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Perspectives on an earn-a-bike intervention on transportation, health and self-esteem among men experiencing homelessness

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ABSTRACT

Introduction: Homelessness continues to be a pervasive public health and social justice issue across the nation. Unfortunately, some of the greatest needs of those experiencing homelessness are not met through traditional resources and agencies, which tend to focus on immediate needs such as food and shelter. One pressing—and often unmet—need of people experiencing homelessness is transportation. Access to reliable transportation is crucial to individuals experiencing homelessness who must locate shelter, employment, and medical services for their survival, all while maintaining relationships with loved ones. The specific aim of this study is to determine the bicycle's impact on mobility, physical health, access to health care, social capital, self-esteem, and employment. We are interested in how the participants used the bicycle and how the bicycle may impact perceived physical, financial, and emotional independence as they may contribute to increased perceptions of self-esteem.

Methods: In order to explore these outcomes, in-depth, open-ended interviews were conducted with 16 men experiencing homelessness who graduated from the earn-a-bike program offered through a local homeless outreach agency. The interviews were recorded, transcribed, and analyzed using Dedoose software.

Results: Study findings suggest that men experiencing homelessness experience several positive impacts from owning a bicycle and value the independence they gained. Maintaining employment, strengthened social capital, improved health and access to health care services, and increased self-esteem emerged as important outcomes for men experiencing homelessness who are bike owners. For example, men reported being able to stop taking prescription medications and reduce illegal drug use because of their bike use. New unresolved challenges include bike theft, lack of secure parking, and storage.

Conclusions: This study provides insight into a cost-effective and sustainable intervention to improve transportation, employment opportunity, health, social capital, and self-esteem in men experiencing homelessness. Findings also highlight challenges to bicycle ownership, some that can be mitigated by providing bike locks.

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1. Introduction

1.1. Homelessness

Homelessness is a widespread, chronic issue across the United States (US) (Council of Economic Advisors, 2019). As housing costs continue to rise, wages remain constant. In fact, the federal minimum wage in 2019 is the same as it was in 2009: \$7.25 an hour (US Department of Labor Statistics, n. d.). In 2019, a full-time worker earning minimum wage could not afford a two-bedroom apartment in any county in the US (National Low Income Housing Coalition, 2019). As a consequence, we are witnessing a growing homeless population with a unique and robust set of needs.

According to the US Interagency Council on Homelessness [USICH], the structural resources that must be leveraged to end homelessness are housing, employment, education, health care, and other social welfare benefits that assist an individual's wellbeing (2017) (US Department of Housing and Urban Development, 2015). However, in a large-scale needs assessment, people experiencing homelessness identified transportation, job-placement, job training, and affordable housing as their most pressing needs and also as the most difficult to attain (Acosta and Toro, 2000). In other words, there is a discrepancy between what resource agencies are providing and the perceived needs of individuals experiencing homelessness. As such, it is pertinent to explore interventions that address both those needs identified by policy makers as well as those directly identified by individuals experiencing homelessness.

Often, homeless policy initiatives and interventions focus on specific sub-populations such as veterans, those with disabilities, or children. Individuals not included in such targeted programs are often left without assistance. As such, organizations and interventions with a more general focus may play an important role in improving outcomes for individuals experiencing homelessness who do not fit into one of the aforementioned categories. For example, in Kansas City, Missouri, a homeless resource center piloted the earn-a-bike program targeting adults who are experiencing homelessness. During this program, individuals experiencing homelessness are eligible to "earn a bike" after completing a training program on basic bike maintenance and riding a bike safely in the city. This program may have significant potential to improve access to transportation as well as play a key function in the improvement of health and social outcomes.

