

Mal logement et diabète : le cercle vicieux

Les liens entre mal-logement et santé sont importants mais ils continuent à ne pas faire l'objet d'une attention suffisante dans les réponses apportées aux personnes.

La Fondation Abbé Pierre et d'autres associations l'affirment chaque année : le logement est une question de santé publique.

Les liens entre problème de logement et de santé sont évidents lorsque l'on se penche sur les conditions de vie et l'état de santé des personnes sans domicile quels que soient les modes d'hébergement proposés par les dispositifs publics (accueil d'urgence et de stabilisation, hébergement d'insertion, hôtels...). Il en va de même des ménages contraints d'habiter des logements insalubres ou trop dégradés.

En elle-même, la précarité est un facteur de risque de nombreuses maladies physiques ou mentales. Mais l'absence de logement stable offrant des garanties minimales de sécurité, d'hygiène, d'espace sans pour autant mobiliser une part trop importante des ressources est, en elle-même, un obstacle majeur à une prise en charge décente des questions de santé identifiées.

Comment traiter correctement des pathologies chroniques ou handicapantes dans des logements inadaptés ?

L'accès aux soins reste difficile pour les populations les plus précaires, malgré l'offre associative, le développement de structures et services dédiés et parfois la bonne volonté de professionnels de santé privés. Mais plus encore, ce sont les difficultés des acteurs de santé à prendre en compte les situations sociales qui se traduisent par des ruptures catastrophiques en matière de continuité des soins, en particulier en ce qui concerne les malades chroniques.

Pour ces derniers, des questions simples ne trouvent pas de réponse naturelle :

- Comment éviter de perdre ou de me faire voler les médicaments qui m'ont été délivrés ?
- Comment conserver dans des conditions adéquates le traitement dont je dois bénéficier ?
- Comment assurer une alimentation et une hygiène conforme à mon état de santé ?

Les conséquences sont dramatiques : les renoncements aux soins sont fréquents, les traitements souvent abandonnés ou pris de manière aléatoire, les consignes les plus simples ne peuvent être suivies et les complications se multiplient.

L'étude de Keen et al. à paraître porte sur cette question cruciale de l'impact du mal-logement chez les patients diabétiques aux USA. Force est de constater que nombre des situations décrites dans cet article fondé sur une série d'interviews de personnes diabétiques mal logées ou sans-abris sont parfaitement transposables des Etats-Unis à notre pays. Elle met en lumière nombre de difficultés rencontrées par ces patients et en particulier leur incapacité à prioriser leur maladie dans leurs choix de vie face aux difficultés imposées par la question pourtant élémentaire du logement.

La prise en charge du diabète en situation de mal-logement ou d'absence de logement constitue ainsi un challenge qui ne peut sans doute pas être résolu si des mesures nouvelles ne sont pas prises pour offrir aux personnes atteintes de maladies chroniques un habitat décent.

Il y a sans doute là une condition essentielle pour assurer une efficience aux soins de santé délivrés à ces personnes, réduire des dépenses de santé et atteindre cet objectif d'équité dans l'accès aux soins de santé souvent mis en avant par nos responsables politiques comme par les professionnels de santé.

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“That wasn't really a place to worry about diabetes”: Housing access and diabetes self-management among low-income adults

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ABSTRACT

Lack of affordable housing access represents a significant and growing problem for low-income households in the United States and these housing challenges may present barriers to the management of chronic diseases such as type 2 diabetes. In this qualitative study, we examined how both housing challenges and housing resources shaped diabetes self-management behaviors. We conducted semi-structured interviews with 40 low-income residents of one US city, New Haven, Connecticut, who had a diagnosis of type 2 diabetes and either resided in or qualified for subsidized housing. We purposively constructed our sample to include a range of housing experiences (subsidized, unsubsidized, homeless) and treatment regimes. We analyzed the data using grounded theory techniques of inductive coding and memo writing. Our findings suggest multiple ways that housing access can affect diabetes self-management with implications for blood glucose levels and future complications. Specifically, we describe the ways that housing access affected participants' ability to: 1) prioritize their diabetes care, 2) establish and maintain diabetes routines, and 3) afford diabetes-related expenses. Together, our findings show how housing challenges increased the cost of adherence to diabetes management regimes such that inadequately housed individuals had to both invest and sacrifice more for the same outcomes. Our findings suggest that improved affordable housing access may represent an opportunity to improve outcomes and reduce socioeconomic disparities among those living with type 2 diabetes.

