

The effect of “Housing First” on mobile and digital media usage by people experiencing homelessness: A program evaluation based on a randomized controlled trial in Spain

Mobile Media & Communication
2024, Vol. 12(2) 328–347
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DOI: 10.1177/20501579231216670
journals.sagepub.com/home/mmc



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Abstract

In 2014, a non-governmental organization called HOGAR SÍ initiated the Hábitat program as a pioneer attempt to implement the Housing First model in Spain. The present study is part of the evaluation of this program, which was carried out from May 2015 to February 2020 using a form of a randomized controlled trial. The treatment group was compared with a control group (people experiencing homelessness but not selected as Hábitat users), keeping track of their evolution over 18 months. Among the many dimensions that were evaluated (coverage of basic needs, life satisfaction, victimization, physical and mental health, etc.), the study analyzed social support and leisure activities involving the use of mobile media and other communication technologies—along similar

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lines to some previous research. The main results show that participating in the Hábitat program brought a few improvements in digital inclusion. That is the case of the higher use of mobile phones to receive calls, to connect to the Internet, or to have contact with relatives, partners, or friends. These gains seem to be significant for the increase in perception of available social support by Hábitat users, whereas these changes did not occur in the comparison group to the same extent. Additionally, participating in the program enhances satisfaction with leisure time, as well as the frequency of carrying out some activities such as shopping, watching TV, or doing a pastime or hobby. It could be concluded that the Hábitat program achieved significant improvements in areas beyond specific housing services. The positive effects regarding social support and leisure activities seem to be partly channeled through mobile phones and digital applications; nevertheless, we are aware that further research and discussion on the active role of these technologies in helping people experiencing homelessness is still necessary.

Keywords

Housing First, homelessness, mobile media, evaluation, randomized controlled trial

Introduction

Three decades ago, the Housing First (HF) model was developed by the organization Pathways to Housing (Tsemberis & Asmussen, 1999). HF's main objective is to attend to individuals experiencing homelessness (IEH) and facing particular difficulties (mental health disorders, drug dependence, etc.) in a different way from the traditional *staircase systems* or *linear residential treatments*. The limitations of these assistance procedures based on "treatment first" had become obvious by that time (Pauly et al., 2013; Tsai et al., 2010; Tsemberis, 2010). HF approaches changed those dynamics by offering permanent housing as quickly as possible, as stable housing was considered the primary need, followed by other supportive services.

Over the years, the HF methodology has spread from North America to other regions, but it had not been applied in Spain until 2014, when a non-governmental organization (NGO) called HOGAR SÍ (previously RAIS Fundación) initiated the Hábitat program. The present study is part of its evaluation, which was carried out from May 2015 to February 2020 using a form of a randomized controlled trial, following the recommendations of previous HF programs (Baxter et al., 2019) and applying the methodology followed in the Housing First Europe project (Busch-Geertsema, 2013). Starting from a previous pilot phase, which made it possible to refine some of its aspects, an experimental design was followed with an equivalent control group (through random assignment) and pre- and post-test measurements were taken every six months in both groups, with a total duration of 18 months. The treatment group was comprised of 152 people at the beginning of the evaluation, 114 of whom remained at the end of the period. For the comparison group (CG), the initial sample size was 284, of whom 141 remained at the end.

Among the many dimensions that were evaluated (coverage of basic needs, life satisfaction, victimization, physical and mental health, etc.), the study analyzed social support

and leisure activities involving the use of mobile media and other communication technologies—along similar lines to some previous research (e.g., Calvo et al., 2019; Neale & Brown, 2015; Pollio et al., 2013; Vázquez et al., 2015). The results show that participating in the Hábitat program brought some improvements in digital inclusion. We have detected gains in the access to information and communication technologies (ICTs), as in the case of the use of mobile phones to receive calls or connect to the Internet (although other factors such as nationality and age also seem to play a role). However, the main positive impacts were related to the perception of available social support. The frequency of telephone contact with family members and partners or friends, as well as satisfaction with those relationships, increased among the Hábitat users. In contrast, these changes did not occur in the CG. The differences in online leisure activities were not as significant but the level of satisfaction in this area was comparatively higher in the Hábitat group.

It can be concluded that the program achieved some improvements in aspects beyond specific housing services. The positive effects regarding social support and leisure activities seem to be partly channeled through telephones and digital applications, but we are aware that further research and discussion on the active role of these technologies in helping people experiencing homelessness is still necessary.

IEH's mobile media usage and the possible effects of the HF model

The evidence of the effectiveness of the HF model to address homelessness is consistent (Pleace, 2018; Pleace & Bretherton, 2019), particularly for people with more pronounced or complex needs associated with mental health problems and/or substance use (Pleace, 2016; Williams, 2020). The main objective of HF is to bring an end to homelessness; therefore, accommodation enhancement has been the most studied aspect and much evidence on the HF's positive effect in this regard has been reported across different programs, countries, and contexts.

Beyond the housing situation, other HF outcomes have been considered, such as quality of life (Aubry et al., 2015; Urbanoski et al., 2018), social functioning (Aubry et al., 2015; Urbanoski et al., 2018), physical and mental health (Greenwood et al., 2020; Tsemberis et al., 2004), and substance use (Kirst et al., 2015; Padgett et al., 2011). Although the use of new ICTs among IEH and their impact on social exclusion/inclusion processes is an aspect that has generated growing interest over the last decade (Calvo et al., 2019), to date it has not been considered as an outcome indicator in HF programs.