1.2. Transportation

Persons experiencing homelessness frequently indicate that transportation is one of the most pressing needs for those trying to secure housing, and further, one of the hardest resources to attain (Acosta and Toro, 2000). Often research on the transportation needs of low-income populations focuses narrowly upon modes of transport to access opportunities like employment and healthful grocery stores. However, transportation is necessary for much more than purely utilitarian endeavors such as getting to work or getting food. Transportation enables individuals to be mobile and thus develop relationships, identities, and self-efficacy. Lack of transportation impacts one's well-being in pervasive ways. Empirical evidence links transportation to social exclusion (Church et al., 2000; Hine and Mitchell, 2001), poor health, education, and employment outcomes (Cass et al., 2005; Kenyon et al., 2002; Lucas et al., 2001; Lucas, 2012; Preston and Rajé, 2007; Stanley et al., 2011). Furthermore, when people are facing social exclusion and transport disadvantage, they have lower well-being scores than could be attributed to either factor in isolation (Delbosc and Currie, 2011).

1.3. Cycling and health

Bicycling for exercise and transportation are each associated with tangible health benefits. Bicycling for exercise is associated with weight reduction and obesity prevention (Wen and Rissel, 2008). Additional benefits from bicycling include a reduction in all-cause mortality, reduced risks for specific cancers, improved fitness, enhanced emotional well-being and improved high-density lipoproteins (Bopp et al., 2018). Evidence supporting the health benefits of bicycling for transportation is less conclusive because it is rarely studied as a single variable; it is most often coupled with walking for transportation. Bicycling for transport is a more intensive activity than walking; therefore, it can be concluded that biking for transport has many health benefits compared to other forms of physical activity (Bopp et al., 2018). The evidence suggests that interventions such as skills training programs, can impact self-esteem, self-efficacy, and housing stability, even when these are not explicit goals of the program (Nelson et al., 2012), leading us to believe that a bicycle intervention may have more impact than the explicit goal of increasing transportation.

1.4. Physical health, healthcare, & homelessness

It is well established that experiencing homelessness is linked with poor physical health (Brown et al., 2012; Lebrun-Harris et al., 2013; Schanzer et al., 2007; Sun et al., 2012; Turnbull et al., 2007). Individuals experiencing homelessness are exposed to an increased number of risks that contribute to their poor health, such as insecure shelter, food, and water, which thwarts their ability to maintain healthy hygiene. The bicycle has the potential to increase physical activity among people experiencing homelessness and in turn increase their overall physical health, reducing the need for other medical interventions (Randers et al., 2012).

Access to healthcare is predicated upon the timely use of personal health services to achieve the best health outcomes (Institute of Medicine, 1993). People experiencing homelessness face extensive barriers in accessing healthcare given increasing costs of medical services and insurance coverage, compromised trust in doctors and medical institutions, as well as recurring transportation problems (Martens, 2009). Given these barriers, coupled with the fact that people experiencing homelessness tend to suffer more frequent and serious ailments, many seek medical assistance via emergency treatment rather than preventative care. In a sample from California,

Kushel et al. (2002) found that homeless people were three times more likely to utilize the emergency department than the rest of the US population. Many of these individuals cited transportation as a barrier to seeing a doctor outside of the ER (Kushel et al., 2002). Improved transportation accessibility may assist the homeless in scheduling and attending preventive care appointments that have the potential to reduce emergency department visits. Transportation also assists in the formation and maintenance of social capital that helps bolster these health benefits.

1.5. Social capital

Social networks usually play an essential role in the well-being among individuals (Putnam, 2000; Klinenberg, 2002). Such social networks as one's friends, family, and loved ones comprise one's "social capital." There is growing research that suggests that a decreased sense of well-being among individuals experiencing homelessness may be due to a decreased social capital and increased social isolation (Biswas-Diener and Diener, 2006; Klinenberg, 2002; Johnstone et al., 2016; Putnam, 2000). Therefore, implementing interventions that increase social capital by introducing individuals experiencing homelessness to social support networks or providing resources to maintain and expand already existing networks are worthwhile avenues of programmatic expansion and evaluation.

