In all of the presented correlations $p \leq .001$

Provided that the Polish version included four macroevaluative dimensions (five original dimensions minus NA), the PCA should produce four factors that corresponded thematically to the dimensions of Architectural & Urban Planning Features, Sociorelational Features, Functional Features, and Context Features. Meanwhile, the Polish data yielded a three-factor solution, which accounted for 66% total variance (Table 20). An analysis with a promax rotation of the main axes showed the following dimensions could be statistically justified: (1) General Evaluation – a factor loading uniquely seven basic dimensions; (2) Communication & Commerce – loading three basic dimensions; and (3) Activity Capability – also loading three basic dimensions. Neighborhood evaluation was weakly correlated with its activity capability ($r=.34$), as was the activity with communication and commerce ($r=.31$). Similarly, there was no correlation between the neighborhood's evaluation and communication and commerce ($r=-.07$). This result is given further elaboration in the section which concludes by verifying the Polish version of the questionnaire.

Table 20
Factorial Structure of hypothetical macroevaluative dimensions

	Factor ^a λ			h ²
	GE	CC	AC	
Environmental Health	.93			.80
Relaxing vs. Distressing	.89			.79
Green Areas	.80			.64
Architectural & Urban Planning Space 1F	.69			.55
Security	.67			.66
Internal Functionality	.61			.43
Upkeep	.60			.49
Transport Services		.87		.71
External Connections		.76		.57
Commercial Services		.73		.72
Stimulating vs. Boring			.80	.77
Socialability			.75	.67
Recreational Services 1F			.64	.69
Eigenvalues by factor	4.56	2.68	1.24	
Variance explained by factor	35%	21%	10%	Σ 66%

Note. K-M-O = .82; Bartlett Test of Sphericity $\chi^2(78) = 659.47, p < .001$

Extraction Method: PCA and Principal Axis Factoring.

Rotation Method: Promax with Kaiser Normalization.

GE – General Evaluation; CC – Communication & Commerce; AP – Activity Capability

h² – communalities (PCA);

Convergent validity

PL-APREQ & NA's convergent validity was determined by comparing the instrument's scores with the scores obtained for a part of the WHOQOL-BREF questionnaire (Power, Bullinger, & Harper, 1999; World Health Organization, 1998) – a well-established tool

for measuring self-assessed life quality, including in relation to subjectively evaluating physical environment quality. The questionnaire includes a subscale concerning the “Environmental Domain of Quality of Life”, which comprises eight questions about perceived environmental quality. Subjects provide their answers on 5-point Likert-type scales that, depending on the question, cover the ranges between “not at all” and “completely”, “very poor” and “very well”, “very dissatisfied” and “very satisfied”, and so forth. We used this dimension to verify the PL-APREQ’s validity.

The total score for the 13 basic PL-APREQ dimensions correlated with the assessment of the WHOQOL’s Environmental Domain at $r = .58$, $p < .001$, which means, depending on how the correlation coefficient is interpreted (Dancey & Reidy, 2011), an average to moderately strong convergent validity of the tool. The PL-APREQ dimensions which revealed highest convergence with the WHOQOL’s Environmental Domain included: Relaxing versus Distressing ($r = .58$, $p < .001$), Security ($r = .52$, $p < .001$), and Green Areas ($r = .51$, $p < .001$). Weak or no correlation with the Environmental Domain was found in the case of Commercial Services ($r = .10$, ns), Transport Services ($r = .05$, ns), and External Connections ($r = -.02$, ns).

Convergent validity was additionally tested by a question, answered after the questionnaire had been completed, asking about participants’ attitude to their neighborhood: “Generally, how satisfied are you with the neighborhood where you currently live?” (response scale 1–10). The total score for the 13 basic PL-APREQ dimensions correlated with this general attitude to one’s neighborhood at $r_s = .70$, which shows a high level of convergence of both declaration. The correlation with the general attitude to the neighborhood was highest for the Relaxing versus Distressing dimension ($r_s = .67$, $p < .001$) and lowest for External Connections ($r_s = .12$, ns). This result is also consistent with the above-mentioned comparison of scores for PL-APREQ and WHOQOL-BREF’s Environmental Domain.

Some PL-APREQ’s basic dimensions were also found to correlate with the self-assessed general life quality, as well as self-assessment of WHOQOL-BREF’s Physical Health and Psychological Health domains (Table 21). Self-assessed general quality of life covaried with PL-APREQ’s four basic dimensions and the total score for all 13 dimensions. Self-assessment of Physical Health covaried with five basic dimensions of the PL-APREQ and the total score for all 13 dimensions. Self-assessed Physiological Health covaried significantly with three PL-APREQ basic dimensions. Interestingly, three PL-APREQ dimensions showed no correlation with any dimension of the WHOQOL-BREF: External Connections, Transport Services, but most crucially, Commercial Services, a dimension representing theoretically a key facilities type in a well-designed modern neighborhood.

Table 21

Correlations between PL-APREQ and WHOQOL-BREF

	AU	EC	IF	GA	SE	SO	RE	CO	TR	RD	ST	EH	UP	Σ13D
General QOL ^τ	.18*				.24**		.21**			.20**				.16*
Physical Health ^s				.19*	.34**		.35**			.29**	.29**			.30**
Psychological Health ^s				.25**	.24*					.23*				
Environmental Domain ^s	.40**		.37**	.45**	.45**	.31**	.31**			.50**		.42**	.20*	.58**

Note. N=110. Intercorrelations of indexes are presented below the diagonal.

^s = Spearman Rho's

^τ = Kendall Tau's

AU = Architectural & Urban Planning Space 1F, EC = External Connections, IF = Internal Functionality, GA = Green Areas, SE = Security, SO = Socialability, RE = Recreational Services 1F, CO = Commercial Services, TR = Transport Services, RD = Relaxing vs. Distressing, ST = Stimulating vs. Boring, EH = Environmental Health, UP = Upkeep, Σ13D = Summative 13. basic dimensions of PL-APREQ

** p ≤ .01, * p ≤ .05, otherwise: non-significant

For the reason that we intended to test PL-APREQ validity by using the tool designed by the World Health Organization, our participants were also asked about their declared state of health. Crucially, the assessing the neighborhood based on PL-APREQ & NA proved insensitive to participant health. In the 110-strong sample, 68 participants declared feeling healthy on the day of the study, while 42 people stated they were “a bit”, “moderately”, “very”, or chronically ill. Variance analysis showed no effect of actual physical illness on any of the PL-APREQ & NA dimensions.