There are many works in recent years that have pointed out the habitual use of these ICTs among IEH—although to a lesser extent than the general population (Neale et al., 2022; Vázquez et al., 2015)—and have considered the potential positive effect of that technology usage in improving their lives (Eyrich-Garg, 2010, 2011). In this regard, Calvo et al. (2019) affirm that the use of ICTs influences the ability to increase social contact and reduces the feelings of loneliness experienced by IEH, which can be complementary to direct personal relationships. Along this line, Eyrich-Garg (2010) found that those IEH who owned and used a mobile phone had a greater perception of security, responsibility, and social connection.

In addition to reducing social isolation, the possible effect of these ICTs on the well-being and physical and mental health of IEH has also been studied, as well as their possible uses to improve these aspects (Heaslip et al., 2021). In this regard, some authors have found that virtual contact with people through social media would reduce certain health risk behaviors among IEH (Rice, 2010; Young & Rice, 2011). Calvo and Carbonell (2018) also uncovered that after a Facebook training course for IEH, there were significant improvements in the psychological well-being and socialization of the participants.

Based on the positive results on the health and well-being of IEH linked to the use of ICTs and mobile devices, different initiatives have been proposed to improve these aspects through e-Health interventions (Calvo & Carbonell, 2019; Heaslip et al., 2021). Different works have indicated that these interventions have achieved significant improvements in such aspects as self-care (Bhui, 2017), adherence to treatment (Burda et al., 2012), mental health (Muggleton & Ruthven, 2012; Neale & Stevenson, 2014), drug use, and sexual risk behavior (Kennedy et al., 2016). Despite these promising results, it is important to recognize that there are still barriers to the access and use of ICTs by IEH that may make it difficult to utilize them to reduce the health inequalities suffered by this group (Heaslip et al., 2021).

Leisure is also an aspect that has been included in HF evaluations as a fundamental element for quality of life (Aubry et al., 2015). However, analysis of the role of digital technologies in this area has been more limited. This is despite the fact that there are quite a few studies that point to the importance of mobile devices and the Internet in leisure activities of some IEH (Calvo & Carbonell 2018; Eyrich-Garg, 2011; Marler, 2023).

Therefore, considering the potential of ICTs to improve the living conditions and well-being of IEH, it is especially interesting to ask about the impact that HF programs may have on the access and use of these technologies and their possible effects on people's lives.

Research questions

RQ1: Does participating in the Hábitat program have any positive effect on access to ICTs, including mobile devices?

RQ2: Does participating in the Hábitat program have any positive effect on the indicators of social support? What is the role of mobile technology in this regard?

RQ3: Does participating in the Hábitat program have any positive effect on leisure activity indicators? What uses of mobile technologies are made in this regard?

Methods

Design and sampling

Following the reference of the Housing First Europe project (Busch-Geertsema, 2013), an experimental design was applied for the evaluation of the Hábitat program, with a randomly assigned equivalent control group. Pre- and post-test measurements, as well as

repeated measures every 6 months (0–6–12–18), were taken for both experimental and control groups.

The population comprising the evaluation meet four criteria (Panadero et al., 2021): legal age, homeless situation, long history of homelessness, and presence of mental health problems, addictions, or disabilities. Compliance with these four criteria was verified by referral bodies prior to the configuration of a proportional stratified random sample that took gender into account (Panadero & Vázquez, 2013). The selection of the people who joined Hábitat in each city was conducted by the Department of Evaluation, Research and Quality at HOGAR SÍ in a transparent computerized procedure, under the supervision of the referring entities and with no participation of professionals linked in any way to the program or any people with a direct relationship with potential users.

Regarding sample size, the experimental group (EG) was initially made up of 152 people (the target was 150) joining Hábitat, of whom 114 completed the evaluation period of 18 months (75% ratio). A target ratio of 2.5 times the number of Hábitat's participants was initially designed for the CG, in anticipation of a loss of the sample resulting from the difficulties in locating IEH over a long period. However, it was not possible to get the aimed-for number of participants so the control group was finally launched with 284 people, and 141 of them were interviewed at the end of the evaluation (50% retention approximately).

The conditions of both groups at the beginning of the evaluation were very similar (Table 1) in terms of their demographic (sex, age, and nationality) and social characteristics (high incidence of mental health problems, addictions or disabilities, and long-term homelessness).

Table 1. Initial main characteristics of the evaluation participants for whom data are available at 0- and 18-month waves.

	Experimental group		Comparison group		χ^2/t tests ^a
	<i>n</i>	%/M	<i>n</i>	%/M	
Gender					
Male	91	82.0%	102	77.9%	0.631
Female	20	18.0%	29	22.1%	0.631
Age (mean)	111	48.4	130	49.5	-0.941
Nationality					
Spanish	65	58.6%	83	63.4%	2.124
Non-Spanish	46	31.4%	48	36.6%	2.124
Severity profile					
Mental health	30	27.0%	40	30.5%	0.360
Addictions	81	73.0%	108	82.4%	3.150
Disabilities	25	22.5%	31	23.7%	0.044
Time in homeless situation					
Months in homeless situation (mean)	93	129.0	111	124.7	0.282

^a χ^2 -tests were applied in the case of categorical variables and *t*-tests (independent samples) in the case of scale variables. * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$, but no statistically significant difference was found.