1. Introduction

The United States (US) is confronting a growing affordable housing crisis, presenting a significant challenge for many low-income households (Desmond, 2016). Rents have outstripped wages, and in the vast majority of the US, full-time workers earning the federal minimum wage cannot affordably rent a one bedroom apartment (Pattillo, 2013). Furthermore, only one-quarter of eligible US households receive rental subsidies that are designed to make housing affordable (Sard and Fischer, 2013). This lack of affordable housing subjects low-income US households to poor housing conditions, high housing costs, housing instability, and homelessness (Burgard et al., 2012; Desmond, 2016; Newman and Holupka, 2015). In turn, these housing challenges are likely to have significant health implications.

While extant research has examined associations between housing and health outcomes (Benfer and Gold, 2017; Shaw, 2004), less is known about the processes that connect housing access to health behaviors. Furthermore, less is known about how housing access may operate to shape the self-management of chronic health conditions in

low-income populations. Socioeconomic disparities in chronic disease outcomes are well-documented in the US (Braveman et al., 2010; Phelan et al., 2010), and housing access may contribute to these disparities through a number of pathways including by affecting the way that these conditions are behaviorally managed.

Type 2 diabetes is one chronic condition that requires intensive self-management and is prevalent among low-income Americans, a population that is also likely to experience housing challenges (Lutfey and Freese, 2005). Not only is the incidence of diabetes associated with socioeconomic status, but complications from diabetes are more prevalent among individuals who have lower incomes or reside in higher poverty areas (Ludwig et al., 2011; Lutfey and Freese, 2005; Schootman et al., 2007). For example, recent research finds that individuals from low-income areas in the state of California are ten times more likely than those from affluent areas to have a limb amputated as a result of their diabetes (Stevens et al., 2014).

Housing access may play a role in these disparate disease outcomes through its effect on self-management behaviors. Diabetes self-management behaviors are closely tied to blood glucose levels, which in

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turn predict diabetes-related complications (Lutfey and Freese, 2005). These diabetes-related behaviors are not inherent to the individual, but rather shaped by economic and social circumstances that constrain and support them (Weaver et al., 2014). In this sense, it is important to understand the contextual factors that affect self-management and ultimately diabetes outcomes. In this paper, we draw on qualitative data to examine the ways that housing functions in the lives of those living with type 2 diabetes to affect self-management behaviors. Beyond diabetes, our analyses speak to the role that housing may play in the production of chronic disease disparities.

1.1. Housing as a social determinant of health

Housing is a well-established social determinant of health (Shaw, 2004). Research has documented negative health effects associated with poor housing quality (Arku et al., 2011; Benfer and Gold, 2017), housing instability (Burgard et al., 2012), high housing costs (Nettleton and Burrows, 1998; Newman and Holupka, 2015; Pollack et al., 2010), the loss of housing associated with eviction or foreclosure (Desmond and Kimbro, 2015; Houle and Light, 2014; Osypuk et al., 2012), and homelessness (Shaw, 2004). In addition to documenting the health costs of housing challenges, recent research in the US suggests health benefits of improved housing access through rental subsidies that are provided by the federal government in the form of either subsidized public housing units or housing vouchers, both of which limit the recipient's rent to 30% of their income. Waitlists for these subsidies average 2 years across the US (Fenelon et al., 2017) and research finds that US households who are waiting for subsidies experience more unhealthy housing conditions, food insecurity, and child health problems compared with subsidy recipients (March et al., 2009; Sharfstein et al., 2001). Providing further support for the health benefits of rental subsidies, a recent study compared subsidy recipients with those receiving subsidies two years later (individuals who were likely on a waitlist) and found that subsidized public housing residence was associated with better self-rated health and less psychological distress (Fenelon et al., 2017). These findings suggest that policy interventions designed to improve housing access may also have health benefits.

In addition to the overall significance of housing for health, some existing research suggests that housing challenges can present barriers to chronic disease management. For example, research suggests that among persons living with HIV/AIDS, access to housing (relative to homelessness) is associated with greater likelihood of engagement in care, higher medication adherence, and lower mortality, viral loads, and emergency department use (Aidala, 2005; Kidder et al., 2007). Moving beyond homelessness, Pollack et al. (2010) find that high housing costs are associated with increased odds of self-reported hypertension and medication non-adherence among both renters and homeowners. This work suggests that improvements in housing affordability may be a way to improve chronic disease self-management and outcomes, potentially leading to reduced health disparities and lower healthcare costs. However, more research is needed to understand the ways that housing access may facilitate chronic disease management behaviors.