It is also worth pointing out that neighborhood assessment results based on PL-APREQ covaried with its being inhabited by participants' friends or family. This has a strong theoretical justification: people are likely to assess higher the neighborhood which offers them social support, as compared with one inhabited by no significant others. Hence, it came as no surprise that the highest correlation with the presence of relatives and friends was found for the the neighborhood's Sociability dimension, with $F(1, 109) = 13.42, p < .001, \eta^2 = .12$. Interestingly enough, a high correlation in this respect was also found for the assessment of Architectural and Urban Planning Space: $F(1, 109) = 6.77, p < .01, \eta^2 = .06$; Recreational Services: $F(1, 109) = 6.77, p < .01, \eta^2 = .06$; as well as the total score for the 13 basic PL-APREQ dimensions: $F(1, 109) = 7.78, p < .001, \eta^2 = .07$. In contrast, a surprisingly low (although still significant) correlation

with this aspect was observed for the NA dimension, with $F(1, 109)=4.18$, $p<.05$, $\eta^2=.04$. We had expected that the close presence of significant others would have a considerably stronger effect on participants' attachment to their neighborhoods.

Discriminant validity

Also the instrument's discriminant validity was determined by comparing its scores with the WHOQOL questionnaire scores. Apart from questions related to the Environmental Domain, the questionnaire includes those asking about respondents' Physical, Psychological, and Social domains. People's residential environment assessment is theoretically related to a host of aspects connected with their functioning, including their general quality of life and behavior, which has been extensively demonstrated in the literature on the subject (see, e.g., Dębek & Janda-Dębek, 2013; van Kamp et al., 2003). Hence, it would be difficult to find a sphere of human life with which tools such as PREQ would have no theoretical relation. This is why we opted to observe the relationships between how different domains of life are perceived in the well-established WHOQOL questionnaire. As a consequence, we chose to base the PL-APREQ's discriminant validity determination on WHOQOL's Social Domain, one that displayed the weakest correlation with the Environmental Domain.

The total score for the 13 PL-APREQ basic dimensions demonstrated no correlation with WHOQOL's Social Domain ($r=.07$, *ns*). Although this was to be expected, it must be noted that some of PL-APREQ's basic dimensions did correlate significantly with the Social Domain. These were the spheres theoretically connected with people's social functioning, that is, with Security ($r=.30$, $p<.001$) and Sociability ($r=.24$, $p<.001$).

Criterion validity

PL-APREQ and criterion-like declarations

In theory, assessing one's neighborhood should be correlated with a range of variables, such as willingness to move out or stay put, one's attachment to the neighborhood, and readiness to recommend the neighborhood as a good place to live to one's friends (e.g. Dębek, 2014; Dębek & Janda-Dębek, 2013; van Kamp et al., 2003).

To verify these relationships, we asked the participants of our study to respond, after they had filled out the PL-APREQ questionnaire, to several questions concerning the matters mentioned above (on 7-point Likert-type scales). Our study also included the place attachment criterion (the already-described NA dimension integrated with the questionnaire). Results are given in Table 22.

Table 22

Correlations between PL-APREQ and criterion-like declarations

Criterion	Σ13D	HI	LO
“I don’t like to move from this neighbourhood in the nearest future”	.34**	Transport Services, .36**	Internal Functionality, .02
“I recommend this neighbourhood to my friends and relatives”	.63**	Relaxing vs. Distressing, .63**	External Connections, .12
Neighbourhood Attachment	.68**	Relaxing vs. Distressing, .61**	External Connections, .16

Note. N=110. Spearman Rho’s and Kendall Tau’s are presented.

Σ13D = summative 13. basic dimensions of PL-APREQ

HI = the particular basic dimension highest correlated with the criterion

LO = the particular basic dimension lowest correlated with the criterion

** p ≤ .01, * p ≤ .05, otherwise: non-significant

PL-APREQ and real estate prices in the assessed neighborhoods

It is our opinion that the most important, and relatively objective, external criterion for verifying the practical functionality of PREQ-type questionnaires – which is urban environment characterization and profiling – is the correlation between the results obtained by using such tools and real estate prices in the assessed areas. This is based on the assumption that in free market economies, to which the Polish economy belongs, real estate prices in a given neighborhood (city, district, or housing estate) are largely influenced by demand – that is, by how attractive given goods are: in this case, a property in a particular neighborhood (Visser, van Dam, & Hooimeijer, 2008). Property attractiveness depends, among other things, on the distance between its location and the city center, and the characteristics of the area’s inhabitants (Archer, Gatzlaff, & Ling, 1996). The third most important criterion influencing real estate prices, apart from functionality and location, is the quality of the surrounding area (Simlai, 2014, Visser et al., 2008, 2008). One key neighborhood dimension as measured by PL-APREQ & NA that translates directly into real estate prices is its security – the lower the neighborhood’s security, the lower its real estate prices, a relationship proven recently by Buonanno, Montolio and Raya-Vílchez (2013). Other such dimensions include accessibility to green areas and water, the inhabitants’ socioeconomic status, connections of the neighborhood with other city parts, trade availability and all sorts of services, as well as proximity to the workplace (Rysak-Czajkowska, 2014; Visser et al., 2008). Therefore, the results produced by PL-APREQ & NA-type questionnaires should correlate with real estate prices in the neighborhoods where the questionnaires are being to make the assessments. In theory, then, neighborhoods scoring highest on PREQ should also be those with the highest apartment prices.

All 110 participants who filled out the PL-APREQ also disclosed their place of residence, approximated to the nearest street intersection. However, before we could proceed to analyze the relationship between the neighborhoods' real estate prices and their assessment in the PL-APREQ, it was necessary to determine the size of the area that should be taken into consideration for the intended price analysis. To that end, we had to designate an area with a specific radius around the intersection declared by participants; yet it proved rather difficult to determine the actual "neighborhood" size that each individual participant could have in mind.