Dependent variables

The selection of items and instruments to include in the survey questionnaires was broadly guided by previous evaluations such as Groton (2013) or Waagemakers Schiff and Rook (2012), and particularly by the dimensions used in the Housing First Europe project (Busch-Geertsema, 2013).

Regarding access to ICTs, and specifically to mobile devices, a list of questions was inserted based on previous research by Vázquez et al. (2015) and the development of some ad-hoc items. In this paper we analyze the following indicators: percentage of people who could receive calls or notifications by phone somewhere (see Supplemental material); proportion of people who reported their own mobile phone or someone else's as the most usual means of receiving calls (Figure 1); proportion of people with the possibility of browsing the Internet or using email (see Supplemental material); proportion of people who reported their own mobile phone or someone else's as the most usual means of browsing the Internet (Figure 2).

Another dimension covered by the questionnaire was social and family relationships. The references for the design of the corresponding block were Lehman et al. (1995), Muñoz et al. (2003), and Vázquez et al. (2015). We worked specifically on the following indicators related to family and social relations: proportion of people who had personal contact with a family member at least once a week (see Supplemental material), and proportion of people who had phone contact with their relatives at least weekly (Figure 3), both based on Lehman et al. (1995, p. 80); proportion of people who had personal contact with their partner or friends at least once a week (see Supplemental material), and proportion of people who had phone contact with their partner or friends at least weekly (Figure 4), both adapted from Lehman et al. (1995, p. 81); phone and online ways of keeping in touch with partner or friends (see Supplemental material); how lonely or abandoned they felt, on a 4-point scale where 1 = not at all, 4 = a lot (see Supplemental material).

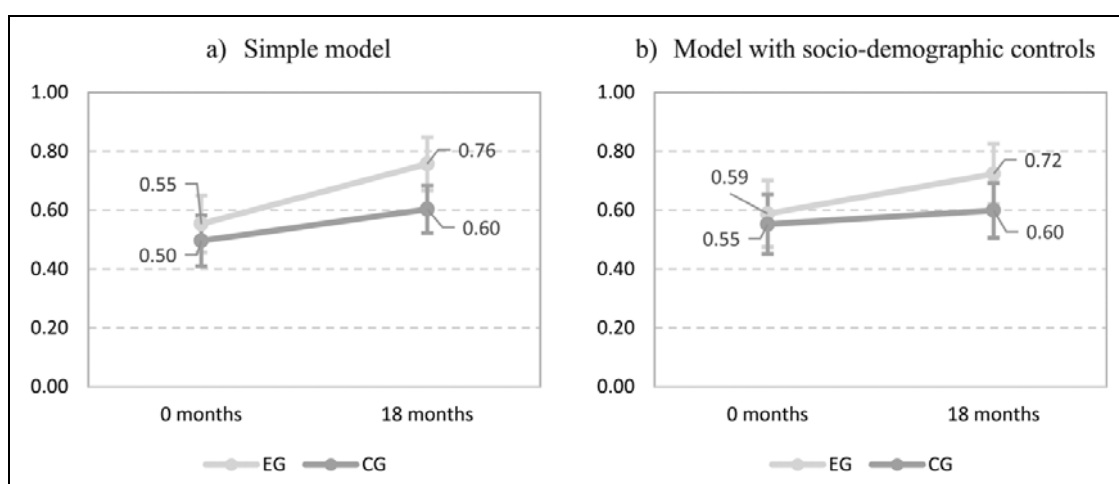


Figure 1. Proportion of individuals who reported their own mobile phone or someone else's as the most usual means of receiving calls. Estimated marginal means by evaluation group and interview wave. (a) Simple model. (b) Model with socio-demographic controls.

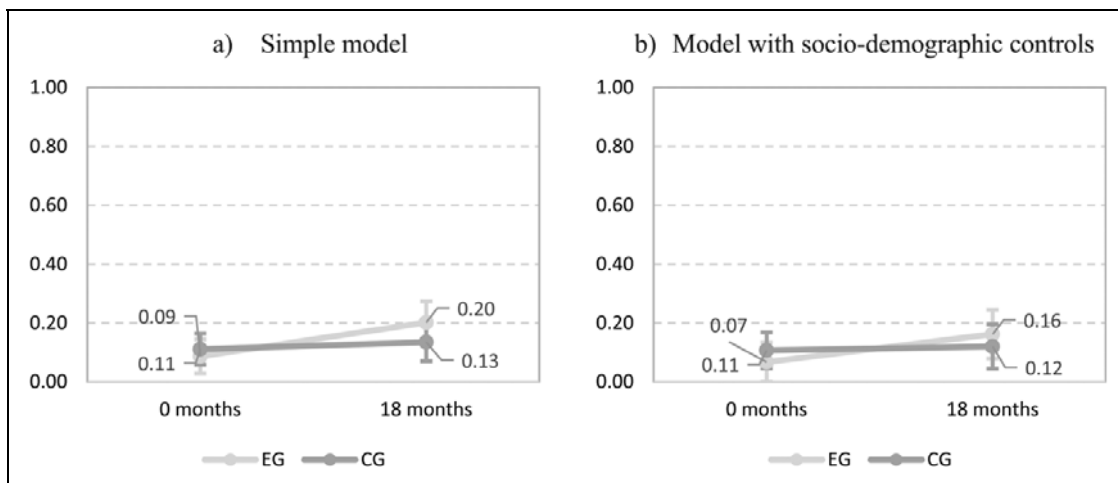


Figure 2. Proportion of individuals who reported their own mobile phone or someone else’s as the most usual means of browsing the Internet. Estimated marginal means by evaluation group and interview wave. (a) Simple model. (b) Model with socio-demographic controls.