1.2. Housing access and diabetes self-management

Individuals living with diabetes must carefully manage their blood glucose levels through medication, diet, exercise, glucose monitoring, and healthcare visits, and these behaviors may be shaped by housing contexts. From a psychosocial perspective, housing access may provide consistency, stability and a sense of security that facilitates prioritization of diabetes management. Research has described housing, or home, as a source of ontological security, or a feeling of well-being that arises from a sense of constancy in one's social and material environment (Dupuis and Thorns, 1998; Kearns et al., 2000; Padgett, 2007). Some research also suggests that this sense of security can be an important

resource for those managing chronic illness. For example, Padgett (2007) found that when homeless individuals with mental health conditions obtained apartments through a housing intervention, they developed a sense of control over their lives, and an ability to look beyond the day-to-day challenges of homelessness, towards future goals. Similarly, for those living with diabetes, housing access may provide an important foundation from which to prioritize diabetes to avoid long-term complications.

Housing and homes also provide a setting for routines that are important to the management of chronic illness. Research describes both the consistency of material and social environments, and also the sense of control that stable housing provides, as important contexts for daily routines (Dunn and Hayes, 2000; Dupuis and Thorns, 1998; Padgett, 2007). Individuals who lack housing, who experience housing instability, or whose housing situation is threatened by unaffordability or potential eviction, may have difficulty establishing and maintaining routines (Luginaah et al., 2010).

Housing access may also provide the material context and resources that are needed to manage diabetes. Individuals who are struggling with homelessness or unstable housing may lack places to store their medication, or the ability to prepare the foods that they need. Additionally, housing costs may compete with the costs of diabetes self-management, which can include medication, glucose testing equipment, nutritious food, exercise opportunities, and payments for medical care (Lutfey and Freese, 2005). Though individuals may be highly motivated to manage their diabetes, they may be preoccupied with housing needs that consume financial, time and emotional resources (Desmond, 2016). They may also prioritize housing payments over other expenses (Desmond, 2016; Keene et al., 2014).

Diabetes self-management can be labor and resource intensive, and lack of economic resources can exacerbate its challenges, increasing the cost of adherence to self-management regimes (Chaufan et al., 2012; Lutfey and Freese, 2005). For example, individuals who don't have a car may spend more time traveling to their appointments on public transportation or may face longer wait times in clinics that serve low-income patients (Lutfey and Freese, 2005). Individuals living on tight budgets may also face greater tradeoffs when diabetes expenses compete with other material needs (Chaufan et al., 2012). Lack of housing may also increase this cost of adherence such that those who have limited housing access must both invest and sacrifice more to achieve the same outcomes.

Though few studies have examined the relationship between housing and diabetes self-management, a recent analysis found an association between better housing conditions and improved glucose control (Vijayaraghavan et al., 2017). However, more research is needed to examine the pathways that underlie this association. Seeking to address this gap in the literature, we draw on 40 semi-structured interviews, collected among low-income individuals diagnosed with type 2 diabetes and living in one US city, New Haven, CT. We examine how participants manage their diabetes in the context of their housing challenges and housing resources. Specifically, we examine how housing shapes 1) the prioritization of diabetes management, 2) the ability to establish and maintain diabetes routines, and 3) the ability to manage diabetes-related expenses.

2. Methods

2.1. Research setting: affordable housing access in New Haven, Connecticut

This study takes place in New Haven, Connecticut, a city with approximately 130,000 residents. While small, New Haven experiences many of the challenges that larger US cities face, including a shortage of affordable housing. Connecticut has the 8th highest housing wage (the wage needed to rent a 2-bedroom apartment spending no more than 30% of one's income) in the US, and in 2015 a worker earning the state's minimum wage would have to work 84 h per week to rent a one

bedroom apartment without spending more than 30% of their income on rent (National Low Income Housing Coalition, 2015). Given these high rents, subsidized housing represents an important component of New Haven's affordable housing landscape. In fact, in 2014, in New Haven County, there were zero unsubsidized available units that would be affordable to low-income households earning less than 30% of the area's median income (McDonald and Pething, 2014).

Housing subsidies in New Haven are provided through both state rental assistance vouchers and federal programs funded by the US Department of Housing and Urban Development (HUD) and managed by the local housing authority. These federal rental subsidies are provided in the form of both project-based units and tenant-based vouchers. Project-based housing consists primarily of public housing projects that are owned and operated by the local housing authority. Tenant-based assistance in the form of vouchers subsidizes the cost of private rental units such that the tenant pays 30% of their income. As in most US cities, these rental subsidies are highly sought after and in short supply (Sard and Fischer, 2013). In 2013, subsidized households in New Haven spent an average of 23 months on the public housing waitlists and 25 months on waitlists for vouchers (US Department of Housing and Urban Development, 2013).

