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ORIGINAL

Digital habitability scale: Connectivity and comfort with technology in dwellings of Mazatlán

Escala de habitabilidad digital: conectividad y comodidad con la tecnología en viviendas de Mazatlán

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ABSTRACT

Homes increasingly host study, work and remote communication, which gives habitability a digital dimension. This instrumental, cross-sectional and exploratory study carried out a preliminary review of a twelve-item digital habitability scale with two dimensions, perceived connectivity in the dwelling and comfort with technology at home, administered in the pilot survey of project FZ-HAB-0030 of the Factoriza UAS platform to residents aged 18 or older of neighborhoods with different connectivity levels in Mazatlán, Sinaloa, Mexico. A preliminary cut of 7 cases, out of a target of 100, was analyzed with descriptive statistics, Cronbach's alpha and inter-item correlations; omega and factor analysis were not interpretable given the size of the cut. Item means ranged from 3.43 to 4.71. Connectivity showed an alpha of .726 and comfort an alpha of .678, each with one item negatively related to its dimension: making video calls from any room and technology helping one feel safe. The correlation between dimensions was high, ρ = .807, but very uncertain. The results do not estimate the properties of the scale, but they guide its revision before the final data cut.

Keywords: digital habitability; home connectivity; digital divide; psychometric evidence

RESUMEN

La vivienda alberga cada vez más el estudio, el trabajo y la comunicación a distancia, lo que da a la habitabilidad una dimensión digital. Este estudio instrumental, transversal y exploratorio realizó una revisión preliminar de una escala de habitabilidad digital de doce reactivos con dos dimensiones, Conectividad percibida en la vivienda y Comodidad con la tecnología en casa, aplicada en el levantamiento piloto del proyecto FZ-HAB-0030 de Factoriza UAS a personas de 18 años o más residentes en colonias de Mazatlán, Sinaloa, con distintos niveles de conectividad. Se analizó un corte preliminar de 7 casos, de una meta de 100, con estadísticos descriptivos, alfa de Cronbach y correlaciones entre reactivos; el omega y el análisis factorial no fueron interpretables por el tamaño del corte. Las medias se situaron entre 3.43 y 4.71. Conectividad obtuvo un alfa de .726 y Comodidad un alfa de .678, cada una con un reactivo relacionado en negativo con su dimensión: la posibilidad de hacer videollamadas desde cualquier espacio y la ayuda de la tecnología para sentirse seguro. La correlación entre las dimensiones fue alta, ρ = .807, pero muy incierta. Los resultados no estiman las propiedades de la escala, pero orientan su revisión antes del corte final.

Palabras clave: habitabilidad digital; conectividad en la vivienda; brecha digital; evidencias psicométricas

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INTRODUCTION

Contemporary housing not only accommodates rest, eating and socializing, but also, increasingly, study, work, procedures and remote communication. This expansion of functions depends on internet connectivity, the availability of devices and the electrical infrastructure that supports them, as well as on the familiarity of its occupants with technology. The habitability of the dwelling thus acquires a digital dimension, which is added to the physical, thermal and spatial conditions traditionally considered in its assessment.

In Mexico, internet access in households has spread, but it is not universal. According to the 2024 National Survey on Availability and Use of Information Technologies in Households, the country had 100.2 million internet users, equivalent to 83.1% of the population aged six and over, and 28.8 million households with internet access, 73.6% of the total(Instituto Nacional de Estadística y Geografía [INEGI], 2025). Based on an earlier edition of that survey,Martínez-Domínguez and Fierros-González (2022)found that internet access and use among the school-age population depended on schooling, economic level, digital skills and place of residence, as well as on the presence of devices in the home.

The COVID-19 pandemic made this dimension of the dwelling visible. In Spain, a study with 1,800 surveys during the 2020 lockdown found that spaces for telework were insufficient in more than a quarter of households, and that their perceived adequacy was related, among other factors, to the quality of digital resources(Cuerdo-Vilches et al., 2021). In Mexico, the analysis of young people's accounts of their lockdown experience showed that the dwelling became an enclosure that housed school, work and businesses, with a saturation of functions in the living spaces(Navarrete Valencia, 2024).