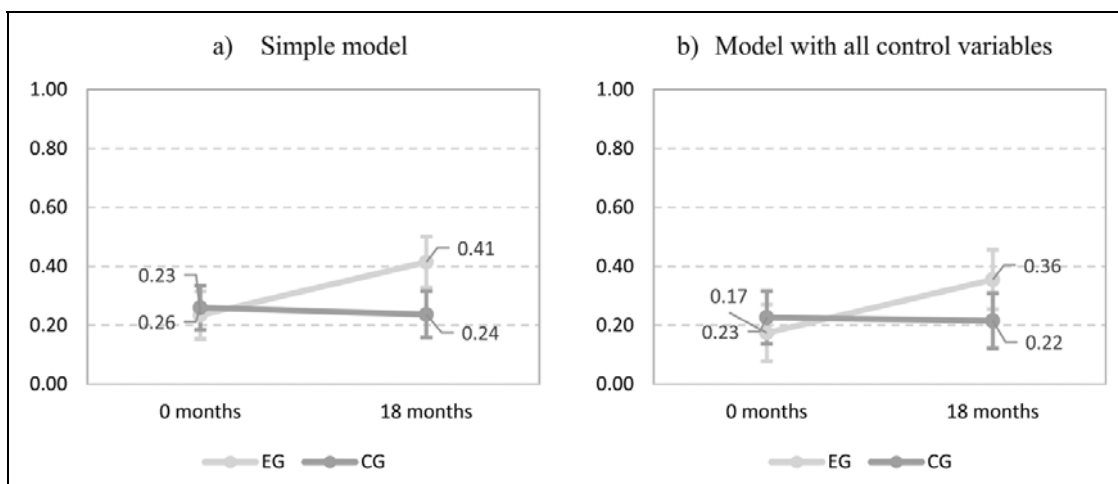


Figure 3. Proportion of individuals who had phone contact with their relatives at least weekly. Estimated marginal means by evaluation group and interview wave. (a) Simple model. (b) Model with all control variables.

Regarding leisure activities, the questionnaire included many items from the quality of life interview (QoLI) designed by Lehman et al. (1995), but also other “online” activities—that is, related to the Internet and other audio-visual broadcasting technologies—that were added following the research by Vázquez et al. (2015). In particular, we addressed the following variables: “offline” leisure activities in the previous month (see Supplemental material), based on the “daily activities” section in Lehman et al. (1995, p. 79); “online” leisure activities in the previous month (Table 2); perceptions on various aspects of their own leisure activities (7-point scale where 1 = terrible, 7 = pleasant) such as ways of spending their spare time, the opportunities to enjoy nice or beautiful things, and how much fun they had (see Supplemental material), also based on the “daily

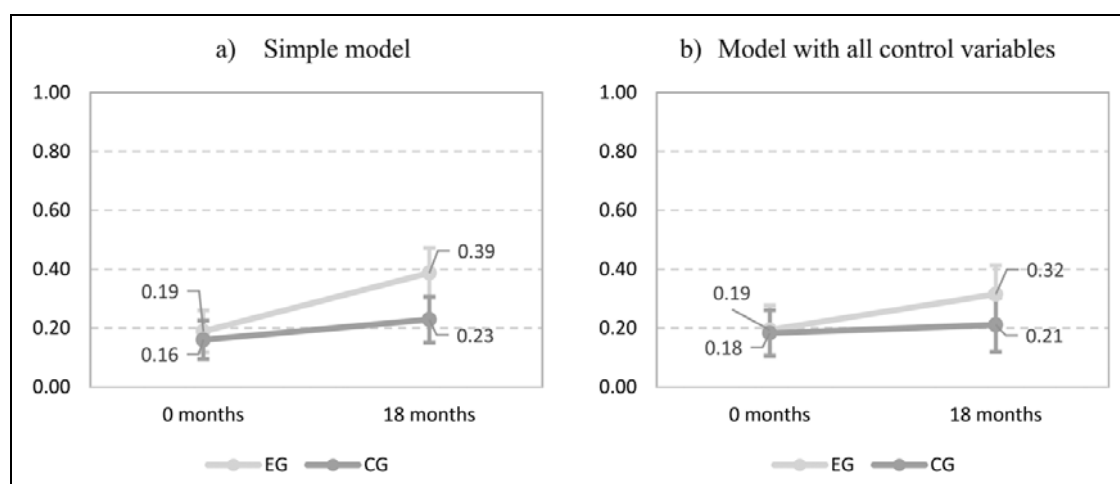


Figure 4. Proportion of individuals who had phone contact with their partner or friends at least weekly. Estimated marginal means by evaluation group and interview wave. (a) Simple model. (b) Model with all control variables.