Determining the average sized area defined as "the neighborhood"

Therefore, we first set to find out what size area participants thought of when they referred to "the neighborhood". For this reason, we conducted another study on a sample made up from people living in Wrocław.

Participants

Thirty-six students participated – 18 women and 18 men aged between 19 and 85 (*Mdn*=45). As was the case with the main study, this was a convenience sample composed of part-time students from the Higher School of Banking in Wrocław, Department of Finance and Management (*N*=20), and part-time students from the University of the Third Age (at the University of Wrocław, *N*=16). They received no financial compensation for their involvement in the study.

Method

Participants were presented with a questionnaire comprising three questions that introduced spatial issues; they involved general neighborhood, unwillingness to move out, and potential in recommending the neighborhood as a good place to live to one's friends. Participants responded on a zero to six scale to the "How satisfied are you with the neighborhood where you currently live?" question, and on seven-point Likert-type scales – to the remaining two questions.

Next, participants were asked to think about the areal space they considered to be "the neighborhood" they had just assessed. As a visual aid, they received a piece of paper showing a square-shaped black and white drawing of a generic urban structure enclosed within four streets; they were then to fill in the street names that enclosed what they identified as their own "residence". The procedure took around five minutes to complete.

Results

The 34 valid observations revealed that participants differed markedly in spatial views on what they considered to be their neighborhoods. The smallest such-delineated area covered a mere 20,000 m² (approx. 24,000 yd²), while the largest – 900,000 m² (slightly over one million yd²). On average, participants declared an area covering 130,000 m²

(approx. 155,000 yd²; *mdn*), a size we initially chose to define as “the average area” surrounding participants’ residences so that we could examine apartment prices in the neighborhoods assessed in PL-APREQ.

Establishing apartment prices in the assessed areas

To establish apartment prices in the assessed areas we used an online search service made available on the Home Broker company’s website (www.homebroker.pl). This service is a quick and efficient tool used to find the average offer and real estate prices in Wrocław, which are based on advertisements and sales transactions handled by this company. A preliminary analysis obtained using this service showed it necessary to expand the initially-accepted area of 130,000 m² (which equals ca. a 200-meter-radius circle) to about 2.5 km² (equal to ca. a 900-meter-radius circle). Only by analyzing areas with such dimensions was it possible to establish the mean price per square meter of apartment space based on at least three offer and three transaction prices.

The price analysis was carried out in December 2014 – half a year after the main PL-APREQ & NA study was completed. The analysis included nearly 3,000 real estate prices in Wrocław (Home Broker, 2014), including 1,848 price offers (on average 20, min. 3 and max. 62 prices per square meter of apartment space for each individual assessment in PL-APREQ) and 1,101 transaction prices (on average 14, min. 3 and max. 32 prices). The price per square meter of apartment space in each “neighborhood” was calculated as the mean offer and transaction price recorded for that individual area. In this way, we were able to “price” 78 neighborhoods (the remaining 32 of the 110 questionnaires were invalid due to their incorrectly identified street intersections located closest to participants’ place of residence).

The assessed areas’ mean offer prices, transaction prices, and prices per square meter of apartment space, as at December 2014, are given in Table B1.

PL-APREQ and Wrocław apartment prices in the assessed areas

The PL-APREQ results were significantly correlated with apartment prices in the assessed areas (Table 23). The prices covaried with the dimensions of Security, Recreational Services 1F, Relaxing vs. Distressing, Environmental Health, Upkeep, and the total score for PL-APREQ’s 13 basic dimensions. The dimensions that did not correlate (a near-zero correlation) with apartment prices were External Connections, Sociability, and Transport Services. The correlation between the total score for the 13 basic dimensions and the mean price per square meter of apartment space in the assessed areas was found at $r_s = .24, p < .01$. This suggests a modest – although still significant – correlation between participants’ subjective neighborhood assessments and objective neighborhood attractiveness indicators : in this case, the apartment prices.

Table 23

Correlations between PL-APREQ and the criterion: real estate prices in the assessed neighborhoods

Criterion	Σ13D	HI	LO
Cena ofertowa	.23*	Upkeep .35**	Socialability .02
Cena transakcyjna	.25*	Relaxing vs. Distressing .30**	Socialability -.01
Cena średnia	.24*	Security .30**	Socialability .01

Note. 78 measured residential environments (areas within the 500 meter radius from the particular crossings nearest to the respondents' homes). Spearman Rho's are presented.

Σ13D = Summative 13. basic dimensions of PL-APREQ

HI = the particular basic dimension highest correlated with the criterion

LO = the particular basic dimension lowest correlated with the criterion

** $p \leq .01$, * $p \leq .05$, otherwise: non-significant

Furthermore, it is worth noting that apartment prices also covaried, at $r_{\tau} = .29$, $p < .01$, with participants' general neighborhood assessment, formulated as the answer to the question: "Generally, how satisfied are you with the neighborhood where you currently live?"

At the same time, we observed no correlation between neighborhood apartment prices and WHOQOL-BREF's Environmental Domain, which indicates that PL-APREQ diagnoses different environmental reality aspects than the WHOQOL-BREF questionnaire does, even though both instruments largely covary in their environmental assessment results ($r = .58$, $p < .001$).

Measurement stability over time

We tested measurement stability over time and residential environmental immunity to external disturbances by examining the same participants twice, in early and late June 2014.

Participants

Participants in this stage were 30 people – 10 men and 20 women aged between 19 and 34 ($Mdn = 21$). They were full-time students at the University of Wrocław, Department of Psychology ($N = 18$), and full-time students at Wrocław University of Technology, Faculty of Architecture ($N = 12$). Participants received no financial compensation for their involvement in the study.

