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In Review

Housing First Impact on Costs and Associated Cost Offsets: A Review of the Literature

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Objective: Housing First (HF) programs for people who are chronically or episodically homeless, combining rapid access to permanent housing with community-based, integrated treatment, rehabilitation and support services, are rapidly expanding in North America and Europe. Overall costs of services use by homeless people can be considerable, suggesting the potential for significant cost offsets with HF programs. Our purpose was to provide an updated literature review, from 2007 to the present, focusing specifically on the cost offsets of HF programs.

Method: A systematic review was performed on MEDLINE and PsycINFO as well as Google and the Homeless Hub for grey literature. Study characteristics and key findings were extracted from identified studies. Where available, impact on service cost associated with HF (increase or decrease) and net impact on overall costs, taking into account the cost of HF intervention, were noted.

Results: Twelve published studies (4 randomized studies and 8 quasi-experimental) and 22 unpublished studies were retained. Shelter and emergency department costs decreased with HF, while impacts on hospitalization and justice costs are more ambiguous. Studies using a pre–post design reported a net decrease in overall costs with HF. In contrast, experimental studies reported a net increase in overall costs with HF.

Conclusions: While our review casts doubt on whether HF programs can be expected to pay for themselves, the certainty of significant cost offsets, combined with their benefits for participants, means that they represent a more efficient allocation of resources than traditional services.

Coûts et économies associés à l'approche « Logement d'abord » : revue de la littérature

Objectif : L'approche « Logement d'abord » (LA), destinée aux personnes en situation d'itinérance chronique ou épisodique, offre un accès rapide au logement permanent combiné à des services intégrés de traitement, de soutien et de réadaptation dans la communauté. Cette approche prend rapidement de l'expansion en Amérique du Nord et en Europe. Les coûts associés à l'itinérance sont considérables, suggérant un potentiel d'économies substantielles avec LA. Notre objectif est d'offrir une revue de littérature à jour, de 2007 à aujourd'hui, portant spécifiquement sur l'impact de LA sur les coûts d'utilisation de services.

Méthode : Nous avons effectué une revue systématique à partir de MEDLINE et de PsycINFO, ainsi que de Google et du Rond-point de l'itinérance. Les caractéristiques des études et leurs résultats ont été extraits, notamment l'effet de LA sur les coûts d'utilisation de services ainsi que son impact net sur les coûts totaux.

Résultats : Nous avons retenu 12 études publiées (4 à répartition aléatoire et 8 quasi-expérimentales) et 22 études inédites. Les coûts des refuges et des visites à l'urgence diminuent avec LA tandis que les effets sur les coûts de justice et des hôpitaux sont ambigus. Les études pré-post ont relevé une nette diminution des coûts totaux alors que les études expérimentales ont relevé une augmentation avec LA.

Conclusions : Bien que notre revue mette en doute la capacité des programmes LA à faire leurs frais, la certitude d'une compensation significative des coûts, alliée aux bénéfices aux participants, signifie que LA représente une allocation plus efficiente des ressources que les services traditionnels.

Housing First programs for people who are chronically homeless, combining rapid access to permanent housing with community-based, integrated treatment, rehabilitation, and support services, are rapidly expanding in North America and Europe. HF programs offer an alternative to traditional continuum of care models, in which a select few people graduate through a series of steps to eventually integrate permanent housing. Many variants of HF programs exist, with the most basic distinction being between whether they provide supported housing (scattered-site or congregate, independent housing with external supports, such as from an ACT team), or supportive housing (congregate housing with on-site supports).[1] Studies have shown that HF programs significantly increase the time that people are stably housed.[2–8] A description of the Pathways HF supported housing model, which has been most widely implemented and evaluated, is found in the companion In Review article.[9]

Cost-of-homelessness reports have indicated that the service use of homeless people is significant. Service providers have observed that while chronically homeless people represent only 20% of shelter users,[10] they consume the largest share of health, social, and justice services. Malcom Gladwell's "Million-Dollar Murray" eloquently illustrates how a combination of homelessness, mental illness, and substance abuse can lead to repeated and costly interactions with multiple service systems.[11] Available estimates of the economic costs that homeless people in Canada generate vary widely, from $30 000[12] to $134 642.[13] In one study,[2] combining administrative data from several systems for about 5000 homeless people with SMI in New York City, average annual service use costs were US$40 500 per person. Thus the overall costs of services can be considerable, suggesting the potential for significant cost offsets, at least among the highest-cost users.

Clinical Implications

- Studies have demonstrated that HF can lead to significant cost offsets. When considering housing stability, health, and quality of life, HF may be a very cost-effective intervention for chronically homeless populations.

Limitations

- Few cost studies have been published that used a rigorous study design. Observation periods tend to be short. Few studies have been conducted outside of the United States.