Table 2. “Online” leisure activities in the previous month. Estimated marginal means by evaluation group and interview wave. Models with all control variables.

	Group	0 months	18 months	EG18-CG18 p-value
Watched TV	EG	39%	85%	.000
	CG	45%	63%	
Listened to the radio	EG	44%	57%	.565
	CG	48%	60%	
Connected to the Internet	EG	31%	41%	.705
	CG	32%	43%	
Checked emails	EG	13%	30%	.645
	CG	18%	27%	
Watched online videos/films/music	EG	12%	25%	.933
	CG	19%	25%	
Used the Internet for employment purposes	EG	11%	20%	.378
	CG	8%	16%	
Used the Internet for learning/training purposes	EG	9%	15%	.668
	CG	8%	13%	
Used the Internet for leisure/hobbies	EG	20%	31%	.943
	CG	23%	31%	
Searched online for old acquaintances/new friends/dating	EG	9%	12%	.357
	CG	10%	15%	
Played online	EG	1%	7%	.958
	CG	6%	7%	
Shopped online	EG	0%	1%	.134
	CG	0%	4%	

EG: experimental group; CG: comparison group.

activities” section in Lehman et al. (1995, p. 79). If these items were treated as integrated scales, the reliability coefficients (Cronbach’s alphas) for this sample would be 0.5 in the “offline” or daily activities scale, 0.7 in the “online” activities scale, and 0.9 in the perceptions on various aspects of their own leisure scale.

Repeated measures models with independent and control variables

For each of the aforesaid dependent variables or indicators, we constructed a repeated measures model and made alternative versions in up to three consecutive steps. The most important independent variable for the evaluation is the distinction between the EG, or users of Hábitat, and the CG, or people who have not obtained a place on the program, despite meeting the requirements for joining, and have been placed on the waiting list, so they continue to use other conventional treatment alternatives (or treatment as usual [TAU]). Due to its relevance, this is the factor that is introduced in the first step.

In the second step of the models, we always include the following socio-demographic control variables and check whether the results of the first step remain or change: gender at 0 months (male = 0, female = 1); age at 0 months (as a continuous scale covariable according to the reported years of age); education level at 0 months, recoded into a four-level variable from a more complex one with nine categories (incomplete primary education or no education = 1, primary education = 2, lower secondary education = 3, upper secondary education or higher education = 4); nationality at 0 months, recoded into a binary variable from one with three categories by merging foreign nationality with dual nationality (foreign or dual nationality = 0, Spanish nationality = 1).

Additionally, we have taken a third step in some particular cases with the aim of verifying the potential effects of mobile media usage on certain issues that we consider relevant and interesting. For example, access to a mobile phone is considered as another predictor of the frequency of phone contact with relatives, partners, or friends, while these kinds of contacts are, in turn, considered as predictors of feelings of loneliness or abandonment. The specification of the independent variables introduced in this third step is indicated in each of the corresponding results sections where we have made the extension of the models.

Results

Access to mobile media and other ICTs

We begin the presentation of results with the indicators of access to any type of telephone (see Supplemental material). As a starting point, the percentage of people who could receive calls or notifications by phone somewhere was almost the same in the EG and the CG: 75% and 76%, respectively. After 18 months, a slight divergence was observed, with the EG rising to 83% and the CG to 79%; however, the difference was not statistically significant. Introducing the control variables in the model, the distance was maintained (84% vs. 80%) and continue to be non-significant.

Going into greater detail, we also analyzed the proportion of people who said they received phone calls most often on a mobile phone, whether they owned it or not (Figure 1). At the beginning of the evaluation, the proportions of affirmative answers

to this question by the people from the EG and those from the CG were very close ($p > .1$). However, a substantial gap opened in the last period, with the EG located 16 percentage points (pp) higher than the CG ($p = .013$). After introducing the control variables, the difference was lowered but still preserved 12 pp ($p < .05$). Nationality was a prominent factor in this case ($p < .01$), with people of foreign nationality (or both foreign and Spanish) presenting a probability between 15 pp and 20 pp higher of using mobile phones as the main means of receiving calls.

Thereafter, the questionnaire asked about the possibility of browsing the Internet or using email (see Supplemental material). The proportion of people from the EG who answered affirmatively was 34% at the beginning, while in the CG it was 36%. At the end of the evaluation period, the differences remained small and non-significant, but at that time the EG had 37% and the CG 31%. Furthermore, no substantial changes were detected when controlling for the other variables of the extended model.

Following a similar line to the previous items, the questionnaire also asked about the usual way of browsing the Internet and we analyzed the propensity to do so using their own or someone else's mobile phone (Figure 2). What we observed is that both groups started from very similar levels; however, by the end the difference had increased—although the difference was marginally significant ($p = .17$). When taking the control variables into account, the patterns were maintained but became even less marked. Also, age was a very relevant factor in this case ($p < .01$), such that the probability of browsing the Internet with a mobile phone dropped significantly in older age groups.

Social support and the role of mobile media

Now that we have reviewed the indicators of access to mobile phones to receive calls and browse the Internet, we will address the role of these technologies in relationships with family members, partners, and friends.