Method, tools, and procedure

As was the case in the study conducted to verify the measurement model, participants filled out the PL-APREQ & NA questionnaire that comprised 66 statements concerning 11 dimensions of perceived residential environment quality and neighborhood attach-

ment. They were to respond to these statements on a seven-point Likert-type scale. In addition, participants were asked to answer (on a 0–6 response scale) an additional question concerning how they generally assessed their neighborhood: “Generally, how satisfied are you with the neighborhood where you currently live?”, and to declare whether they would recommend the neighborhood as a good place to live to their friends (on a 7-point Likert-type scale). Finally, participants completed a short demographic form. They were also given printed coupons bearing a seal and a unique number, with the instruction to bring the coupons to the study’s second stage. This made it possible to identify the participants at the two stages conducted within a one-month period, while also ensuring their anonymity. The study took between 10 and 12 minutes to complete.

Results

The measurements, taken across a one-month period, were highly correlated (see Table 24) and showed almost identical distributions for the majority of dimensions. Three dimensions demonstrated considerable differences in mean values obtained in both studies, although still showing high intrasubjective correlations; they were Green Areas (systematically higher results obtained in the first study), Recreational Services, and Environmental Health (in both these cases, systematically lower results in the first study). The mean differences recorded for the two studies were insubstantial, while the three dimensions were found to show lower standard deviation levels in the study conducted later. A lower dispersion of results was observed in the retest, which showed lower standard deviation levels for 11 of the 13 tested dimensions and the NA assessment – for the remaining two dimensions, the retest’s SD measure was either comparable to or lower than in the first study (as was the case of Internal Functionality). The dimensions that proved most stable were External Connections (virtually no mean difference between the test and retest), Security, and Sociability. The total score for the 13 basic dimensions of the PL-APREQ did not differ between the test and retest: $F(1, 28) = 3.37, ns$.

Table 24

Differences and correlations between test and retest in PL-APREQ & NA

	K-S	K-S p	Min	Max	ΔM	t	F	η ²	p	r _s
Architectural & Urban Planning Space 1F	.80 ¹ .77 ²	>.05 ¹ >.05 ²	1.25	5.75	.07	.66	.44	ns	.51	.90
External Connections	.99 ¹ .86 ²	>.05 ¹ >.05 ²	.50	6.00	.00	.00	.00	ns	1.00	.84
Internal Functionality	.61 ¹ .77 ²	>.05 ¹ >.05 ²	.33	6.00	.25	-1.30	1.68	ns	.20	.64
Green Areas	.64 ¹ .74 ²	>.05 ¹ >.05 ²	1.00	6.00	.36	-2.96	8.76	.23	.01	.85
Security	1.26 ¹ .56 ²	>.05 ¹ >.05 ²	.33	5.00	.02	.15	.02	ns	.88	.83

Socialability	1.06 ¹ .95 ²	>.05 ¹ >.05 ²	.33	5.33	.02	-.18	.03	<i>ns</i>	.86	.74
Recreational Services 1F	.79 ¹ .71 ²	>.05 ¹ >.05 ²	1.00	6.00	.31	2.33	5.42	.16	.03	.81
Commercial Services	.49 ¹ .83 ²	>.05 ¹ >.05 ²	1.00	6.00	.15	.91	.81	<i>ns</i>	.37	.76
Transport Services	.86 ¹ .50 ²	>.05 ¹ >.05 ²	1.00	6.00	.05	.49	.23	<i>ns</i>	.63	.90
Relaxing vs. Distressing	.87 ¹ .65 ²	>.05 ¹ >.05 ²	2.00	6.00	.06	.68	.46	<i>ns</i>	.50	.90
Stimulating vs. Boring	.53 ¹ .60 ²	>.05 ¹ >.05 ²	.67	4.67	.29	1.85	3.43	<i>ns</i>	.07	.62
Environmental Health	.57 ¹ .72 ²	>.05 ¹ >.05 ²	.67	5.67	.31	2.33	5.42	.16	.03	.84
Upkeep	.87 ¹ .95 ²	>.05 ¹ >.05 ²	2.00	6.00	.10	1.14	1.29	<i>ns</i>	.26	.83
Neighbourhood Attachment	.76 ¹ .64 ²	>.05 ¹ >.05 ²	.67	6.00	.04	.36	.13	<i>ns</i>	.72	.86

Note. N = 30.

K-S = Kolmogorov-Smirnoff test: normality of distribution; ¹ = test, ² = retest

Min / Max = minimum and maximum both in test and retest, ΔM = absolute difference between test and retest means,

t = t test for dependent measures: differences in test and retest, F = repeated measures ANOVA test, η² = partial eta

squared: size of the one-month interval effect, r_s = Spearman's Rho between test and retest.

In all of the presented correlations p ≤ .001

Measurement stability over time was also found for the answers to the two questions: “Generally, how satisfied are you with the neighborhood where you currently live?” (Wilcoxon Signed-Rank Tests indicated that post-test scores were statistically the same as in the pre-test, $Z = -1.00$, $p > .05$ and $r_{\tau} = .77$, $p < .001$); and “Would you recommend the neighborhood as a good place to live to your friends?” (Wilcoxon Signed-Rank Tests: $Z = -1.06$, $p > .05$; $r_{\tau} = .81$, $p < .001$).

Verification of the PREQ & NA's Polish adaptation – Conclusions

PL-APREQ & NA in light of the original Italian tool and its Iranian adaptation

The Polish questionnaire version, the PL-APREQ & NA, is a tool that appears well-designed for assessing perceived multidimensional residential environment quality. The instrument differs in its dimensional structure and the reliability of some indicators from both the original version (Fornara et al., 2010) and from its recent Iranian adaptation (Bonaiuto et al., 2015). As can be inferred from the Iranian study (Bonaiuto et al., 2015), where the instrument also differed from the Italian original in both structure and measurement reliability, the authors appear to have accepted the existing intercultural differences. Admittedly, the structural changes and minor item modifications introduced to the

adapted versions did not in essence alter their measurement – all the significant residential environmental dimensions diagnosed by the Italian original have also found their way to the Iranian and Polish adaptations. The only exception is Welfare Services (School Services and Social Care Services), which was eliminated from the Polish version due to its less than acceptable statistical properties.