2.2. Sampling and recruitment

We posted flyers throughout the New Haven community (at public libraries, the housing authority, bus stops, social service offices, and community-based organizations) to recruit 40 participants for qualitative interviews. Eligible participants were over age 24, diagnosed with type 2 diabetes and met the income criteria for subsidized housing eligibility. We used purposive sampling procedures to ensure diversity with respect to housing status and treatment regimes. Half of the sample lived in rent subsidized housing and 6 participants were homeless at the time of the interview. Twenty-six participants took insulin and all participants took either oral medications or insulin for their diabetes. Table 1 provides additional sample characteristics.

2.3. Data collection and analysis

We conducted semi-structured interviews between July 2016 and January 2017. We asked participants about challenges that they faced managing their diabetes, and resources and strategies that helped them. We also asked about their housing experiences and residential trajectories. Participants also completed close-ended questions about mental health, medications, and financial well-being. Interviews lasted 45 minutes to 2 hours and were audio recorded and transcribed verbatim. Participants were compensated \$50.00. Seventeen interviews were conducted by the first author, 8 by the second author, and 15 by the third author. Data collection for this project was approved by the Yale University Institutional Review Board.

Following a grounded theory approach (Corbin and Strauss, 2014), our analysis was an ongoing, iterative process that co-occurred with data collection. We wrote thematic summaries after each interview and memos about developing concepts. Once interviews were completed, we used our memos and group discussion to collaboratively develop a codebook. The three authors and additional research assistants then applied this codebook to a small set of transcripts. We discussed inconsistencies between coders, redundancies, and the clarity of codes. We then revised the codebook and repeated this process three times before finalizing it. Using Dedoose, an on-line coding program, two coders independently applied the finalized codebook to each of the first 20 transcripts and resolved inconsistencies through discussion. The remaining 20 transcripts were coded by a single coder, though we continued to discuss coding questions in team meetings.

The first author extracted and reviewed coded excerpts for codes relating to housing and diabetes self-management, and reviewed full transcripts to contextualize these excerpts within participants' broader

Table 1
Characteristics of interview sample.

Characteristic	Interview Sample (N = 40)
Age (years)	51.0 (mean)
Ethnicity	
Black and/or African American	25
White and/or Caucasian	7
Hispanic and/or Latino(a)	3
Multiracial and/or Other	5
Gender	
Male	21
Female	19
Receiving Rental Subsidy	
Yes	20
No	20
Currently Homeless	
Yes	6
No	34
Primary Language	
English	38
Spanish	2
Taking Insulin	
Yes	26
No	14
Insurance Type	
Medicaid ^a	26
Medicare ^b	5
Dual Medicaid/Medicare	5
No insurance	2
Private insurance	2
Primary Income Sources	
Employment	6
Spouse or family member	3
Disability benefits	19
Other state benefits	12

^a Medicaid provides health coverage to low-income adults and children and is jointly funded by the states and the federal government.

^b Medicare is a federal program that provides health coverage for those who are over 65 or have a qualifying disability.

narratives. Ongoing discussion among the authors throughout the analysis provided an opportunity to check our interpretations against each other's and the data.

3. Findings

The sections below describe the ways that housing access affected three primary aspects of participants' diabetes self-management: diabetes prioritization, diabetes routinization, and diabetes-related expenses. Our discussion focuses not only on the challenges that inadequate housing posed to participants' diabetes self-management, but also on the creative, but sometimes labor-intensive strategies that they employed to manage their diabetes despite these challenges. These strategies illustrate the added cost of adherence that housing challenges may impose for those living with type 2 diabetes.

3.1. Housing as a foundation to prioritize diabetes care

Participants described housing as a foundational need that when not adequately met, could prevent them from prioritizing their diabetes self-management, often despite strong motivation to avoid complications. For some participants, the immediate need for housing could take priority over the longer-term consequences of poor glucose control. Additionally, housing challenges could consume both emotional and physical resources that were needed to manage their health. Some participants described how without housing, they lacked a foundation from which to pursue their health goals.

Justice (age 47) provides an example of how housing challenges could interfere with the prioritization of diabetes self-management.

Justice was renting a room from a friend at the time of the interview, but had recently been homeless. He explained that he “overlooked” his diabetes while he was living on the streets. He was not experiencing complications at the time, and the more immediate challenges of finding a place to stay appeared more pressing than the potential long-term consequences of poor glucose control. He explained, “When I was homeless, it [diabetes] was very hard to manage it because I would not pick up my prescription. I would leave my bag somewhere because I didn’t want to walk around with it. It was just a lot of – it seemed like other things presented itself to be more important than that, so I just overlooked it. I was just thinking, ‘Well, I’m healthy.’”