The FZ-HAB-0030 project of the Factoriza UAS platform set out to develop a digital habitability scale. To this end, a twelve-item instrument organized into two dimensions, perceived connectivity in the dwelling and comfort with technology at home, was designed, and a pilot survey was started in neighborhoods of Mazatlán with different levels of connectivity. This article presents the results of the first preliminary data cut of that survey. The general objective is to carry out a preliminary review of the functioning of the scale. The specific objectives are to describe the responses to the items, estimate the internal consistency of each dimension, examine the correlations between the items and identify the adjustments that the instrument requires before the final data cut.

DEVELOPMENT

The digital dimension of habitability

Habitability studies have traditionally considered space, construction quality, thermal comfort, lighting and services. A systematic review of the factors associated with residential satisfaction grouped these factors into categories that interact with one another, from functional and technical to psychological and public policy ones(Saleem and Alchalabi, 2025). Connectivity can be understood as a dwelling service comparable to water or energy, and NavarreteValencia (2024)treated it as such when he included internet access among the quantitative indicators of habitability, alongside water and energy, in his analysis of the dwelling during lockdown.

The study byCuerdo-Vilches et al. (2021)offers a quantitative approach to this dimension. Using surveys, photographs and narratives from Spanish households, the authors assessed the perceived adequacy of teleworking spaces, their characteristics and the availability of digital resources and internet. Beyond social status and household stability, dwelling tenure, type and floor area, indoor environmental quality, the availability of exclusive spaces for teleworking and the quality of digital resources were significantly related to this adequacy. These results indicate that digital habitability combines physical attributes of the dwelling, such as space and electrical installation, with technological resources and with the experience of its occupants.

Digital divide and dwelling

The digital divide is not limited to the availability of a connection. In Mexico, the productive use of internet by the school-age population was related to digital skills and to the presence of intermediaries who support its use at home, in addition to economic resources and place of residence(Martínez-Domínguez and Fierros-González, 2022). In England, an evaluation of a telephone training program for social housing residents during the pandemic described this population as highly exposed to digital exclusion. It found that a lack of skills to use devices hindered their use

more than a lack of devices, and that the cost of data was a central concern(Walker et al., 2024).

These results suggest that a digital habitability scale must distinguish, at least, the quality of the connection in the dwelling, the sufficiency of resources for the people who use them and the comfort of occupants with technology. The project scale captures these contents in its two dimensions, and additionally includes aspects of the dwelling's electrical infrastructure, such as the location of outlets and the availability of a place to charge devices.

The dwelling as a place of study and work

The 2020 lockdown turned the dwelling into a school and an office, and tested its capacity to accommodate those functions. In the accounts of young Mexicans analyzed by NavarreteValencia (2024), the dwelling became a workplace, the lockdown made the advantages and shortcomings of the inhabited space more visible, and the multifunctionality of spaces sometimes produced a saturation of functions with physical, social, economic, and psychological effects. The author also noted that remote work and classes depended on the use of information technologies and on a reliable electricity supply.

This background shows that digital habitability is not limited to the existence of a connection: it includes the possibility of using it in the different spaces of the dwelling, the sufficiency of the service for all its occupants, and the availability of adequate electrical infrastructure. The scale of the project incorporates these aspects in items such as the possibility of making video calls from any space, the sufficiency of internet for the people who use it, the possibility of studying online, and the location of electrical outlets.

Technology in the home, comfort, and safety

The literature on smart home technologies, focused mainly on older adults, provides background on comfort with technology in the home. A systematic review of 27 studies found that about 89 % reported positive attitudes toward these technologies, that convenience was the most frequent reason for acceptance, and that concerns about privacy and safety, together with a lack of need, were the most frequently cited reasons for rejection (Jaberi et al., 2026). Another review of 30 studies from ten countries found that these technologies supported physiological monitoring, safety, and emergency detection, and identified privacy, cost, technical reliability, and digital literacy as barriers (Zhai et al., 2026).