A first review[14] published in 2000 on the cost-effectiveness of interventions for homeless people with mental illness identified no studies on housing programs offering immediate access to housing, a basic principle of HF. Later, Culhane[15] included, as part of a larger review, studies concerning cost offsets from various interventions addressing homelessness. One key overall implication of that review was that costly interventions, involving housing subsidies and supports, are not likely to generate cost offsets equal to the cost of the interventions, except for the most costly users. Since that literature review was completed, the results of several additional studies have become available. Our purpose here is to provide an updated literature review, focusing specifically on the cost offsets of HF programs for people with mental illness. We consider all types of HF programs, whether involving supported or supportive housing. As such programs are generally viewed as a key component of plans to end homelessness, our review should help clarify the resource and economic consequences of implementing such plans.

Abbreviations

ACT	assertive community treatment
AH	At Home
CICH	Collaborative Initiative to help end Chronic Homelessness
CS	Chez soi
ED	emergency department
HF	Housing First
HUD-VASH	Housing Urban Development–Veterans Affairs Supportive Housing
ICM	intensive case management
QALY	quality-adjusted life year
RCT	randomized controlled trial
SMI	severe mental illness
TAU	treatment as usual

Methods

We performed a systematic review on MEDLINE and PsycINFO. The MEDLINE search used the MeSH terms "costs and cost analysis", "cost-benefit analysis", "housing", "homeless persons", "mental health", and "mental disorders" as well as the key words "economics", "cost", "financing", "Housing First", "subsidized housing", "supported housing", and "supportive housing". The PsycINFO search included only the key words "economic", "cost", "financing", "subsidized housing", "supported housing", and "supportive housing". The MEDLINE database search covered 1966 to 2015. PsycINFO covers journal articles dating as far back as 1806. No restriction

was put on the date, even though most HF studies were done after 2000.

Regarding unpublished studies, this literature review completes that found in the US Interagency Council on Homelessness Cost Offset Studies report.[16] It compiled all economic analyses done on HF until 2007, including unpublished studies. To update this list, we carried out a Google search of PDF documents using the key words "Housing First" and "cost", from 2007 to May 2015. In addition, an exhaustive search was done on the Homeless Hub, an online database archiving most research articles, studies, and reports on homelessness, including grey literature. Additional studies were also identified by experts whom we consulted. The grey literature review only includes articles from 2007 to 2015.

We extracted 8 study characteristics and key findings from identified studies: population characteristics; intervention description; sample size; study design; study perspective (health care insurer, governmental, or societal); costs measured; outcome measured in the case of an economic analysis; and main results. We noted, where available, 9 impacts on service costs associated with HF (increase or decrease) and the net impact on overall costs, considering the cost of the HF intervention. The service impacts measured include the following: health care, when health care type was not identified; inpatient psychiatric; inpatient physical; ED; outpatient clinic; shelters; justice, which included police contacts, justice services, and incarceration; other, which included drug and alcohol rehabilitation programs and nursing homes; and net impact on overall costs.

In extracting data from the reports, for the sake of consistency, we have used the term supported housing to designate independent housing (often, but not always, scattered-site) with off-site supports, and the term supportive housing to designate congregate housing with on-site supports. When available, we included a description of the support intervention, which could be ACT, intensive case management, or case management. Participant cost per year were also identified. If cost results were not presented on an annual basis, they were annualized.

One of us identified relevant articles and carried out the data extraction. In cases of doubt, concerning the relevance or interpretation of an article, the other was consulted and consensus was reached.

Results

Tables 1 tand 2 and online e-Table 1 describe the studies identified using the criteria indicated above. We found a total of 4 published RCTs (Table 1), including results from the recent Canadian AH–CS for moderate-need participants[6] and for high-need participants,[7,8] in addition to 8 published quasi-experimental studies (Table 2). Among the published quasi-experimental studies, 5 followed a design with a comparison group, and 3 a simple pre–post design. Online eTable 1 describes 22 unpublished studies. Among these, site-by-site results for high-need participants of AH–CS (which are also reported in combined form in Table 1) are the only results that come from an experimental study. Three additional studies followed a quasi-experimental design with a comparison group. The remaining 18 studies, including 1 from Finland[17] and 1 from Australia[18]—the only non–North American studies we identified—all follow a pre–post design. Thus, out of a total of 34 studies, 21, more than 60%, rely on a pre–post design, and only 4 (2 of which come from the AH–CS study) are experimental.

We excluded 2 Canadian studies,[19,20] which merely applied unit costs from the provinces of Nova Scotia and British Columbia to the volumes of service use reported in a study previously carried out in New York City.[2] These studies may be viewed as a type of sensitivity analysis carried out on the New York City data, and thus do not report on an independent data collection effort.