We begin with the frequency of personal contact with relatives, which will serve as a reference for the subsequent analysis of telephone contact (see Supplemental material). At the beginning of the evaluation, the proportions of people who had this type of in-person contact with a member of their family at least once a week were very similar in both groups: 18% in the EG and 19% in the CG. At the end of the period, the levels increased in tandem to 24% in the EG and 26% in the CG, maintaining practically the same level. The introduction of controls did not cause any significant change, although the proportion in the EG was slightly lower at 18 months (21%). Nationality seemed to be important in this regard ($p < .05$) since foreigners (or dual nationals) were between 10 pp and 15 pp less likely to have personally contacted their relatives each week.

We now focus our attention on communication with relatives over the phone (Figure 3). The starting situation was similar in both groups. However, at 18 months a significant difference emerged ($p < .01$): the EG almost doubled the proportion while the CG stagnated. Controlling for other socio-demographic variables, and also for the use of a mobile phone (one's own or someone else's) or other means as the main way to receive calls, reduced the gap but did not substantially change the result (14 pp, $p = .022$). In addition to the experimental group variable, only the habitual use of a mobile

phone had a significant positive effect on the frequency of telephone contact with relatives (24 pp higher, $p = .01$).

As regards personal relationships with partners or friends (see Supplemental material), the starting situation was quite similar in both groups: 75% of the EG and 69% of the CG had contact at least once a week. After 18 months, there was a significant drop in both groups, greater in the EG (53%) than in the CG (61%). We have not been able to identify the reasons for this widespread decline, because even the control variables introduced in the next step did not show a clarifying pattern. The only thing we observed when adding the rest of the variables is that the percentages by group and wave remained very similar, and that age was very important in this regard ($p < .01$), with the probability of weekly contact being much lower in older people.

The results look very different in the case of telephone contact with partners or friends (Figure 4). Firstly, the frequency was lower overall. Regarding the comparison between groups and their evolution over time, it went from a fairly even start to a significant difference (EG 16 pp higher than CG, $p < .01$) at the end. Controlling for the other variables, the results showed a reduction in the gap between the groups (10 pp, $p = .080$).

Beyond the evaluation group, age was the only socio-demographic variable that had a significant effect ($p < .05$), presenting a negative correlation with the probability of having weekly telephone contact with a partner or friends. However, once the variable of the usual ways of receiving calls was introduced into the model, this latter variable became the only one that stands out clearly, and more specifically the category of one's own mobile phone or someone else's (28 pp higher, $p = .002$).

Going into a little more detail about remote contact, the questionnaire asked about different ways of maintaining contact with a partner or friends: phone calls, WhatsApp, Facebook, Instagram, Skype, Twitter, and other social media (see Supplemental material). There were no significant differences between the EG and the CG in the use of any of these particular means, not even after introducing the control variables in the models.

On the other hand, as regards the feeling of loneliness or abandonment experienced by the participants (see Supplemental material), no significant changes were observed over the first 18 months among the participants in the CG, whereas a significant improvement was observed among those in the EG; that is, the latter's average score on the scale—between 1 = nothing, and 4 = a lot—decreased. As a result of these trends, the initial equality became a significant difference at 18 months: the EG average was 0.66 points below the CG average. Even after introducing the socio-demographic control variables, the difference at 18 months remained clearly significant (-0.66 points, $p < .001$).

In the last step of the model specification, keeping the socio-demographic variables but also adding the frequencies of telephone contact at 18 months both with relatives and with a partner or friends, the distance between groups was slightly shortened (-0.62 points, $p < .001$). On the other hand, weekly telephone contact with a partner or friends also appeared as a significant factor, decreasing the feeling of loneliness or abandonment (-0.45 points, $p = .01$).

Leisure activities and uses of mobile media

As regards the leisure of the people participating in the evaluation, a series of activities carried out both “offline” and “online”—that is, using digital ICTs or audio-visual broadcasting media in the month prior to the interview—were analyzed. We present the results of the models with socio-demographic controls, but in this case they did not display any major differences from the models without controls.

In the “offline” section (see Supplemental material), we observed very few or no differences between groups in going for a walk, going to restaurants or cafés, reading books or newspapers, and playing sports. There was only a significant difference in shopping (with the EG reaching a frequency almost 30 pp higher than the CG at 18 months), in taking a bus or car ride (with EG maintaining a distance of 14–16 pp above CG in both waves), and also significant (but a bit weaker) difference in practicing a pastime or a hobby (with EG 12 pp higher at 18 months).

In the section on “online” leisure activities (Table 2), we found general increases in watching television, listening to the radio, connecting to the Internet, and various online uses, but with a slightly more pronounced trend in the EG in cases where it started from a slightly lower level. On the other hand, at the end of the evaluation we did not see notable differences between the groups in any activity, except for watching television, where the EG reached a proportion that was 22 pp higher than the CG. These results already took into account the control for socio-demographic variables, among which age played a prominent role, as it often reduced the probability of carrying out online activities. We also controlled by the most common means of connecting to the Internet, and it became clear that those who tended to use their own mobile phones or those of others, instead of alternative modes of connection, were the ones who are most likely to do many of the online activities from the list.