The relationship between home technology and the feeling of safety is therefore ambivalent: devices can support safety but can also generate concerns about privacy. This ambivalence is relevant to the scale of the project, which includes in the comfort dimension an item on the help of technology in feeling safe.

Evidence of validity in the initial stage of a scale

The internal consistency of a dimension is usually estimated with Cronbach's alpha(Cronbach, 1951), which assumes equivalent loadings among the items, and with McDonald's omega(McDonald, 1999/2013), which does not; simulation studies have compared the performance of both coefficients under different data conditions(Malkewitz et al., 2023). The internal structure is explored with exploratory factor analysis, which first requires verifying the adequacy of the data and a sufficient sample size(Ferrando et al., 2022; Goretzko et al., 2021). Scales with items in both directions may show wording effects, because some people respond inconsistently to the positive and negative items of the same dimension(Steinmann et al., 2022), and identifying those responses can reduce such effects(García-Batista et al., 2021). The scale of the project includes three reverse items.

METHODOLOGY

Design

An instrumental, quantitative, non-experimental, cross-sectional study was carried out with a descriptive and exploratory scope. The data correspond to the survey LEV-0035, "Mazatlán Pilot - Digital habitability", from the FZ-HAB-0030 project of the Factoriza UAS platform, and to the frozen dataset DST-0033, with a cut-off date of October 9, 2026. The survey constitutes an independent sample and is the only one of the project.

Population, sample and data cut

The population was defined as residents aged 18 or older living in a dwelling in Mazatlán, Sinaloa, and the survey was conducted in neighborhoods with different levels of connectivity selected by the project lead. According to the Factoriza record, 13 persons opened the questionnaire and 7 completed it; no cases were excluded for quality control, so 7 cases were analyzed (Table 2).

The data cut analyzed is preliminary: it comprises 7 cases out of a target of 100, and the survey remained open, in field status, as of the cutoff date. With 7 cases for 12 items, the ratio is 0.6 cases per item, so the correlation matrix among the twelve items is not invertible.

Instrument

The digital habitability scale was administered. It consists of twelve items with a five-point response format, from Strongly disagree (1) to Strongly agree(5), organized into two dimensions of six items each: perceived connectivity in the dwelling (R1 to R6) and comfort with technology at home (R7 to R12). Three items are worded in the reverse direction, R3, R6 and R9, and are recoded in the data matrix, so that a higher score indicates better connectivity and greater comfort with technology. Table 1 presents the code, the dimension, the text and the direction of each item.

Table 1. Structure of the instrument.

Code	Item	Reverse
R1	The internet connection in my dwelling is stable	No
R2	I can make video calls from any space in my dwelling	No
R3	In my dwelling, the cell phone signal is weak	Yes
R4	The internet in my dwelling is enough for the people who use it	No
R5	I can study online from my dwelling	No
R6	Internet failures interrupt my activities at home	Yes
R7	The technological devices in my dwelling make my daily life easier	No
R8	I feel comfortable using the technology in my dwelling	No
R9	I find the technology in my dwelling complicated	Yes
R10	The electrical outlets in my dwelling are where I need them	No
R11	In my dwelling I have a place to charge my devices	No
R12	The technology in my dwelling helps me feel safe	No

Note. R1 to R6 belong to perceived connectivity in the dwelling and R7 to R12 to comfort with technology at home; the dimension column is omitted for legibility. 5-point response scale (Strongly disagree, Disagree, Neither agree nor disagree, Agree, Strongly agree). Reverse items are already recoded in the delivered matrix. Source: Factoriza UAS, project FZ-HAB-0030, survey LEV-0035, dataset DST-0033.

Procedure

Responses were collected through the survey questionnaire managed in Factoriza UAS, which records express online informed consent before the first item and does not collect identifying data. Factoriza froze dataset DST-0033 with a cryptographic fingerprint, generated the matrix with the reverse items recoded, and produced the descriptive, internal consistency and correlation analyses within each dimension (runs RUN-00191 to RUN-00195). The complementary analyses were run with the data file and the item dictionary exported by the platform.