PL-APREQ & NA and macroevaluative dimensions

The results of our Polish study did not justify accepting the five originally-proposed macroevaluative dimensions: (1) Architecture & Urban Planning, (2) Sociorelations, (3) Functions, (4) Contexts, and (5) Neighborhood Attachments. Principal component analysis and principal axis factoring clearly indicated that the relationships between the Polish basic dimensions differ substantially from those of the original instrument. A potential solution would be to base further analyses on the three macroevaluative dimensions statistically justified in the Polish version: General Evaluation, Communication & Commerce, and Activity Capability. This, however, appears overly reductionist given the potential practical application of the PL-APREQ & NA, as one key use that this tool is intended for is to multi-dimensionally compare of how people perceive the multiple aspects of their environments, leading, for instance, to building useful residential environment profiles. Such comparisons and profiling should be based on measures detailed enough to allow for distinguishing between environments with a higher and lower value according to social needs. What is more, these measures should also be precise enough to diagnose the areas where urban environments fail in fulfilling their residents' needs. Such diagnoses can be performed by comparing multiple environments on the 13 basic dimensions of the PL-APREQ & NA, which could be conducive to developing potential action plans aiming at increasing the environments' quality. Ultimately, the goal of such comparisons is to improve residential environments, leading in consequence to a higher life quality for people inhabiting urban areas (Dębek & Janda-Dębek, 2013).

In light of the above-presented results and in the aims that the PL-APREQ & NA questionnaire can be used to achieve, we recommend using the combined 13 basic dimensions and NA, rather than the 3 macroevaluative dimensions and NA.

Validity of the instrument

PL-APREQ & NA is a well-suited instrument for assessing residential environment quality and neighborhood attachment. Assessing residential environment quality by PL-APREQ & NA proved highly, although not excessively, correlated with the assessment made by using the well-known questionnaire WHOQOL-BREF. PL-APREQ & NA yields measurements that are stable over time and appear immune to potential external disturbances, such as the participant's physical and mental state.

Furthermore, the perceived quality of the 13 PL-APREQ neighborhood dimensions is significantly and positively correlated with neighborhood attachment (NA), respondents' readiness to recommend the neighborhood to their friends, and their unwillingness to move out. Most importantly, however, the PL-APREQ & NA-based neighborhood assessment is significantly and positively correlated with the assessed neighborhoods' apartment prices. This indicates the tool's theoretical as well as ecological validity.

Our study also demonstrated that the assessed residential environmental quality in Poland is indeed positively correlated with general of quality of life and physical health. This has long been hypothesized, while also numerous attempts have been made to examine these relationships in several other countries (Dębek & Janda-Dębek, 2013; van Kamp et al., 2003).

Of the 13 PL-APREQ's basic dimensions, the one related to neighborhood relaxation (stress) potential, appears to have the greatest diagnostic significance. This dimension demonstrated the highest correlation with both the assessed neighborhoods' transaction prices per one meter of apartment space, participants' readiness to recommend the neighborhood to their friends, and neighborhood attachment, but also with the generally assessed environmental quality measured by the WHO questionnaire, and by that measured by one test item. What is more, this is also one of two dimensions (the other being neighborhood security) that correlated with both general life quality and participants' self-assessed physical and psychological health.

Conclusions

So far, no tool has been available in Poland that would allow people to measure reliably their subjective perceptions of their residential environments. We believe the PREQ & NA questionnaire may fill this gap and prove a useful instrument that can be effectively utilized in environmental psychology. The results of our analyses justify the conclusion that PREQ & NA is a fairly universal, reliable tool that should also lend itself to an adaptation to Polish conditions. As has been demonstrated above, the questionnaire is not excessively sensitive to cultural differences. In light of the subtle differences that likely exist between the populations inhabiting different countries, it may prove necessary to introduce a several minor modifications to the tool. These would involve, for example, eliminating several original questionnaire indexes and items, a recommendation that has been elaborated on in greater detail above. Provided that the analysis is subjected to a range of the necessary corrections, the Polish version PL-APREQ & NA, which has been presented in this article, can be successfully employed for use in Poland.

That being said, the above adaptation is not entirely free from limitations. First and foremost, even though we chose a demographically diversified group of study participants, they did not constitute a random sample, which means the group does not represent the Polish population. Furthermore, the analyzed environments were not systematically diversified: the study was conducted in Wrocław and a several other cities/towns in Lower Silesia Province, with the study participants being selected without accounting for the type of residential environment they inhabited (e.g., single family housing, downtown-type development, block housing estate, etc.). Further research aimed at verifying PL-APREQ & NA should involve random stratified sampling, with the stratification variable including participants' places of residence in particular environmental types. Such a research approach could perhaps be conducive to normalizing the instrument and, as a result, lead to developing Polish subjective residential environmental quality norms for a variety of urban environment types.

References

- Aiello, A., Ardone, R. G., & Scopelliti, M. (2010). Neighbourhood planning improvement: Physical attributes, cognitive and affective evaluation and activities in two neighbourhoods in Rome. *Evaluation and Program Planning*, 33(3), 264–275. doi:10.1016/j.evalprogplan.2009.10.004
- Altman, I., & Rogoff, B. (1987). World views in psychology: Trait, interactional, organismic and transactional perspectives. In D. Stokols & I. Altman (Eds.), *Handbook of environmental psychology* (pp. 1–40). New York: Wiley.
- Archer, W. R., Gatzlaff, D. H., & Ling, D. C. (1996). Measuring the Importance of Location in House Price Appreciation. *Journal of Urban Economics*, 40(3), 334–353. doi:10.1006/juec.1996.0036
- Babbie, E. R. (2006). *The Practice of Social Research* (11th ed.). Belmont, CA: Thomson Wadsworth.
- Bedyńska, S., & Cypriańska, M. (2013). *Statystyczny drogowskaz 1: Praktyczne wprowadzwnie do wnioskowania statystycznego*. Warszawa: Wydawnictwo Akademickie Sedno; Szkoła Wyższa Psychologii Społecznej.
- Bell, P. A., Greene, T. C., Fisher, J. D., & Baum, A. (2004). *Psychologia środowiskowa* (1st ed. in the Polish language). *Psychologia Środowiskowa*. Gdańsk: Gdańskie Wydawnictwo Psychologiczne.