Most of the published articles we reviewed reported on programs addressed to homeless people with SMI or people experiencing chronic homelessness, with some studies specifically targeting the highest-cost service users. Some articles studied specific homeless populations; for example, veterans[5,21] or people with severe alcohol use disorder.[22,23] Most of the unpublished studies reported on programs addressed to people experiencing chronic homelessness and included reports on less often studied populations, such as homeless people in rural areas.[24,25]

The interventions evaluated also varied across studies. Detailed examination of the study reports indicates an almost bewildering variety of program configurations, many including a mix of supported and supportive housing. To be included, though, they had to observe the basic principle of HF, of providing immediate access to housing. With the exception of Rosenheck et al's study,[5] most comparison groups received TAU services, in which the individual does not normally have immediate access to housing.

Most studies relied on data obtained from administrative databases, mainly Medicare and Medicaid reimbursements. In such cases, studies vary in the comprehensiveness of the service use data that they included. For example, while Thomas et al[26] and Becker[27] included only hospital inpatient and ED costs, most studies combined at least some data from the health care, justice, and shelter systems. Levanon Seligson et al[28] relied on the most comprehensive set of administrative data, including all of the cost elements just mentioned, as well as on cash assistance and food stamps. A few studies combined self-reported with administrative data. The AH–CS, the HUD-VASH, and the CICH studies relied only on self-reported data and is the most comprehensive in the scope of the costs it measures.

Most studies did not explicitly state the economic perspective that they adopted. Based on the types of costs included, we could infer that most studies took a perspective approximating that of the government or of a health insurer. The inclusion of shelter costs, to the extent that shelters are funded by private donations rather than the government, is consistent with a societal perspective, but in other respects, few studies (including, notably, the AH–CS study) could be considered to have adopted a societal perspective. In particular, only the AH–CS and the HUD-VASH studies tried to measure impacts on earned income.

Table 1 Published experimental studies

No.	Study and site	Population	Interventions, and sample sizes	Follow-up duration	Perspective(s) of economic evaluation	Measured costs, earnings, and transfers	Cost offsets and ICER where available (per person per year)
1	Rosenheck et al,[5] 2003 HUD-VASH San Francisco, CA San Diego, CA New Orleans, LA Cleveland, OH United States	Homeless veterans with major psychiatric disorder and (or) alcohol or drug use disorder	E1: *n* = 182 received HUD-VASH (ICM and Section 8 vouchers) E2: *n* = 90 received ICM, no vouchers C: *n* = 188 received standard VA homeless services	3 years	1) VA 2) Total health care system (VA and non-VA) 3) Government 4) Society	VA medical and mental health inpatient, residential, and outpatient Non-VA medical and mental health inpatient, residential, and outpatient Shelters, prison, cash transfer payments, earnings, cash transfer payments, and Section 8 vouchers from government perspective only Administrative data ICER = Cost per additional day housed	VA perspective E1 = US$12 178 E2 = US$11 698 C = US$9505 ICER = US$58 No statistical difference Health care system perspective E1 = US$15 416 E2 = US$14 133 C = US$13 095 ICER = US$50 No statistical difference Government perspective E1 = US$22 704 E2 = US$20 325 C = US$19 173 E1 > C ($P < 0.5$) ICER = US$74 Societal perspective E1 = US$15 705 E2 = US$14 805 E3 = US$13 638 ICER = US$45 No statistical difference
2	Basu et al,[37] 2012 Chicago, IL United States	Homeless and chronically ill Recruitment following a hospitalization Homeless at least 30 days before hospitalization	Housing with case management E: *n* = 201 TAU C: *n* = 204	18 months	Described as societal but close to governmental	Hospitalizations, ED, community health clinics, drug and alcohol rehabilitation centres, nursing homes, incarcerations, arrests, and convictions	E = US$31 199 C = US$37 506 Cost decreased by US$6307 per person per year Not statistically significant difference observed on total costs
3	Stergiopoulos et al,[6] 2015[a] AH–CS project: Winnipeg, MB Vancouver, BC Toronto, ON Montreal, QC Canada The following rows detail study results by sites (3A, 3B, 3C, and 3D)	Homeless with mental illness with moderate need	Supported housing (mostly scattered-site) with minimal supportive housing E: *n* = 689 TAU C: *n* = 509	3 to 6 months before, 21 or 24 months after study entry	Societal	Health and social services: ED, hospitalization (psychiatric and physical), visits to community health centres, visits to day centres, shelters, rehabilitation centres, Justice services: police contacts, arrests, court appearances, police cell, detention centres, and prison Welfare and disability payments Employment earnings Self-reported data only	On average, the cost of supportive housing with ICM services was Can$14 177 per participant annually, about 30% less than the cost of supportive housing with ACT (Can$22 257), and resulted in an average net cost offset of Can$4849 per participant per year, or 34% of the cost of the intervention. Differences not tested statistically.