Data analysis

In a first stage, Factoriza UAS calculated the mean, standard deviation, skewness, kurtosis and response percentages at the extreme values of each item; the internal consistency of each dimension using Cronbach's alpha(Cronbach, 1951), with the corrected item-total correlation and alpha if the item is deleted; and the Pearson correlations between the items of each dimension, with 95% confidence intervals via Fisher's transformation. In a second stage, the program analisis_psicometrico.py, version 1.0, was run in Python 3.13.16(Python Software Foundation, 2026), with NumPy 2.5.3(Harris et al., 2020), SciPy 1.18.1(Virtanen et al., 2020)and pandas 3.0.5. The program applies fixed, declared procedures, with no manual intervention in the calculations.

The program attempted to estimate McDonald's total omega(McDonald, 1999/2013)for each dimension from a one-factor model, without reversing items, and the exploratory factor analysis of

the twelve items, with sampling adequacy, test of sphericity, number of factors by parallel analysis with 100 simulations, minimum residual extraction and oblimin rotation. It also estimated the relationship between the mean scores of the two dimensions with Spearman's coefficient and its 95% confidence interval, via Fisher's transformation with the standard error ofBonett and Wright (2000). Reference values for psychometric indices are treated as guidelines and not as decision rules(Ferrando et al., 2022). No item was eliminated, and no confirmatory factor analysis was run.

Ethical considerations

Participation was voluntary and anonymous. Factoriza UAS records express online informed consent and does not collect names, emails or other identifying data.

Statement on the use of artificial intelligence

During the preparation of this manuscript, the Factoriza UAS platform was used for data management and for descriptive, internal consistency and inter-item correlation analyses; a Python analysis program with fixed and validated procedures was used for omega, exploratory factor analysis and the correlation between dimensions; and the Claude Opus language model (Anthropic) was used to run that program, to assist in the literature search, to draft a preliminary version and to assemble the document from the results. The authors reviewed, corrected and approved the entire text, verified every reference and assume full responsibility for the content of the article.

RESULTS

Sample composition

Table 2 summarizes the flow of cases. Of the 13 people who opened the questionnaire, 7 completed it and were analyzed, with no exclusions due to quality control. The 7 cases analyzed answered the twelve items.

Table 2. Sample composition.

Indicator	Value
People who opened the questionnaire	13
Completed questionnaires	7
Cases excluded due to quality control	0
Cases analyzed	7
Items	12

Note. Survey "Piloto Mazatlán · Habitabilidad digital" (LEV-0035); population: residents aged 18 or older who live in a dwelling in Mazatlán; territory: Mazatlán, Sinaloa, in neighborhoods with different levels of connectivity selected by the project lead. Dataset DST-0033, fingerprint 2590a19e05df307b. Source: Factoriza UAS. Preliminary data cut: n = 7 out of a target of 100, with the survey still open.

Connectivity and comfort with technology

Table 3 and Figure 1 present the descriptive statistics. In perceived connectivity in the dwelling, the possibility of making video calls from any space had the highest mean (R2: M = 4.71, SD = 0.76), with a skewness of -2.65 and a kurtosis of 7.00, followed by the sufficiency of internet for the people who use it (R4: M = 4.57, SD = 0.79). The absence of interruptions due to internet failures, in the recoded version of the reverse item, had a mean of 3.86 (R6: SD = 0.90); the stability of the connection (R1: M = 3.57, SD = 1.40) and the possibility of studying online (R5: M = 3.57, SD = 1.81) shared a lower mean, the second with the greatest dispersion of the instrument, and the cell phone signal, in the recoded version of the item on its weakness, had the lowest mean of the instrument (R3: M = 3.43, SD = 1.13).