- Bonaiuto, M., Fornara, F., & Bonnes, M. (2006). Perceived residential environment quality in middle- and low-extension Italian cities. *Revue Européenne de Psychologie Appliquée/European Review of Applied Psychology*, *56*(1), 23–34. doi:10.1016/j.erap.2005.02.011
- Bonaiuto, M. (2004). Residential satisfaction and perceived residential environment quality. In C. D. Spielberger (Ed.), *Encyclopedia of applied psychology* (pp. 267–272). Amsterdam: Elsevier.
- Bonaiuto, M., Aiello, A., Perugini, M., Bonnes, M., & Ercolani, A. P. (1999). Multidimensional Perception of Residential Environment Quality and Neighbourhood Attachment in the Urban Environment. *Journal of Environmental Psychology*, *19*(4), 331–352. doi:10.1006/jevp.1999.0138
- Bonaiuto, M., Fornara, F., Ariccio, S., Ganucci Cancellieri, U., & Rahimi, L. (2015). Perceived Residential Environment Quality Indicators (PREQIs) relevance for UN-HABITAT City Prosperity Index (CPI). *Habitat International*, *45*, 53–63. doi:10.1016/j.habitatint.2014.06.015
- Bonaiuto, M., Fornara, F., & Bonnes, M. (2003). Indexes of perceived residential environment quality and neighbourhood attachment in urban environments: a confirmation study on the city of Rome. *Landscape and Urban Planning*, *65*(1–2), 41–52. doi:10.1016/S0169-2046(02)00236-0
- Bonnes, M., Bonaiuto, M., Ercolani, A. P., & De Rosa, A. M. (1991). Residential satisfaction in the big city: a transactional-contextual study. In M. Bonnes (Ed.), U.N.E.S.C.O. *Programme on Man and the Biosphere. Urban Ecology Applied to the City of Rome. M.A.B. Italia Project II. Progress Report N. 4*. Roma: M.A.B. Italia and C.N.R.
- Bonnes, M., Bonaiuto, M., & Ercolani, A. P. (1991). Crowding and residential satisfaction in the urban environment: a contextual approach. *Environment and Behavior*, *23*, 531–552.
- Buonanno, P., Montolio, D., & Raya-Vílchez, J. M. (2013). Housing prices and crime perception. *Empirical Economics*, *45*(1), 305–321. doi:10.1007/s00181-012-0624-y
- Campelo, A., Aitken, R., Thyne, M., & Gnoth, J. (2014). Sense of place: the importance for destination branding. *Journal of Travel Research*, *53*(2), 154–166. doi:10.1177/0047287513496474

- Dancey, C. P., & Reidy, J. (2011). *Statistics without maths for psychology* (5th ed.). Harlow: Pearson.
- Dębek, M. (2014). Towards people's experiences and behaviours within their worlds: The integrative-transactional framework for studying complex people-environment interactions. *Social Space*, 8(2), 1–55.
- Dębek, M., & Janda-Dębek, B. (2013). Jakość życia w przestrzeniach zurbanizowanych – definicje, podsumowanie wyników badań oraz problemy metodologiczne. *Czasopismo Psychologiczne*, 19(2), 251–263. doi:10.14691/CPJ.19.2.251
- Easthope, H. (2004). A place called home. *Housing, Theory and Society*, 21(3), 128–138. doi:10.1080/14036090410021360
- Field, A. P. (2009). *Discovering statistics using SPSS* (3rd ed.). Introducing statistical methods. London: Sage Publications.
- Fornara, F., Bonaiuto, M., & Bonnes, M. (2010). Cross-Validation of Abbreviated Perceived Residential Environment Quality (PREQ) and Neighborhood Attachment (NA) Indicators. *Environment and Behavior*, 42(2), 171–196. doi:10.1177/0013916508330998
- Gifford, R. (2007). *Environmental psychology: Principles and practice* (4th ed.): Optimal Books.
- Harzing, A. W. (2007). Publish or Perish. Retrieved from <http://www.harzing.com/pop.htm>
- Hay, R. (1998). Sense of place in developmental context. *Journal of Environmental Psychology*, 18(1), 5–29. doi:10.1006/jevp.1997.0060
- Hernández, B., Martín, A. M., Ruiz, C., & Hidalgo, Ma del Carmen. (2010). The role of place identity and place attachment in breaking environmental protection laws. *Journal of Environmental Psychology*, 30(3), 281–288. doi:10.1016/j.jenvp.2010.01.009
- Home Broker. (2014). Retrieved from <https://homebroker.pl/>
- Jackson, J. B. (1994). *A sense of place, a sense of time*. New Haven: Yale University Press.
- Jorgensen, B. S., & Stedman, R. C. (2001). Sense of place as an attitude: Lakeshore owners attitudes toward their properties. *Journal of Environmental Psychology*, 21(3), 233–248. doi:10.1006/jevp.2001.0226