Justice also explained that the day-to-day preoccupation with where he was going to sleep distracted him from diabetes-related priorities. He explained, “When a person is unmanageable, their health becomes unmanageable because they don’t pay attention to themselves. They’re more distracted about where I’m gonna live or where I’m gonna sleep or what I’m gonna do today. The person that is manageable that has structure has better control over that disease.”

Similarly, Melissa (age 43) described the challenges of prioritizing her diabetes after losing her home to foreclosure and subsequently experiencing a period of unstable housing, moving between her daughter’s place and a shelter. She explained, “You’re forgetting that because you’re in such a bad place in life, who wants to remember taking meds or going to the doctor? So you’re missing the doctor’s appointment, you know? ... I see why so many people that live on the street probably don’t take care of their self because they’re probably so busy looking for a place to lay their head, how could they go to the darn doctor’s?” Like Justice, Melissa described how immediate housing concerns could interfere with the ability to look forward towards longer-term health goals.

For other participants, these immediate housing challenges consumed physical as well as emotional energy. For example, Garrett (age 47), who had been homeless for many years described how sleep deprivation associated with living on the street made it hard for him to prioritize his diabetes medication regime. He explained that when he had been up most of the night, catching what sleep he could on buses or at fast food restaurants, he was just too tired to make medication a priority. Similarly, John (age 30), described the exhaustion of homelessness that affected his medication adherence. He explained, “My body was getting no rest and then I felt like, what’s the point then? I felt like, at the time, what’s the point of getting the medicine if my body’s not getting to rest properly.”

In the phrase, “what’s the point,” John suggests that without having his basic need for shelter met, the management of his diabetes could seem almost futile. John described how his diabetes became much easier to prioritize when he obtained the subsidized apartment that he lived in at the time of the interview noting, “So now I try to deal with it better.”

Several participants described housing as a “bottom line” for managing their diabetes; it was a minimal need that must be met in order to pursue health goals, and also a platform from which these goals could develop. Justice explained, “So homelessness, it makes it worse for any person with any type of disease to manage because they don’t have the proper foundation to operate from.” Similarly, Myron (age 59), who had spent many years homeless before moving to a subsidized apartment explained that having housing was necessary to pursue self-improvement goals, including those related to diabetes. He noted, “People always say pull yourself up by your bootstraps. When you don’t have housing, you don’t have any bootstraps. There’s no way to pull yourself up.”

While participants described the challenges of consistently prioritizing diabetes while homeless or living in unstable housing, many still were highly motivated to avoid complications and protect their health. Several had witnessed diabetes complications among family and friends and were aware of the potential consequences of poor glucose management. For example, despite housing struggles that sometimes

interfered with her medication adherence, Melissa, like many participants, took her diabetes seriously, attending diabetes education classes and extensively researching diabetes self-management. She explained, “I’m not playing around with my life because you can die from this if you don’t take care of yourself so who wants to die? I don’t wanna die a premature death because I wasn’t taking my meds, no.” This kind of motivation, as discussed below, often resulted in effortful attempts to adhere to diabetes regimes despite housing challenges.

3.2. Housing and diabetes routines

Participants described routinization as critical to diabetes self-management, with several noting that their diabetes care was “like brushing my teeth.” Kara (age 38), who lived in the same house for 6 years before moving to an apartment a few months prior to the interview, explained, “It just becomes routine. Just like when you get up in the morning and you brush your teeth, it just becomes part of my routine. It’s part of my routine. I get up. I brush my teeth. I check my sugar. I take my insulin.” Similarly, when asked if there were times that it was harder to manage his diabetes, Nate (age 51) replied, “Not at all. That’s part of my everyday routine. It’s almost like getting up, brushing your teeth, taking a shower, putting your clothes on. That’s how I look at it.” For many participants, housing played an important role in the establishment and maintenance of routines, providing participants with both a consistency of place that supported the routinization of health behaviors, and also control over their environment that affected both their diet and medication regimes. In contrast, for some participants who lacked housing, unpredictability and lack of environmental control served as barriers to consistently maintaining diabetes-related behaviors, and could also increase the costs of adherence.

For Regina (age 46), obtaining housing was critical to developing a diabetes routine. Regina had spent many years living on the street and more recently with her fiancé’s family until, about a year prior to the interview, she received a subsidized apartment in a public housing development. She described the significance of housing for her diabetes self-management, noting, “Then I found housing. I got housing, everything, my numbers, as far as my health, got back on track. I’m insulin-dependent. I have many medications that I take on a daily basis but since I’ve had housing, my diabetes changed. It went from up here to being down here in the right place.” In particular, she described how the spatial consistency of her apartment facilitated a more consistent diabetes medication regime by allowing her to store and take her medication in the same place each day. She explained, “That’s the first thing I do. I get up out that bed, I sit right there, I already have my medicine, the needles and everything set up.”