In comfort with technology at home, feeling comfortable using the technology of the dwelling had the highest mean of the dimension, equal to that of R2, and the lowest dispersion of the instrument (R8: M = 4.71, SD = 0.49). The perception that the technology is not complicated, in the recoded version of the reverse item (R9: M = 4.57, SD = 0.53), and the availability of a place to charge the devices (R11: M = 4.57, SD = 0.53) shared the same mean and dispersion, followed by the help of technology to feel safe (R12: M = 4.43, SD = 0.79) and by the adequate location of the electrical outlets (R10: M = 4.29, SD = 0.95).

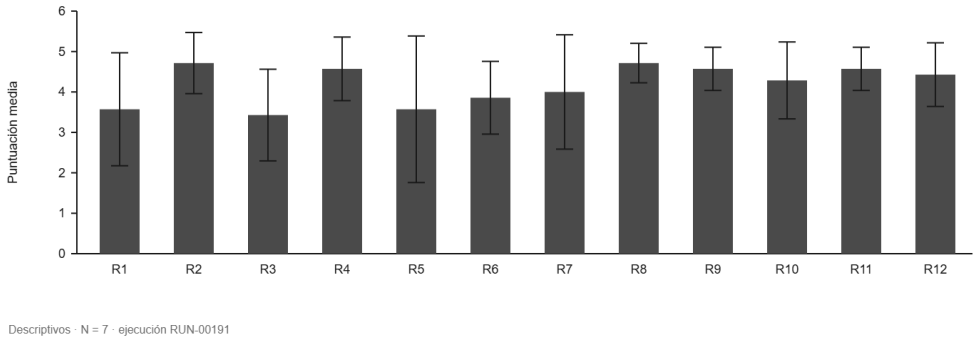
The facilitation of daily life by technological devices had the lowest mean of the dimension (R7: M = 4.00, SD = 1.41). Overall, the people surveyed felt comfortable with the technology of their dwelling and rated the stability of their connection and the possibility of studying online more dispersedly.

Table 3. Descriptive statistics of the items.

Item	M	SD	Skewness	Kurtosis	Floor	Ceiling
R1	3.57	1.40	-0.97	1.01	14%	29%
R2	4.71	0.76	-2.65	7.00	14%	86%
R3	3.43	1.13	-0.24	-1.23	29%	14%
R4	4.57	0.79	-1.76	2.36	14%	71%
R5	3.57	1.81	-0.98	-1.08	29%	43%
R6	3.86	0.90	0.35	-1.82	43%	29%
R7	4.00	1.41	-1.98	4.40	14%	43%
R8	4.71	0.49	-1.23	-0.84	29%	71%
R9	4.57	0.53	-0.37	-2.80	43%	57%
R10	4.29	0.95	-0.76	-1.69	29%	57%
R11	4.57	0.53	-0.37	-2.80	43%	57%
R12	4.43	0.79	-1.11	0.27	14%	57%

Note. N = 7. Floor and ceiling indicate the percentage of responses at the minimum and maximum values. The item-total correlation column is omitted from the Factoriza descriptive table, whose values do not match those of Table 4 because they are not calculated over the total of each dimension. Factoriza UAS run RUN-00191. Preliminary data cut: n = 7 of a target of 100, with the survey open.

Figure 1. Mean scores per item with one-standard-deviation bars.



Note. N = 7. Scale from 1 to 5; reverse items R3, R6 and R9 are shown recoded. Factoriza UAS run RUN-00191. Preliminary data cut: n = 7 of a target of 100, with the survey open.

Internal consistency

Table 4 brings together the item analysis by dimension calculated by Factoriza. Perceived connectivity in the dwelling obtained an alpha of .726. The possibility of studying online (R5: .834) and connection stability (R1: .813) were the most consistent items, followed by internet sufficiency (R4: .642) and the absence of interruptions (R6: .486); cell phone signal had a weak relationship (R3: .211), and the possibility of making video calls from any space was negatively related to the dimension (R2: -.095), so that its elimination would raise alpha to .791.