- Kalandides, A. (2011). The problem with spatial identity: revisiting the “sense of place”. *Journal of Place Management and Development*, 4(1), 28–39. doi:10.1108/17538331111117142
- Kline, P. (2000). *The handbook of psychological testing* (2nd ed). London, New York: Routledge.
- Lalli, M. (1992). Urban-related identity: Theory, measurement, and empirical findings. *Journal of Environmental Psychology*, 12(4), 285–303. doi:10.1016/S0272-4944(05)80078-7
- Lewicka, M. (2005). Ways to make people active: The role of place attachment, cultural capital, and neighborhood ties. *Journal of Environmental Psychology*, 25(4), 381–395. doi:10.1016/j.jenvp.2005.10.004
- Lewicka, M. (2008). Place attachment, place identity, and place memory: Restoring the forgotten city past. *Journal of Environmental Psychology*, 28(3), 209–231. doi:10.1016/j.jenvp.2008.02.001
- Lewicka, M. (2011). Place attachment: How far have we come in the last 40 years? *Journal of Environmental Psychology*, 31(3), 207–230. doi:10.1016/j.jenvp.2010.10.001
- Lewicka, M. (2012). *Psychologia miejsca. Monografie Polskiego Stowarzyszenia Psychologii Społecznej*. Warszawa: Wydawnictwo Naukowe Scholar.
- Manzo, L., & Devine-Wright, P. (Eds.). (2014). *Place attachment: Advances in theory, methods, and applications*: New York: Routledge.
- Marans, R. W. (2012). Quality of Urban Life Studies: An Overview and Implications for Environment-Behaviour Research. *Procedia - Social and Behavioral Sciences*, 35, 9–22. doi:10.1016/j.sbspro.2012.02.058
- Marans, R. W., & Stimson, R. J. (Eds.). (2011). *Investigating quality of urban life: Theory, methods and empirical research*. Dordrecht: Springer.
- Moslemi, M., & Ayvazian, S. (2014). Study Joint Elements between Creation “Sense of Place” and “Place Attachment”. *Advances in Environmental Biology*, 8(7), 2202–2210.
- Power, M., Bullinger, M., & Harper, A. (1999). The World Health Organization WHO-QOL-100: Tests of the universality of quality of life in 15 different cultural groups worldwide. *Health Psychology*, 18(5), 495–505. doi:10.1037/0278-6133.18.5.495

- Ramkissoon, H., Graham Smith, Liam David, & Weiler, B. (2013). Testing the dimensionality of place attachment and its relationships with place satisfaction and pro-environmental behaviours: A structural equation modelling approach. *Tourism Management*, 36, 552–566. doi:10.1016/j.tourman.2012.09.003
- Rysak-Czajkowska, P. (2014). Jakie czynniki wpływają na wartość rynkową nieruchomości? *Inwestuj w Nieruchomości*. Retrieved from <http://www.iwn.son.pl/raporty-opinie-analazy-ryнку-nieruchomosci/232-jakie-czynniki-wplywaja-na-wartosc-rynkowa-nieruchomosci>
- Scannell, L., & Gifford, R. (2010). Defining place attachment: A tripartite organizing framework. *Journal of Environmental Psychology*, 30(1), 1–10. doi:10.1016/j.jenvp.2009.09.006
- Simlai, P. (2014). Estimation of variance of housing prices using spatial conditional heteroskedasticity (SARCH) model with an application to Boston housing price data. *The Quarterly Review of Economics and Finance*, 54(1), 17–30. doi:10.1016/j.qref.2013.07.001
- Smith, K. (2011). *The relationship between residential satisfaction, sense of community, sense of belonging and sense of place in a western Australian urban planned community* (Doctoral Thesis). Edith Cowan University.
- Stedman, R. C. (2002). Toward a social psychology of place: Predicting behavior from place-based cognitions, attitude, and identity. *Environment and Behavior*, 34(5), 561–581. doi:10.1177/0013916502034005001
- Steg, L., & Berg, Agnes E. van den (Eds.). (2010). *Environmental psychology: An introduction*. Wiley.
- van Kamp, I., Leidelmeijer, K., Marsman, G., & Hollander, A. de. (2003). Urban environmental quality and human well-being. *Landscape and Urban Planning*, 65(1–2), 5–18. doi:10.1016/S0169-2046(02)00232-3
- Visser, P., van Dam, F., & Hooimeijer, P. (2008). Residential environment and spatial variation in house prices in the netherlands. *Tijdschrift voor Economische en Sociale Geografie (Journal of Economic & Social Geography)*, 99(3), 348. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=edb&AN=34184825&lang=pl&site=eds-live&authtype=ip,uid>
- World Health Organization. (1998). *WHOQOL User Manual* (1st ed.). Geneva.

APPENDIX A

Table A1

Polish translations of the APREQ & NA items (only items present in the final version of PL-APREQ & NA are shown).

Indexes (basic dimensions)	Items in English	Items in Polish
1. Architectural & Urban Planning Space 1F	BD2 There is enough space between houses in this neighborhood	W tej okolicy jest wystarczająco dużo przestrzeni między budynkami.
	BD3 There is little space between buildings in this neighborhood*	W tej okolicy jest mało przestrzeni pomiędzy budynkami.
	BV1 The dimension of buildings is oppressive in this neighborhood*	W tej okolicy rozmiary budynków są przytłaczające.
	BA2 It is pleasant to see this neighborhood	Miło się patrzy na tę okolicę.
2. External Connections	EC1 The city center can be easily reached from this neighborhood	Łatwo się dostać do centrum z tej okolicy.
	EC2 This neighborhood is well connected with important parts of the city	Ta okolica jest dobrze połączona z ważnymi częściami miasta.
3. Green Areas	GA1 There are green areas for relaxing in this neighborhood	W tej okolicy są tereny zielone, gdzie można odpocząć.
	GA2 There are enough green areas in this neighborhood	W tej okolicy jest wystarczająco dużo zieleni.
	GA4 In this neighborhood, green areas are in good condition	W tej okolicy zieleń jest dobrze utrzymana.
4. Internal Functionality	IP2 There's a good availability of parking spaces	W tej okolicy miejsca parkingowe są łatwo dostępne
	IP1 Parked cars impede walking in this neighborhood*	W tej okolicy zaparkowane samochody utrudniają ruch pieszym.
	IP3 It is easy to cycle around in this neighborhood	W tej okolicy można łatwo poruszać się rowerem.
5. Security	SE1 You can meet bad people in this neighborhood*	W tej okolicy kręcą się podejrzane osoby.
	SE2 Acts of vandalism happen in this neighborhood*	W tej okolicy często dochodzi do aktów wandalizmu.
	SE3 Here in the night there is the risk of dangerous encounters*	W tej okolicy spacer późnym wieczorem może być niebezpieczny.
6. Socialability	SO1 In this neighborhood, it is difficult to make friends with people*	W tej okolicy trudno się z kimś zaprzyjaźnić.
	SO2 In this neighborhood, it is easy to get to know people	W tej okolicy łatwo nawiązać znajomość z innymi ludźmi.
	SO3 In this neighborhood people tend to be isolated*	Mieszkańcy tej okolicy unikają innych ludzi.
7. Commercial Services	CS1 There are all kinds of stores in this neighborhood	W tej okolicy można znaleźć wszystkie rodzaje sklepów.
	CS2 Anything can be found in the neighborhood's stores	W okolicznych sklepach mogę znaleźć wszystko.
	CS3 This neighborhood is well served with stores	W tej okolicy jest wystarczająco dużo sklepów.