Regarding the participants’ perception of different aspects of their leisure activities (see Supplemental material), it is observed, first of all, that the people in the Hábitat program (EG) increased their satisfaction with the way in which they use their spare time between the start and the end of the program, while there were no notable changes among the people from the CG. As a result, at 18 months the mean of the EG was significantly higher than that of the CG, even after controlling for socio-demographic variables: 0.68 points higher ($p < .01$) on a scale from 1 (terrible) to 7 (pleasant). In the case of the second aspect—the opportunities to enjoy pleasant or beautiful things—the pattern was apparently similar, but when the control variables were added, the difference at 18 months was smaller and clearly non-significant. Finally, in the question about how much fun they had in their leisure time, the same trends appeared, although with a crossing of the lines: the EG started from a slightly lower average and, with a significantly increasing trajectory, ended at a level slightly above the average of the GC; despite this, in the model with controls, the difference at 18 months was marginally significant (0.49 points, $p = .059$).

Discussion

The aim of this study was to explore the role of digital (and particularly mobile) technologies on the impact of the Hábitat initiative, something that has rarely been done in

previous evaluations of HF programs. For that purpose, we have examined the available data from the pre- and post-treatment surveys following three main research questions.

Firstly, we have analyzed some aspects related to access to mobile telephony and the Internet (*RQ1. Does participating in the Hábitat program have any positive effect on access to ICTs, including mobile devices?*). We observed an increase in the possibilities of receiving calls or telephone notifications in both groups of participants. We also see a rise in mobile phones (own or someone else's) as the most common means of receiving calls and, in this case, it was more pronounced in the EG than in the CG. Regarding the possibility of browsing the Internet or using email, the evolution shows some stability in both groups, while the percentage of people who used a mobile phone (their own or someone else's) as their main means of browsing increased relatively more in the EG. All these results lead us to think that the positive effect that Hábitat could have on access to ICTs was real but moderate. However, there is a nuanced reflection that we want to share: if we consider that entering individual homes can reduce the probability of frequenting spaces where devices and connections are sometimes offered for free—such as in shelters, other care centers for IEH, hotspots, or libraries (Eyrich-Garg, 2011; Humphry, 2014; Marler, 2023)—then we could conclude that the impact of the program on its participants' digital inclusion could be even greater than it seems.

On the other hand, we have studied one of the circumstances usually included in previous evaluations of HF cases: the situation of isolation and loneliness that often accompanies IEH as well as changes in social relationships or perceived social support (*RQ2. Does participating in the Hábitat program have any positive effect on the indicators of social support? What is the role of mobile technology in this regard?*). Nelson et al. (2015), who carried out an interesting qualitative study to identify the changes perceived by the participants in a HF program, pointed out changes in social contacts among the positive changes described by the participants. Along this line, in the present work significant improvements were found among the people of the Hábitat program in some respects related to the support network. For example, although in this case no significant increases in personal contacts with family members—similar to those found by Aubry et al. (2015)—were achieved, there is an increase in telephone contact between users of the program and their families. Regarding relationships with a partner or friends, we rather observed a pronounced drop in personal contacts greater in the EG than in the CG but, at the same time, a greater increase in telephone contacts from the EG than from the CG. A possible hypothesis to be tested in future developments is that the significant drop in the EG's direct personal relationships is related to entering individual homes, which may lead to a lower frequency of interactions with other IEH than before entering the program. Nonetheless, the most important result for the mobile media and homelessness research field is that the habitual use of a mobile phone (one's own or someone else's) had a significant positive effect on the frequency of telephone contact with both relatives and partners or friends.

Apart from that, throughout the 18 months of follow-up, the participants' feelings of loneliness or abandonment were reduced, the average of the EG reaching a more favorable perception level than that of the CG. These differences between groups remained even when other control variables are taken into account and, furthermore, it is likely that telephone contact may be associated with improved results in this regard. So we

can think of these technologies as relevant means for maintaining relationships and socializing when having close contact is not possible or difficult, and for alleviating feelings of loneliness/abandonment, in line with previous research findings on IEH use of ICT and social network sites (Calvo et al., 2019; Calvo & Carbonell, 2018; Neale & Brown, 2015).

Finally, we have addressed aspects related to leisure, which has been an element considered in this type of evaluations as essential for quality of life and personal development (*RQ3. Does participating in the Hábitat program have any positive effect on leisure activity indicators? What uses of mobile technologies are made in this regard?*). In this case, the results suggest that participation in the Hábitat program is accompanied by certain improvements in leisure: satisfaction with this aspect increases significantly, in addition to increasing the frequency of participating in some activities (such as going for a walk, watching TV, or undertaking a pastime or hobby). This would be in line with what was indicated by Patterson et al. (2013), who also found significantly higher scores in leisure and free time among people in the HF program at 12 months. Regarding the role of digital technologies, we have found levels of leisure activities “online” that exceed those reported in previous studies (Calvo et al., 2019), as well as a trend towards an increase in their adoption. We also found that those who used mobile phones (their own or someone else’s) as their primary means of connecting to the Internet were the ones who are most likely to do many of the studied online activities.

These results show that the HF model has quite a few positive results, also in terms of digital inclusion, but it is not a panacea capable of solving any problem, as Busch-Geertsema (2012) and Pleace and Bretherton (2019) have pointed out. Rather, it is an efficient tool (Panadero et al., 2021) that must be considered within a broader care system for the homeless and that is particularly useful in certain contexts and for cases with more extreme profiles.