Comfort with technology at home obtained an alpha of .678. Feeling comfortable with technology was the most consistent item (R8: .839), followed by the location of electrical outlets (R10: .680); the perception that technology is not complicated, the place to charge the devices and the facilitation of daily life had moderate relationships (R9 and R11: .551; R7: .548), and the help of technology to feel safe was negatively related to the dimension (R12: -.162), so that its elimination would raise alpha to .792. The complementary program reproduced the alpha values of both dimensions (Table 5), but did not report omega, because each dimension contains an item that correlates negatively with the rest, R2 in Connectivity and R12 in Comfort, a situation in which total omega is not interpretable.

Table 4. Item analysis by dimension.

Dimension	Item	Corrected item-total r	α if item deleted
Connectivity	R1	.813	.554
Connectivity	R2	-.095	.791
Connectivity	R3	.211	.754
Connectivity	R4	.642	.662
Connectivity	R5	.834	.534
Connectivity	R6	.486	.687
Comfort	R7	.548	.619
Comfort	R8	.839	.565
Comfort	R9	.551	.618
Comfort	R10	.680	.524
Comfort	R11	.551	.618
Comfort	R12	-.162	.792

Note. N = 7. Connectivity = perceived connectivity in the dwelling; Comfort = comfort with technology at home. The corrected item-total correlation excludes the item itself from its dimension total. Cronbach's alpha for the full dimension, with 6 items each: Connectivity = .726 (RUN-00192 execution); Comfort = .678 (RUN-00194). Source: Factoriza UAS, Tables 4 and 6 of the package, merged without modifying values. Preliminary data cut: n = 7 of a target of 100, with the survey open.

Table 5. Internal consistency by dimension.

Dimension	Items	n	α	ω
Connectivity	6	7	.726	n/a
Comfort	6	7	.678	n/a

Note. α = Cronbach's alpha; ω = McDonald's total omega from a one-factor model by minimum residual, without reverse-scoring items. Complete cases per dimension. Connectivity = perceived connectivity in the dwelling; Comfort = comfort with technology at home. The program does not report ω because R2, in Connectivity, and R12, in Comfort, correlate negatively with the rest of their dimension; this observation is moved to the note from the corresponding column. Source: own elaboration with analisis_psicometrico.py 1.0 (Python 3.13.16), dataset DST-0033_FZ_HAB_0030. Preliminary data cut: n = 7 of a target of 100, with the survey open.

Table 6 presents all correlations between the items of each dimension. In Connectivity, only two correlations had intervals that excluded zero: internet sufficiency with the possibility of studying online (R4 and R5: r = .902, 95% CI [.462, .986], p = .006), and connection stability with the possibility of studying online (R1 and R5: r = .837, 95% CI [.226, .975], p = .019). Correlations of R2 with the other items of the dimension were negative, except for the one with the absence of interruptions (R2 and R6: r = .420). In Comfort, no correlation had an interval that excluded zero; the highest were those of feeling comfortable with technology with the perception that it is not complicated and with the place to charge the devices (R8 and R9, R8 and R11: r = .730, 95% CI [-.051, .957], p = .062), and those of R12 were negative with all the items of the dimension, except with the location of the electrical outlets (R10 and R12: r = .477).

Internal structure and relationship between the dimensions

The planned exploratory factor analysis could not be estimated in an interpretable way, and its results are not presented in tables. With 7 cases for 12 items, the correlation matrix is not invertible, so the measure of sampling adequacy could not be calculated and the test of sphericity is meaningless. Parallel analysis suggested one factor, which in the program's solution explained 48.72 % of the variance, but that solution presented a Heywood case, with a communality greater than 1 in the possibility of studying online (R5), and with fewer cases than items it has no support. These results appear in the reproducibility appendix, but they provide no evidence on the dimensionality of the instrument.

Table 6. Correlations between the items of each dimension.