continued

Table 1 continued

No.	Study and site	Population	Interventions and sample sizes	Follow-up duration	Perspective(s) of economic evaluation	Measured costs, earnings, and transfers	Cost offsets and ICER where available (per person per year)
3A	AH–CS Winnipeg Site A	Same as above	E: *n* = 177 TAU C: *n* = 126	Same as above	Same as above	Same as above	E = Can$48 842 C = Can$42 698 Decrease in cost of Can$6408, offsetting part of HF intervention cost of Can$12 552 Net cost = Can$6144
3B	AH–CS Vancouver Site B	Same as above	E: *n* = 98 TAU C: *n* = 82	Same as above	Same as above	Same as above	E = Can$52 786 C = Can$46 675 Decrease in cost of Can$9481, offsetting part of HF cost of Can$15 952 Net cost Can$6111
3C	AH–CS Toronto Site C	Same as above	E: *n* = 200 TAU C: *n* = 159	Same as above	Same as above	Same as above	E = Can$54 249 C = Can$42 360 Decrease in cost of Can$2842, offsetting part of HF cost of Can$14 731 Net cost = Can$11 889
3D	AH–CS Montreal Site D	Same as above	E: *n* = 199 TAU C: *n* = 99	Same as above	Same as above	Same as above	E = Can$45 046 C = Can$42 373 Decrease in cost of Can$11 356, offsetting HF intervention of Can$14 029 Net cost: Can$2673
4	Aubry et al,[7,8] 2015[a] AH-CS project Vancouver, BC Winnipeg, MB Toronto, ON Montreal, QC Moncton, NB	Homeless with SMI (high need)	E: *n* = 469 Scattered-site apartments with ACT C: *n* = 481 TAU	Same as above	Same as above	Same as above	Cost offset = Can$21 367 Intervention cost = Can$22 257 Net cost = Can$890

AH–CS = At Home–Chez soi; C = control; E = experimental; ED = emergency department; HF = Housing First; HUD-VASH = Housing Urban Development–Veterans Affairs Supportive Housing; ICER = incremental cost-effectiveness ratio; ICM = intensive case management; MHCC = Mental Health Commission of Canada; n/a = not available SMI = severe mental illness; TAU = treatment as usual; VA = Veterans Affairs

[a] This study is part of the same AH–CS trial as the Aubry et al[7,8] study presented below. This study reports on the moderate need group of AH/CS.

[b] This study is part of the same AH–CS trial as the Stergiopoulos et al[6] study presented above. This study reports on the high need group of AH–CS. Site results are reported in online eTable 1.

Table 2 Published quasi-experimental studies

No.	Study and site	Population	Interventions and sample sizes	Observation period	Study design	Stated perspective measured costs, earnings, and transfers	Main results (cost per person per year)
Studies with comparison group							
5	Culhane et al,[2] 2002 New York, NY United States	Homeless with SMI	Supported (scattered and congregate) and supportive housing Participants[a] *N* = 4679 Different number depending on the variable studied C group: TAU	1989 to 1997 Follow-up varies by participants	Retrospective Pre–post study with paired group Administrative data from 1989 to 1997	Not stated. Hospitalization, outpatient clinic, shelter, incarceration, and permanent housing No mention of indirect costs	Pre-supportive housing mean cost US$40 451 per person Supportive housing cost: US$17 277 Net cost of supportive housing: US$995
6	Larimer et al,[22] 2009 1811 East Lake Seattle, WA United States	Chronic homeless with severe alcohol addiction problems Highest users of crisis centres and hospitals	Supportive housing with case management E: *n* = 95 C: *n* = 39 C group comes from program waiting list	1 year before, 1 year after	Quasi-experimental with propensity score matching Administrative data	Not stated Insurance claims: detox, drug and alcohol rehabilitation centre, rehabilitation centres, emergency medical services, hospitalization, shelter, incarceration, and permanent housing	1 year prior to HF E = US$48 792 C = US$39 816 6 month after HF E = US$17 904 C = US$23 184 12 month after HF E = US$11 496 C = n/a Using a difference-in-difference approach, housed participants had US$42 828 less cost during the housed period relative to C participants. Housing cost was US$13 440, yielding a total mean cost offset of US$29 388. Adjusted total cost rate reduction of 53% for housed participants relative to wait-list C participants during the first 6 months
7	Gilmer et al,[38] 2009 REACH San Diego, CA United States	Homeless with SMI	Supported (congregate and scattered site) and supportive housing with section 8 vouchers Homeless outreach, ACT, and outpatient services E: *n* = 177 C: *n* = 161 homeless person with SMI who initated case management or outpatient services at the same time as REACH clients (E) (wait-list)	2 years before and 1 or 2 years after	Pre–post with matched control group Retrospective Difference in difference Administrative data	Health insurer Mental health services of San-Diego: case management, outpatient clinic, ED visits, hospitalizations, and prison mental health services	In comparison with C group, E (HF) participants: Case management cost increased by US$6403 Hospital cost decreased by US$6103 Criminal justice system mental health services decreased by US$570 No statistically significant difference in other costs
8	Srebnik et al,[23] 2013 Begin at Home Seattle, WA United States	Homeless high hospital and drug and alcohol rehabilitation centre services users	Supportive housing with case management E: *n* = 29 C: *n* = 31 homeless people receiving TAU	1 year before, 1 year after	Pre–post with comparison group Prospective Administrative data	Government Insurance claims Hospitalization, ED Sobering centre Respite centre	Cost reduction after HF E = US$62 504 C = US$25 925 Difference between E (HF) and C group is US$36 579, more than offsetting HF intervention cost of US$18 600 Net cost = –US$17 979