Similarly, Mike (age 60), who lived in a transitional shelter where he had his own room, described how having a consistent place to store his diabetes supplies facilitated his self-management routine. He explained, “But now it’s nice – I’ve got all my – now on my dresser drawer, everything that I need and I just take with me what I need for the day.” For Mike, this consistency was a sharp contrast to when he was living in an emergency shelter and often unable to safely store his medications.

While Mike and Regina described benefits of having their diabetes supplies in one place, other participants described how routines could be disrupted when housing challenges interfered with this spatial consistency. For example, when Kara, after losing her job, had to move from her house of 6 years to a more affordable apartment, she described a temporary disruption in the routines that she had previously adhered to consistently. When asked if there was a time when it was hard to adhere to her medication regime, she responded, “Yeah, like last month because it was really stressful having to move.” In the disruption of the move, Kara did not consistently take her medication or monitor her blood sugar, and once passed out due to a “low spurt” (low blood sugar).

Myron described the challenges of checking his blood sugar in a homeless shelter where he did not have consistent access to his testing

equipment. He explained, “That was one of the things I didn't do also when I was at the shelter. My stuff was over there in the storage. Half the time I couldn't find my machine and stuff. It was buried in the rest of the stuff. Half the time I didn't check it. I'd go with what I felt like.” Myron's description of having his testing equipment buried amongst his other belongings at a storage facility located many miles from where he was sleeping contrasts sharply with more stably housed participants who kept their medications at their bedsides.

Myron kept his diabetes-related supplies in a storage facility because he felt he could not safely store them at the homeless shelter. This lack of environmental control is another way that housing challenges undermined participants' diabetes self-management routines. Like Myron, several other participants described the challenges of storing medication at homeless shelters. For example, Joe (age 61) explained, “You had to guard your clothes, so it wasn't like you had medication because if you left your stuff somewhere somebody went in your bag, your stuffs gone. Now you sick for real ... so that wasn't a place to really worry about diabetes.” Without the ability to store their medication safely, participants often did not have access to medication when they needed it.

Several participants described the particular challenges of storing insulin while homeless or staying in shelters. Without a place to store his insulin, Paul stopped taking it completely. He explained, “It's been tough – like I just started taking my medication again two days ago because, given my living situation, I can't carry around syringes, I can't carry around insulin; it has to be refrigerated. Even the oral medications it's hard to carry it around. If I have to stay at the shelter they don't – anything that's left around gets stolen. So right now I'm just taking metformin.” Paul's example illustrates how a lack of environmental control associated with homelessness could have a significant impact on medication regimes.

In addition to medication challenges, housing affected dietary routines that were important to diabetes self-management. Some participants noted that stable housing provided them with control over their food environment, describing “home” as a dietary “safe zone” where they could follow dietary recommendations consistently. For example, Leonard (age 51), who lived in an unsubsidized studio apartment explained, “... when I'm at home, and I know what I have there, and I know what I can't eat, then it's not a big issue.”

The “safe” nature of home, had implications for individuals who did not have housing. For example, when Diana (age 49) and her husband's new apartment did not pass inspection and they had to spend a few weeks in a hotel, she was unable to prepare her own food and her blood sugar was “out of whack”. She explained, “... because you can't control really what you're eating because if you go into a fast food restaurant you don't know the ingredients they have in their food. But I had no choice but to eat it.”

While for Diana, this lack of housing was temporary, other participants described longer term challenges of controlling their diet without a home. For example, Regina described the challenges of eating well while living with her in-laws. She explained, “Not being in my own place, it was hard to try to fight my diabetes and stay healthy and stuff because when you're living with somebody else, it's almost like you have to eat whatever's being made and stuff. So that was kind of hard 'cause you couldn't cook the things that you want, like healthy stuff”.

Homeless participants described having little control over their diets. For example, Tory (age 39) explained that the food provided in the homeless shelter was not conducive to managing diabetes. He explained, “I think it's more harder when I was homeless because I said kitchens, the shelters, they feed you pasta. And if you out there all day and didn't eat nothing, you eat whatever they give you.” Here Tory emphasizes a lack of choice in his food environment that contrasts sharply with participants who carefully prepared their own meals.

John described the limited food options in the shelter as having a direct impact on his blood sugar. He explained, “It was hard 'cause the doctors didn't understand why my blood sugars were so high ... I didn't

have a choice of the food I was eating. Like I just had to eat whatever they gave at the shelter. So they tried to work with me and to just get it down and they just told me that just use small little portions. But I was telling him like if I eat smaller portions I will be hungry 'cause I know they only gave dinner at their shelter. So like for breakfast I had to get whatever I could get So they thought I was just like eating whatever, like I didn't care what I'm eating. I'm like, “I'm homeless and I got to get what I can get.”