Dimension	Variable pair	r	IC 95%	p
Connectivity	R1 and R2	-.135	[-.806, .688]	.772
Connectivity	R1 and R3	.451	[-.458, .899]	.310
Connectivity	R1 and R4	.563	[-.330, .924]	.188
Connectivity	R1 and R5	.837	[.226, .975]	.019
Connectivity	R1 and R6	.473	[-.435, .904]	.283
Connectivity	R2 and R3	-.222	[-.835, .638]	.632
Connectivity	R2 and R4	-.240	[-.841, .626]	.604
Connectivity	R2 and R5	-.104	[-.795, .704]	.824
Connectivity	R2 and R6	.420	[-.487, .891]	.348
Connectivity	R3 and R4	.053	[-.729, .775]	.910
Connectivity	R3 and R5	.266	[-.609, .849]	.564
Connectivity	R3 and R6	-.093	[-.791, .710]	.842
Connectivity	R4 and R5	.902	[.462, .986]	.006
Connectivity	R4 and R6	.370	[-.531, .878]	.414
Connectivity	R5 and R6	.467	[-.441, .903]	.291
Comfort	R7 and R8	.725	[-.063, .956]	.065
Comfort	R7 and R9	.661	[-.183, .944]	.106
Comfort	R7 and R10	.496	[-.411, .909]	.258
Comfort	R7 and R11	.661	[-.183, .944]	.106
Comfort	R7 and R12	-.449	[-.898, .459]	.312
Comfort	R8 and R9	.730	[-.051, .957]	.062
Comfort	R8 and R10	.564	[-.328, .924]	.187
Comfort	R8 and R11	.730	[-.051, .957]	.062
Comfort	R8 and R12	-.062	[-.779, .725]	.895
Comfort	R9 and R10	.281	[-.599, .853]	.542
Comfort	R9 and R11	.417	[-.490, .890]	.352
Comfort	R9 and R12	-.283	[-.854, .597]	.538
Comfort	R10 and R11	.281	[-.599, .853]	.542
Comfort	R10 and R12	.477	[-.431, .905]	.279
Comfort	R11 and R12	-.283	[-.854, .597]	.538

Note. N = 7. Connectivity = perceived connectivity in the dwelling; Comfort = comfort with technology at home. Pearson correlation. Confidence intervals were obtained using Fisher's z transformation. Cross-sectional design: the reported relationships are associations. Factoriza UAS runs RUN-00193 and RUN-00195 (Tables 5 and 7 of the package, merged without modifying values). Preliminary data cut: n = 7 out of a target of 100, with the survey open.

The Spearman correlation between the mean scores of Connectivity and Comfort, with 7 cases, was positive and high, ρ = .807, 95 % CI [-.009, .978], p = .028. The p value and the confidence interval do not agree in their reading, because the interval, calculated with the standard error ofBonett and Wright (2000), includes zero by a minimal margin; with 7 cases, the magnitude of the relationship is highly uncertain. Since the analysis comprises a single pair of dimensions, the result is presented in the text and not in a table.

Discussion of results

The purpose of this study was to conduct a preliminary review of the functioning of the digital habitability scale in dwellings in Mazatlán. With 7 cases, the coefficients cannot be interpreted as estimates of the instrument's properties: the simulation literature on alpha and omega has been developed with much larger samples(Malkewitz et al., 2023), and factor analysis requires a sample size that this data cut does not reach(Ferrando et al., 2022; Goretzko et al., 2021). The data cut does, however, allow identifying the items that depart from their dimension and formulating hypotheses about their functioning.

In Connectivity, the core of the dimension was formed by the stability of the connection,

its sufficiency for the people who use it, and the possibility of studying online. These contents correspond to the quality of the digital resources thatCuerdo-Vilches et al. (2021)associated with the adequacy of spaces for working at home. The possibility of making video calls from any space in the dwelling departed from that core. Its mean was the highest in the dimension and almost all responses concentrated at the maximum value, which leaves little variability for relating it to the other items. Moreover, the item combines the quality of the connection with coverage in the different spaces of the dwelling, a different content. The cell phone signal, for its part, depends on mobile telephony infrastructure rather than on the dwelling's internet service, and its weak relationship with the dimension is compatible with that difference and with a possible artifact of the reverse wording(García-Batista et al., 2021; Steinmann et al., 2022).