continued

Table 2 continued

No.	Study and site	Population	Interventions and sample sizes	Observation period	Study design	Stated perspective measured costs, earnings, and transfers	Main results (cost per person per year)
9	Martinez and Burt,[40] 2006 Canon Kip Community House and the Lyric Hotel San Francisco, CA United States	Homeless and who had at least 2 qualifying conditions (mental disorder, a substance use disorder, or human immunodeficiency virus infection and acquired immune deficiency syndrome).	Supportive housing with case management E: *n* = 236 C: *n* = 25 wait-list	2 years before, 2 years after	Pre–post With control group	Health care system ED, inpatient	Cost reduction of US$1300 HF = US$13 000
Pre–post studies with no comparison group							
10	Mares and Rosenheck,[41] 2009 CICH Chattanooga, TN Chicago, IL Columbus, OH Denver, CO Fort Lauderdale, FL Los Angeles, CA Martinez, CA New York, NY Philadelphia, PA Portland, OR San Francisco, CA United States	Chronic homeless	Supported housing and supportive housing Permanent housing with case management primary health care services, and mental health and drug and alcohol rehabilitation services E: *n* = 734	1 year before, 1 year after	Pre–post No comparison group prospective Self-reported	Health insurer Medical care, dental care, mental health care, addiction rehabilitation, hospitalization, outpatient clinic, earnings Unit cost comes from previous study on schizophrenia (Rosenheck et al,[50] 2006) Does not include intervention cost	Health costs decreased by 50% (from $6832 to $3372) Number of days housed increased significantly (18 to 83 days out of 90 days after 12 months in CICH program)
11	McLaughlin,[39] 2011 Maine United States	Chronic homeless with mental health or physical health problems that benefit from Medicaid or Medicare	Supported housing (scattered sites housing vouchers) E: *n* = 263	2 years before, 2 years after	Pre–post study without comparison group Retrospective Administrative data	Government Insurance claims ED Police contacts Prison Community services No information on cost sources or indirect costs	Pre-HF cost = US$18 629 Post-HF cost = US$17 281 Cost decrease of US$5925 completely offsets HF costs of US$4577. Net cost = –US$1348
12	Greenberg et al,[49] 2013 San Mateo, CA United States	Chronic homeless with chronic conditions (Shelter system failures)	Supportive housing (SRO) and supported housing (scattered site) with case management E: *n* = 11	18 months before, 12 to 24 months after	Pre–post	Government Medical costs and police contacts	Medical costs and police costs decreased from US$2351 to US$347 and from US$413 to US$0.48, respectively Net impact on cost not calculated

ACT = assertive community treatment; C = control; CICH = Collaborative Initiative to help end Chronic Homelessness; E = experimental; ED = emergency department; HF = Housing First; n/a = not available; REACH = Reaching Out and Engaging to Achieve Consumer Health; SMI = severe mental illness; SRO = single room occupancy; TAU = treatment as usual

All of the studies, except one, were cost studies, comparing the costs incurred by a group receiving HF with those incurred by a group not receiving HF (which could have been the same group before introduction of HF). The one exception is an RCT carried out in the Veterans Affairs system, in which incremental cost-effectiveness ratios were estimated, using additional days housed as a measure of effectiveness.[5] We found no study using QALYs as a measure of effectiveness.