As John noted, in addition to not having access to the right foods, he also did not have control over when he ate. Though smaller and more frequent meals allow for better glucose control, John did not have the consistent access to food that would allow him to eat frequently.

Many participants were committed to following diet and medication routines, despite their housing challenges, and developed creative, and sometimes labor-intensive strategies in order to navigate the constraints of their environment. For example, participants described visiting multiple food pantries in order to secure food that was appropriate for a diabetic diet. Myron drove several miles to a storage facility each day in order to take his medications. Garrett and his providers worked out an arrangement with the pharmacy so that he could pick up smaller quantities of insulin, rather than a large box that he could not store. When Samson (age 54) was living in a San Francisco homeless shelter, prior to moving to New Haven, he woke up early so that he could take his medication in a park, rather than in the shelter that he did not consider clean or safe enough for taking injectable medications. He explained, “And I get up an hour earlier, I do what I have to do ... and be out the door and be at your location where you consume your medication on time, as the bottle recommends what time you should take it. And that's what I started doing. I was proactive.” Samson's proactive behavior exemplifies participants' motivation to adhere to self-management regimes despite housing challenges. It also illustrates the added costs of this adherence in terms of time and energy, something that for many participants who were managing housing challenges, was already in short supply.

3.3. Housing and diabetes self-management expenses

For some participants, housing costs competed with diabetes-related expenses and posed barriers to self-management. For some, medication costs competed with rent payments. Even when medications and provider visits were fully covered by insurance, the high costs of a diabetic diet presented challenges for those managing high rents on limited budgets. Participants described having to make difficult trade-offs, forgoing one health-related need at the expense of another. Participants also described strategically navigating tight budgets in order to adhere to diabetes self-management regimes, despite high housing costs.

Liane (age 49) struggled to pay rent that consumed the majority of her monthly income. She had moved to her apartment after losing her home to foreclosure and was on the waitlist for a rental voucher. While many participants had virtually no healthcare expenses as a result of their coverage through Medicaid, a US federal and state program that provides health care coverage to low-income Americans, this was not the case for Liane who had insurance through Medicare, a federal program for older and disabled adults. Liane described modest healthcare payments as competing with her rent and other financial demands. She explained “There are medications I can't get because I can't afford them. When I'm done paying my rent and making sure my son has food, I don't have extra \$10. I don't. I have just enough to pay my bills.” She explained that she manages by juggling, “medication one month and food the next.” She also described the challenge of deciding where to invest limited funds. In reference to her \$15 medication fee, she explained, “That's my extra gallon of milk or my extra loaf of bread. So do I get the food for the kid or do I get my medication so I can stay alive and take care of him? It's a toss-up.”

Other participants described the high cost of food that sometimes competed with housing expenses, or were beyond the reach of their

limited incomes. For example, Roxy, who paid \$280 per month to stay with a friend, struggled to follow a diabetic diet on a tight budget. She explained, "... I only get \$730.00 a month, and to live and to buy what I need, and then food, it's hard to maintain the right diet. Yeah, because you can't eat what you want whenever you want. You've got to buy a certain thing, and you've got to make that last all month, so that's the hard part." Several participants noted that their diet changed at the end of the month, when they ran out of funds. For example, Kara explained, "At the end of month, I'm not eating the vegetables I'm supposed to be eating. I'm not eating the proteins that I'm supposed to be eating."

Several participants employed labor intensive strategies to maximize limited budgets and acquire adequate nutrition despite rent burdens. They shopped in bulk and at discount grocery stores, and carefully planned food budgets. Melvin (age 54), was very careful about his diet, preparing all his own food, even bringing his own provisions to family gatherings. He tried to eat fish frequently and planned to spend the interview incentive on salmon. He noted that he would often find an odd job to pay for fish, explaining that he was "always hustling," to eat well. This hustle exemplifies the commitment to eating well exhibited by many participants in the study, and also the added cost of adhering to this commitment given limited financial resources.

When high rents competed with diabetes expenses, participants noted that the rent often came first. For example, prior to receiving state funded rental assistance, Melvin struggled to make sure the rent was always paid. He explained, "It was hard because, number one, we wanted to make sure the rent was paid. Now it don't make no difference having all this food and all this stuff when you ain't got a place to stay." Melvin prioritized his housing payments as a way to protect his health, because he considered housing to be a foundation for his self-care.