In Comfort, feeling comfortable with technology was the most coherent item, and the location of electrical outlets and the place to charge devices, which describe the dwelling's infrastructure, were moderately related to comfort. Technology helping one feel safe departed from the dimension. This behavior is consistent with the ambivalence documented in the literature on domestic technologies, which can support safety but also generate concerns about privacy and data safety(Jaberi et al., 2026; Zhai et al., 2026). The item perhaps measures a content different from comfort, the function of technology as a means of protection, which could form part of a dimension of its own.

The presence of items on electrical infrastructure in the comfort dimension deserves particular reflection. The location of outlets and the availability of a place to charge devices are physical attributes of the dwelling, not dispositions of its occupants, and in this data cut they were moderately related to comfort. Their inclusion is consistent with the observation that working and studying at home depend on a reliable electricity supply (Navarrete Valencia, 2024) and on the physical characteristics of the dwelling, such as its surface area, its indoor environmental quality, and the availability of spaces exclusively for those activities (Cuerdo-Vilches et al., 2021). Nevertheless, mixing physical attributes and subjective experiences in the same dimension can hinder its interpretation, and the final data cut will allow examining whether electrical infrastructure groups with comfort or constitutes a facet of its own of digital habitability, closer to the material conditions of the dwelling.

The high correlation between the two dimensions, although very uncertain, suggests that connectivity and comfort with technology form part of the same experience of the digital dwelling, in line with studies that link digital resources with the skills and experience of their users(Martínez-Domínguez and Fierros-González, 2022; Walker et al., 2024). If this relationship holds in the final data cut, it will be worth examining whether the two dimensions are empirically distinguished or whether the scale measures a general construct of digital habitability.

Finally, the survey was designed in neighborhoods with different levels of connectivity, a sound decision for capturing the variability that the digital divide produces among households(INEGI, 2025; Martínez-Domínguez and Fierros-González, 2022). With 7 cases and no information on each person's neighborhood, that variability cannot yet be examined. The high means in most of the comfort items and in several of the connectivity items suggest that, in this data cut, dwellings with good connectivity predominate, something the final data cut should balance.

CONCLUSIONS

The study met its objective within the scope that a preliminary data cut of 7 cases allows: it does not offer estimates of the psychometric properties of the scale, but it identifies the adjustments required. Perceived connectivity in the dwelling obtained an alpha of .726 and comfort with technology at home an alpha of .678, each with one item that was negatively related to the rest, the possibility of making video calls from any space and the help of technology to feel safe, respectively. The omega and the factor analysis were not interpretable, and the correlation between dimensions was high, but very uncertain. Respondents felt comfortable with the technology in their dwelling and rated the stability of their connection and the possibility of studying online more dispersedly.

The limitations are substantial. The sample of 7 cases, against a target of 100 and with the survey still open, is insufficient to estimate internal consistency accurately and does not allow factor analysis. Respondents answered in neighborhoods selected by the project lead, so the results do not generalize to the population of Mazatlán. The study did not measure the characteristics of the respondents or their dwellings, nor the type of connection or the devices available. The cross-sectional design does not allow the direction of the relationships to be established. No confirmatory factor analysis was performed.

These results give rise to decisions for the authors. The first is to review R2, distinguishing the quality of the connection from its coverage in the spaces of the dwelling. The second is to decide

whether R12, the help of technology to feel safe, is kept in the comfort dimension or moved to a safety and privacy dimension. The third is to assess whether the cell phone signal, R3, corresponds to the connectivity of the dwelling. The fourth is to record each respondent's neighborhood and the type of connection, in order to examine the variability that motivated the design of the survey. None of these decisions was made in the present analysis, which retains the twelve items.

As future lines, it is proposed to complete the survey up to the planned target, with a balanced number of dwellings with different levels of connectivity; to repeat the internal consistency analysis and perform the exploratory factor analysis with the final data cut; to confirm the structure in an independent sample through confirmatory factor analysis, and to relate digital habitability to other dimensions of dwelling habitability. A scale with sufficient validity evidence would make it possible to incorporate the digital dimension into habitability studies in northwestern Mexico.

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CONFLICT OF INTEREST

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