As may be seen in Table 3 and online eTable 2, while all 21 studies that relied on a pre–post design and that reported a net impact on costs showed a net savings following the introduction of HF, 3 of the 4 experimental studies reported a net increase in costs for HF, compared with control, groups. Among studies using a quasi-experimental design with a comparison group, 1 showed higher cost, and 4 lower, for the HF group. The direction of changes in costs for individual types of services, where reported, was usually negative, although higher costs were more often associated with HF in the case of studies that used control or comparison groups. Higher costs were also more common with inpatient services and case management services, which in some cases reflected the cost of the intervention itself.

Discussion

Our update on previous literature reviews has identified several more recent studies, including some, notably the AH–CS trial, that have relied on more rigorous designs than most in the past. Not surprisingly, these additional studies do not alter the conclusion that HF interventions for homeless adults with mental illness lead to cost offsets. In particular, shelter costs are—in every instance where they have been reported—lower for groups receiving an HF intervention. This is virtually inevitable, given that HF interventions provide housing that replaces shelters. Less obviously, but also understandably, ED visits show up as consistently lower for HF groups. ED visits are not planned, and one would expect the support services associated with HF to lead to a reduction in their number.

The effects on hospitalizations, both for physical and for psychiatric reasons, are more ambiguous. Most studies reported a decrease in inpatient costs, both psychiatric and physical. This is especially true of studies following a pre–post design, and in such cases, regression to the mean is a likely part of the explanation: in many pre–post studies, people who entered HF programs may have done so after a period when they were homeless and in crisis, thus experiencing higher costs than what is usual for them. In the AH–CS study, for all TAU groups in all of the sites, costs decreased following randomization.[14–16,24,29–32] Decreases in inpatient costs for HF groups may also be associated with an increase in outpatient clinic and community treatment costs, as the use of such services can, in some cases, prevent hospitalizations. This is apparent especially in the high-need groups of AH–CS. However, in numerous studies, especially among those involving a comparison group, and especially among moderate-need participants of AH–CS, inpatient costs increased.[29] The support of an HF program could also lead to people receiving needed care that had been neglected when they were living on the street.

A further reason why community treatment costs appear to be higher with HF in many studies is that many of these do not distinguish between HF community treatment costs and other services: part of HF intervention costs are, in numerous cases, embedded in the outpatient category.

Most studies have observed decreases in justice costs. Homeless people are often arrested for crimes associated with survival strategies, such as entering private property or sleeping on a park bench.[33,34] Also, a positive association between more severe psychiatric symptoms and nonviolent crimes has been observed.[35] By providing housing to homeless people and support to stabilize mental health symptoms, a decrease in police contacts, arrests, detentions, and court appearances can be expected. However, moderate-need participants in the AH–CS[14] and veteran participants of HUD-VASH[5] experimental groups incurred increases in incarceration costs, compared with the control groups. Participants may have been incarcerated for crimes committed prior to their entry in HF programs. A longer follow-up period would provide more definitive results.

Although most studies have taken a governmental perspective, few have studied the impact of HF on social assistance and income supplements. The few studies that have, have reported an increase in payments.[14–16,29–32,36] Homeless participants with mental illness may have neglected enroling in income assistance programs, and HF support providers would likely then have ensured that participants did so.

Thus, consistent with Culhane's[12,13] earlier conclusion, cost offsets, especially for certain types of costs, may be expected from HF programs. However, whether these offsets are likely to exceed the cost of the intervention itself is a question often asked about such interventions.

Table 3 and online eTable 2 indicate that the answer one would give to that question depends on the weight that one gives to studies that follow a pre–post design. It is striking that all 15 of such studies included in Table 3 and online eTable 2, which have reported a net impact on overall costs, show net savings. However, when one considers instead experimental studies and quasi-experimental studies with a comparison group, the results are equivocal.

It is not surprising that one would observe such a difference between the results of studies that follow a pre–post design, and those of studies that make use of a comparison or control group. As previously noted, studies that follow a pre–post design are likely to overstate cost savings from HF programs because of regression to the mean. People typically enter HF programs at times when they are in crisis and have had relatively high service use. There will be a natural tendency for costs of many of these people to go down, even if they do not enter an HF program. More rigorous study designs suggest smaller cost offsets relative to those of intervention costs.

As Culhane[12] has noted, there is a greater potential for cost offsets to be significant if costs in the absence of HF