8. Recreational Services 1F	SP1 You can do various sports in this neighborhood	W tej okolicy można uprawiać różne sporty.
	SP2 The neighborhood is well equipped with sports grounds	Ta okolica jest dobrze wyposażona w obiekty sportowe
	SA1 Entertainment activities for residents are lacking in this neighborhood*	W tej okolicy brakuje rozrywek dla mieszkańców.
9. Transport Services	TS1 In this neighborhood, public transport provides good connections with the rest of the city	Komunikacja publiczna zapewnia dobre połączenie tej okolicy z resztą miasta.
	TS2 In this neighborhood, the frequency of public transport is adequate for residents' needs	Częstotliwość kursowania komunikacji publicznej w tej okolicy jest dopasowana do potrzeb mieszkańców.
	TS4 Bus stops are well distributed in this neighborhood	Przystanki komunikacji publicznej są dobrze rozmieszczone w tej okolicy.
10. Environmental Health	EH1 The air is clean in this neighborhood	W tej okolicy jest czyste powietrze.
	EH2 This neighborhood is generally not polluted	Ta okolica jest ogólnie czysta (mowa o wszelkich zanieczyszczeniach)
	EH3 This is a noiseless neighborhood	Ta okolica jest cicha.
11. Relaxing vs. Distressing	RD1 There is a calm atmosphere in this neighborhood	To jest spokojna okolica.
	RD2 This neighborhood is still livable if compared with the chaos of other areas	W porównaniu z innymi obszarami w tej okolicy mieszka się dobrze.
	RD3 Living in this neighborhood is quite distressing*	Życie w tej okolicy jest stresujące.
12. Stimulating vs. Boring	SB1 This neighborhood is full of activity	W tej okolicy wiele się dzieje.
	SB2 Every day there is something interesting in this neighborhood	W tej okolicy każdego dnia dzieje się coś ciekawego.
	SB3 Nothing happens in this neighborhood*	W tej okolicy brakuje aktywności (<i>tzn. nigdy „nic się nie dzieje”</i>).
13. Upkeep	UP1 Streets are regularly cleaned in this neighborhood	W tej okolicy ulice są regularnie sprzątane.
	UP2 Road signs are well kept in this neighborhood	Oznakowanie ulic w tej okolicy jest dobrze utrzymane (w dobrym stanie).
	UP4 There are too many holes in the neighborhood's streets*	Ulice w tej okolicy są dziurawe.
Neighbourhood Attachment	NA1 This neighborhood is part of me	Ta okolica jest częścią mnie.
	NA2 It would be very hard for me to leave this neighborhood	Byłoby mi trudno wyprowadzić się z tej okolicy.
	NA3 This is the ideal neighborhood for me	To idealna okolica dla mnie.

Table A2

Comparison between Polish and Iranian adaptation of APREQ & NA with the Italian original

Scales (basic dimensions)	Factors (indexes)	Poland		Iran		Italy	
		N _e	α	N _e	α	N _e	α
Architectural and Urban Planning Space	1. Building Aesthetics					3	.72
	2. Building Density					3	.85
	3. Building Volume					3	.83
Architectural and Urban Planning Space	1. Building Aesthetics & Density			3	.73		
	2. Building Volume			3	.80		
Architectural and Urban Planning Space 1F	(unidimensional)	4	.82				
Commercial Services	Commercial Services	3	.86	4	.87	4	.88
Green Areas	Green Areas	3	.77	4	.88	4	.87
Environmental Health	Environmental Health	3	.83	4	.89	4	.86
Organization of Accessibility and Roads	1. Internal Practicability	3	.66	2	.54*	3	.67
	2. External Connections	2	.71	3	.80	3	.82
Sociorelational Features	1. Security					3	.78
	2. Sociability					3	.73
	3. Discretion					3	.79
Sociorelational Features	(unidimensional)			7	.87		
Sociorelational Features	1. Security	3	.91				
	2. Sociability	3	.74				
Welfare Services	1. School services	–	–	3	.86	3	.79
	2. Social care services	–	–	3	.78	3	.62
Recreational Services	1. Sport services			3	.91	3	.82
	2. Social-cultural activities			2	.36*	3	.71
Recreational Services 1F	(unidimensional)	3	.74				
Pace of Life	1. Relaxing versus Distressing	3	.81	3	.84	3	.71
	2. Stimulating versus Boring	3	.76	3	.77	3	.67
Transport Services	Transport Services	3	.87	4	.75	4	.81
Upkeep	Upkeep	3	.65	3	.93	4	.70
Neighbourhood Attachment	Neighbourhood Attachment	4	.84	4	.93	4	.82
	Σ of items	43		58		66	

Note. α = Cronbach's α, N_e = number of items, * = Pearson correlations instead of α

– removed from the questionnaire due to low reliability

APPENDIX B

Table B1

*Average real estate prices per square meter of the apartment in investigated neighborhood (Wrocław, Poland)**

	M	Mdn	HI	LO
Offer price	5.85 (1.39)	5.62 (1.34)	9.17 (2.18)	4.70 (1.12)
Actual transaction price	5.48 (1.30)	5.42 (1.29)	7.26 (1.73)	4.23 (1.01)
Average price	5.68 (1.35)	5.55 (1.32)	8.20 (1.95)	4.60 (1.10)

Note. 78 measured residential environments (areas within the 500 meter radius from the particular crossings nearest to the respondents' homes)

M = mean of prices' means; Mdn = median of prices' means

HI = highest of prices' means; LO = lowest of prices' means

All prices reported in thousands PLN. Approximate equivalents in thousands EUR reported in brackets.

* based on 2949 observations at www.homebroker.pl in December 2014