4. Discussion

Our findings suggest multiple ways that housing access can affect diabetes self-management, with implications for blood glucose levels and future complications. First, participants described how housing challenges associated with homelessness and instability consumed emotional resources and physical energy, interfering with their ability to prioritize their diabetes care. Participants noted that when housing needs were not met, they did not have a foundation from which to pursue longer term-health goals related to their diabetes. Their descriptions echo Padgett's (2007) findings that the provision of stable housing can allow those struggling with chronic illness (in her case mental health challenges) to begin to ask "what is next?" Like Padgett (2007) and others (Arku et al., 2011; Dunn and Hayes, 2000; Dupuis and Thorns, 1998) participants also described a sense of consistency and control associated with stable housing, that supported the routinization of diabetes behaviors. Environmental consistency allowed participants to perform diabetes-related tasks in the same place each day. Participants who had their own apartments also described control over their food environment, facilitating adherence to diabetic diets. In contrast, participants who were homeless, who lived with family members, or who experienced instability, described a lack of control and consistency that interfered with both their diet and medication regimes. Finally, for some participants, high housing costs competed with diabetes related expenses, creating barriers to self-management.

Notably, despite the housing challenges that participants faced, many went to great lengths to manage their diabetes. Some paid for food and medications on tight budgets, stretching the dollar or securing extra income through "hustles." Some developed creative work-arounds for shelter policies that made it difficult to take medications. Others, struggling with high housing costs, navigated difficult tradeoffs, sacrificing one need at the expense of another. The efforts that participants made to manage their diabetes despite housing challenges represent what Lufey and Freese (2005) refer to as an added 'cost of adherence' that low-income individuals must pay for their diabetes self-management. Building on this prior work, our data suggest that inadequately

housed individuals may have to both invest and sacrifice more for the same outcomes.

Though this paper provides important insight into the ways that housing intersects with diabetes self-management, it has some limitations. First, individuals who volunteered to participate in this study may be different than those who did not, meaning that our data do not contain a full range of experiences. Second, as with all interview studies, we rely on participants' accounts of their behaviors, rather than observing them directly. To better capture participants' actual behaviors and experiences, we focus our analysis and data collection on concrete examples that are more likely to be trustworthy than generalized statements (Weiss, 1998). Despite these limitations, our findings provide novel insight into the way that housing operates to affect diabetes self-management and can inform both policy and clinical practice.

4.1. Implications for policy and practice

Chaufan and Weitz (2009) note that social conditions are largely absent from the literature on diabetes self-management which focuses primarily on education and life-style modification. Our findings speak to the limitations of this individual approach, highlighting the role of social conditions that constrain or support self-management behaviors, and a need for attention to the policies that shape these conditions.

In terms of healthcare policy, most participants received insurance coverage through Medicaid, a US state and federal insurance program for low-income households. This coverage reduced the cost of adherence, providing free medications and provider visits. While in Connecticut, Medicaid is widely available to low-income adults, eligibility, and resulting access to diabetes care, varies greatly across the US (Kaufman et al., 2015). For individuals without adequate insurance coverage, the challenges of managing diabetes may be substantially greater. However, while healthcare access was an important resource for participants, our findings suggest that lack of housing may create barriers to fully benefiting from this care.

Recent policy initiatives in the US have begun to consider housing interventions as ways to both improve health and the benefits of healthcare (Cassidy, 2016). For example, state governments have developed programs to provide supportive housing to high-cost patients who account for a large portion of public healthcare spending (Doran et al., 2013). Our findings suggest that beyond these high-cost patients, housing access may also help to improve the management of chronic conditions, and ultimately prevent patients from developing high-cost and life-threatening complications.

Our findings also suggest a need to address housing issues at the clinic level. Given its potentially significant role in shaping health behaviors, housing may be an important topic for providers to raise with their patients (Singh, 2016). Additionally, coordinated care efforts that can help diabetes patients manage social needs such as housing may offer an opportunity to improve diabetes outcomes. One example is the Medical Legal Partnership (MLP) model which seeks to address legal needs that undermine patients' health by coordinating medical and legal services. MLPs can help patients access subsidies, avoid foreclosure or eviction, and secure disability benefits that are needed to support housing expenses (Sandel et al., 2010).

While legal assistance and other coordinated care may help some patients access housing that improves their health, these efforts do not address the profound shortage of affordable housing available to low-income Americans. Though more research is needed, our data suggest that access to rental subsidies can improve self-management, as several participants described the receipt of subsidized housing as turning points in their diabetes care. However, this potentially valuable resource is in short supply, with waitlists measured in years (Sard and Fischer, 2013). Expanding the federal rental subsidy program to cover all eligible households may offer an opportunity to address both housing and health needs, potentially reducing socioeconomic

disparities in chronic disease outcomes, as well as healthcare costs associated with preventable complications.

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