Table 3 Published studies on HF impact on costs

No.	Study and site	Health care	Inpatient psychiatric	Inpatient physical	ED	Justice	Outpatient clinic	Shelter	Other	Net impact on overall costs
Published studies—experimental										
1	Rosenheck et al,[5] 2003 HUD-VASH	Non-VA (–)	+	–		Incarceration (+)	Case management (+) Mental health (+) Medical–Surgical (+)	–	Earned Income (–)	+
2	Basu et al,[37] 2012	Inpatient (–)			–	Legal costs (–)	Clinic (+) Case management (+)		Addiction treatment rehabilitation centres (–) Nursing home (–) Housing and respite (+)	–
3	Stergiopoulos et al,[6] 2015 Goering et al,[29] 2014 AH–CS Cross-Site[a]: moderate needs The following rows detail study results by site[b,c]						Office visits nonstudy (+)	–	SRO with support (–)	+
3A	AH–CS Winnipeg Site A		–	+	–	Incarceration (+) Police contacts, arrests, detentions (+) Court appearance (+)	Community based provider visits non-HF (–)		Unstable housing (for example, group home) (–)	+
3B	AH–CS Vancouver Site B		–	–	–	Incarceration (+) Police contacts, arrests, and detentions (+) Court appearance (+)	Community based provider visits non-HF (–)	–	SRO (–) Social assistance (–) Earned income (–) Day centre (–)	+
3C	AH–CS Toronto Site C		+	+	–	Incarceration (+) Police contacts, arrests, and detentions (–) Court appearance (+)	Community based provider visits non-HF (–)	–	Unstable housing (for example, group home) (–)	+
3D	AH–CS Montreal Site D		+	–	–	Incarceration (–) Police contacts, arrests, and detentions (–)	Community based provider visits non-HF (–) Home visits nonstudy (–)	–	SRO (–) Unstable housing (for example, group home) (–) Day centre (–) Social assistance (+) Earned income (–)	+

continued

Table 3 continued

No.	Study and site	Health care	Inpatient psychiatric	Inpatient physical	ED	Justice	Outpatient clinic	Shelter	Other	Net impact on overall costs
Published studies—experimental										
4	Aubry et al,[8] 2015[c,d] Goering et al,[29] 2014 AH–CS Cross-Site: high needs		–	–		Incarceration (–)	Office visits nonstudy (–) Home visits nonstudy (–)	–		+
Summary of published studies—experimental (4)[e]		Non-VA (1–)	1+	2–	1–	Incarceration (1+/1–) Legal cost (1–)	Case management (2+) Home visits nonstudy (1–) Office visits nonstudy (1+/1–) Clinic (1+) Mental health (1+) Medical–Surgical (1+)	3–	Earned income (1–) Addiction treatment and rehabilitation (1–) Nursing home (1–) Housing and respite (1+)	3+/1–
Published studies—quasi-experimental with comparison group										
5	Culhane et al,[2] 2002 New York	Inpatient (–)			–	Incarceration (–)	+	–		+
6	Larimer et al,[22] 2009	Medicaid (–)			–	Incarceration (–)	+	–	Detox (+) Addiction treatment rehabilitation centres (–) Emergency medical service (–)	–
7	Gilmer et al,[38] 2009 REACH	Inpatient and ED (–)				–	Clinic (+) Case management (+)			
8	Srebnik et al,[23] 2013	Inpatient and ED (–)				Incarceration (–)			Sobering centre Medical respite	–
9	Martinez and Burt,[40] 2006	Inpatient (–)	–		–	Incarceration (–)				
Summary of published studies—quasi-experimental with comparison group (5)		Inpatient and ED (2–) Inpatient (1–) Medicaid (1–)		1–		Incarceration (3–) Justice (1–)	Clinic (3+) Case management (1+)	2–	Detox (1+) Emergency medical service (1+) Sobering centre (1–) Medical respite (1–) Addiction treatment and rehabilitation (–)	1+/1–

continued

Table 3 continued

No.	Study and site	Health care	Inpatient psychiatric	Inpatient physical	ED	Justice	Outpatient clinic	Shelter	Other	Net impact on overall costs
Published studies with pre–post design										
10	Mares and Rosenheck,[41] 2009	Inpatient (–)					Clinic (–) Medical and (or) dental treatment (–) Mental health services (–)		Substance abuse treatment (–)	
11	McLaughlin,[39] 2011	–			–	Police contact (–) Incarceration (–)	Community support (–)	–	Detox (–) Ambulance (–) Medication (+)	–
12	Greenberg et al,[49] 2013	Medical (–)				Police contact (–)				
Summary of published studies with pre–post design (3)		Inpatient (1–) Medical (1–) Health care (1–)	1–		1–	Police contact (2–) Incarceration (1–)	Clinic (1–) Medical and (or) dental (1–) Mental health services (1–) Community support (1–)	–	Substance abuse treatment (1–) Detox (1–) Ambulance (1–) Medication (1+)	1–

+ = cost increase; – = cost increase; AH–CS = At Home–Chez soi; ED = emergency department; HF = Housing First; HUD-VASH = Housing Urban Development–Veterans Affairs Supportive Housing; REACH = Reaching Out and Engaging to Achieve Consumer Health; SMI = severe mental illness; SRO = single room occupancy

[a] Cross-Site results presented in the National Final Report Cross-Site At Home/Chez soi Project.[29] Cost differences of more than Can$1000 are presented.