Limitations

The evaluation carried out is innovative given the scarcity of studies on the effectiveness of the HF program in Spain and shows the feasibility of carrying out this type of approach: more than 430 people were interviewed throughout the process, 255 of whom were still contactable after 18 months. However, it is necessary to underline some limitations on the evaluation that affect the outcomes of this work. The particularities of the study group and the conditions for the fieldwork explain this situation to a large extent. Some of the difficulties concern the overall design of the study, while others are related to specific aspects of the technological issues analyzed.

In the first general category is the size of the sample, which limits the ability to generalize the analysis with optimal representativeness and robustness. This is exacerbated in some items, including some ICT-related ones, through a reduced response rate. Although the sample does not match the size of the largest studies carried out internationally (Goering et al., 2014; $n=2,148$; Lemoine et al., 2019: $n=703$; Rosenheck et al., 2003: $n=460$), it far exceeds those of the studies carried out in Spain (Bernad et al., 2016: $n=62$; Pleace, 2016: $n=38$).

Another limit relates to the difficulty in tracking individuals experiencing homelessness over time (*traceability*). Different works have achieved follow-up percentages at 12 months of close to 50% (e.g., Nuttbrock et al., 1999), although for some works higher follow-up percentages have been obtained, even reaching 80% (e.g., Tsemberis et al., 2004). Longitudinal studies in Spain have been very scant and show low follow-up rates (Muñoz et al., 2003; Panadero, 2004). This evaluation has reached rates of 75% in the Hábitat group and 50% in the CG. We acknowledge the negative impact that these non-response and attrition levels may have on the statistical power and accuracy of our study but, on the other hand, we think that it can be considered a worthy effort given the experimental design and the lack of specific research on this combination of HF effects and the role of digital technologies.

Regarding the perspective of the mobile media contents of the evaluation, some other limitations should be considered. Firstly, the design of the questionnaire was not developed exclusively to obtain that specific information, but as a way to collect results with a broad approximation to the level of well-being experienced in both alternatives of IEH assistance. That is the case, for example, of the leisure section, where ICT uses are diminished within the overall number of activities. Secondly, the questionnaire design did not anticipate the particular analysis of causal relations between mobile media usage and other issues such as social support or leisure activities, so the results of this article are limited to correlation or association measures. Therefore, further research from a more focused perspective will be of great interest and we strongly encourage future HF programs to include ICT-related items more actively in their evaluations, as these technologies (particularly mobile media) are key tools in IEH's social support, civil rights, connection to and rating of services, online education, intervention scheduling, and intervention delivery (Vázquez et al., 2015). People in homeless situation tend to lack reliable and regular Internet access (Calvo et al., 2019), so the effects of housing programs could be potentiated if they give a more active role to those technological resources. Finally, attending and accompanying IEH should go beyond the mere housing actions and pursue their autonomous development, not only through capital-enhancing activities (such as digital skills training) but also through social interactions (Calvo & Carbonell, 2018) and entertainment/pastimes which help IEH to manage the mental and social negative effects of their socioeconomic marginalization (Marler, 2023).

Conclusion

Decades ago, HF was a disruptive proposal in the area of care for IEH. Nowadays it is a reputed model that is spreading across a growing number of countries. One of HF's strengths is the implementation of consistent evaluations, in which many key concerns such as poverty, health issues, or social support have been assessed. However, those evaluations have not focused so much on HF users' digital inclusion or the role of ICT in their lives. The existence of this knowledge gap gives special relevance to the present work.

Our study shows that the Hábitat program could achieve significant improvements not only in specific housing services, but also in the use of mobile phones to receive calls, to connect to the Internet, or to have contact with relatives, partners, or friends, as well as in

the perception of available social support. Additionally, even though participating in the program did not have any significant effect regarding the leisure activities related to ICT—except for watching TV—it did enhance the participants' satisfaction with their leisure time. We think that these findings are a valuable contribution to research on HF service users and the role of digital technologies (including mobile media) in their lives.

Acknowledgments

We would like to thank HOGAR SÍ and Provienda for their support. We would also like to thank all those who were consulted during the collection of primary information on the use and cost of the services. Above all, we would like to thank the people who have provided us with complex and often difficult-to-obtain information, without which all this work would have been impossible. Only the guarantee of statistical secrecy and the anonymity of the respondents prevent us from mentioning these people by name, although Panadero et al. (2021) includes the list of centers consulted. Similarly, we would like to say thank you for the involvement of the peer team made up of Luis Ayala, Ángel Rivero, and Mercedes Valcárcel, and, in particular, for the comments of Juan Oliva, Albert Sales, and Joseba Zalakain. Their contributions have been of immense value, both in the design and methodological selection phase and in enriching the discussion of the results. Their courageous collaboration has also been an indicator of the existing interest among specialists in studies of the position of homeless people and HF programs such as the one we have carried out. Last but not least, we would like to thank our Sección Departamental de Economía Aplicada, Pública y Política at Facultad de Ciencias Políticas y Sociología (UCM) for their funding support in the last steps of the preparation of this article.

Data availability

The data that support the findings of this study are available from Fresno Consulting S.L. Restrictions apply to the availability of these data, which were used under license for this study. Data are available from the authors with the permission of Fresno Consulting S.L.

Declaration of conflicting interests


The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by Fresno Consulting S.L. and the Complutense University of Madrid.

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Supplemental material

Supplemental material for this article is available online.

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