[b] Site results (3A, 3B, 3C, and 3D) presented in Stergiopoulos et al online supplement.

[c] The article[15] reports only on HF net impact on costs. Cross-Site results were reported in the National Final Report Cross-Site At Home/Chez soi Project[29] and are presented in this table. In this report, only cost differences of Can$1000 or more are indicated for cross-site results.

[d] This study is part of the same AH–CS trial as the Stergiopoulos et al.[6]

[e] AH–CS Cross-Site results are accounted for. Site results are combined by need only. Although AH–CS high-need (study no. 3) and moderate-need (study no. 4) groups are part of the same trial, these studies are counted as 2 separate studies in this summary.

services are larger. Indeed, this is what one observes here. Notably, in the AH–CS study, at each of the 4 sites that had both moderate- and high-need participants, baseline costs were higher for the high-need participants, and cost offsets were much greater, on average, than for moderate-need participants.

These conclusions need to be interpreted in light of the considerable limitations of most of the studies reviewed. For one, the longest study follow-up period is only 3 years.[5] We do not know whether a longer follow-up period would have increased or decreased the magnitude of cost offsets for a given group of participants. Also, details on how unit costs were calculated are also often lacking. Lack of consistency in unit cost calculation could substantially affect the magnitude of estimated cost offsets. In the study by Basu et al,[37] indirect costs were included in drug and alcohol rehabilitation centre and prison costs while they did not seem to be included in the cost of HF managers ($15/hour). Finally, data on frequencies of use of services are subject to various biases.

As previously mentioned, most studies estimated service use from administrative data collected from health insurers and hospitals.[2,5,22,23,37–40] Use of administrative data presents some limitations. Hospitalizations or visits to health professionals may not have been recorded. In the 1811 East Lake study, hospitalizations that took place outside of the Harbor View Medical Center were not recorded by Medicaid and could thus not be analyzed for the study.[22] Because Harbor View Medical Center and 1811 East Lake work in partnership, it is likely that visits to other hospitals decreased more for the HF group staying at 1811 East Lake than for the control group. In the Chicago study, Basu et al[37] report that 11% of files requested to out-of-region hospitals were not obtained. In contrast, studies using self-report data[14–16,29–31,41] are subject to differential attrition. Participants

with deteriorating physical or mental health states are more likely to be lost to follow-up. The control group, not benefiting from any particular type of intervention for the most part, may include more participants lost to follow-up; also, participants not receiving any HF services may lose interest in participating in the study. However, in the HUD-VASH study, participants lost to follow-up and participants followed were found to be quite similar.[5] When adjusting results for differential attrition (propensity score weighting) in the CICH study, a preliminary study observed few differences in results, with or without adjustments.[41] The possibility of recall bias constitutes a further limitation of self-reported service use data. Administrative data of the CICH study were compared with self-reported data. A strong correspondence was found for rehabilitation centre and prison use; however, hospital use was overreported by participants.[42]

These limitations notwithstanding, the results suggest that HF programs may result in cost offsets that equal the cost of the intervention, but that this is not certain to occur. What does this imply?

A simplistic approach to evaluating health and social programs is to believe that spending on programs such as HF can only be justified if they at least pay for themselves. Such an approach can hardly be justified, as few health care innovations that governments agree to fund do so (for example, new cancer drugs); often, they generate no cost offset at all. Rather, they are judged to yield sufficient benefit to merit their cost.

Evaluating the extent to which HF programs are worth funding, compared with other interventions, is difficult. Economists would normally ask that the cost-effectiveness of HF programs be evaluated using QALYs, so their cost-effectiveness can be compared with that of a myriad of other health care interventions. However, we would argue that this would be unfair. First, the relevance of QALYs for people with mental illness has been questioned.[43] Second, HF is not merely a health care intervention—it is also a social one, and to evaluate it only in terms of the health improvements it generates would understate the value of providing housing and improving the quality of peoples' lives over and above their health. Third, homelessness is very visible, and many members of the general public would consider it of significant value to themselves, for altruistic reasons, that it be remedied effectively. On what basis, then, can the value of funding HF programs be defended?

A full discussion of this question would require delving into the ethics of resource allocation and would exceed the scope of this review. Suffice it to say that more and more communities have been developing and implementing multi-year plans to end homelessness, plans that include HF programs as one of their key components, and mobilizing considerable resources to do so.[44,45] While our review may cast doubt on whether HF programs can be expected to pay for themselves, the certainty of significant cost offsets, together with the evidence of their effectiveness in increasing residential stability and improving the lives of an especially vulnerable population,[1,2,5,14,15,46–48] means that they represent a more efficient allocation of resources than traditional services.

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