Preliminary evidence suggests that biking and city designs that promote biking may help to improve social capital (Whitaker, 2005; Pucher and Buehler, 2012). People who live in neighborhoods that are pedestrian and bike friendly report higher levels of social capital (Leyden, 2003). Specifically, people living in pedestrian-friendly or mixed use neighborhoods, were more likely to know their neighbors, participate politically, trust others, and be socially engaged (Leyden, 2003). Inversely, car-centric communities, such as Kansas City, result in social isolation and reduced social interactions (Handy et al., 2008). Therefore, increasing opportunities for bicycling that in turn increase mobility, may lead to increased social inclusion (Bopp et al., 2018, p. 29). In fact, some research has argued that it is the physical activity itself that may account for both increases in social capital and health outcomes (Mohen et al., 2012).

In addition to the practice of bicycling itself, programs that promote adoption of bicycling may have their own unique effects on social capital. For example, in a study of immigrant women who participated in a bicycle education program, many indicated that the program provided a sense of belonging and the ability to form meaningful relationships (Mohammadi, 2019). Bicycling as an activity may perhaps be more important for vulnerable populations such as immigrant and homeless people because of the reduced social capital and increased social isolation experienced by such populations.

1.6. Self-esteem

Self-esteem is a holistic self-evaluation of our accomplishments, capabilities, values and bodies and other's perception of us (Tesser, 1991). Self-efficacy is the confidence in one's ability to perform a specific behavior or set of behaviors within a particular context and it develops from context-specific evaluations that shape one's ability to mobilize motivations, cognitive resources, and courses of action to accomplish a goal (Bandura, 1977, 1997). Individuals experiencing homelessness often experience low self-esteem, and as such, may be a contributing factor in keeping individuals from escaping homelessness (DiBlasio and Belcher, 1993).

Historically, the bicycle has been a transformative tool in one's independence and self-sufficiency (Horton et al., 2012). There is reason to believe the bicycle may produce similar transformative outcomes for individuals experiencing homelessness, whose lack of mobility, independence, connection, physical activity, and employment may all contribute to diminished self-esteem.

1.7. Employment & homelessness

Sustainable and meaningful employment is key to ending homelessness. Unemployment, underemployment, and low wages are all causes of homelessness (National Coalition for the Homeless, 2019). However, individuals experiencing homelessness face obstacles that make finding and maintain work difficult.

High self-esteem is strongly correlated with employment, particularly among men (Rosenberg, 1979; Najam et al., 1996; Waters and Moore, 2002). While this may be a multi-directional relationship, given that employment may increase one's self-esteem, it is postulated that those with low self-esteem may be less motivated to apply or follow through the employment process in the first place. Low levels of self-esteem and self-efficacy have also been shown to affect reemployment after one has lost a job (Guindon and Smith, 2002). Specifically, Solove et al. (2015), found that higher levels of self-esteem were associated with higher levels of reemployment after three months of unemployment. Therefore, identifying interventions that increase one's self-esteem may have a positive impact on reemployment. Belcher et al. (1991), found that professionals can often times prevent chronic homelessness by identifying low self-esteem in homeless people. DiBlasio and Belcher's (1993) findings suggest that homeless people need services to address their low self-esteem to escape homelessness, which may be accomplished through interventions that improve basic skills.

In addition to providing income and a structure to one's day, employment also increases one's social capital and support network as they are linked to others—such as colleagues and clients—through a codified role. As such, employment may have a direct impact on social support, which has been found to be a significant predictor of self-efficacy and self-esteem (Maddy et al., 2015). In sum, these initiatives may all be interrelated—building up a social support network can increase likelihood of employment and vice-versa, both of which could contribute to increased self-esteem and self-efficacy. Programs that assist in achieving employment have been found to improve health and well-being, particularly among those who are both unemployed and experiencing homelessness. However, without reliable transportation, many of these services themselves remain beyond reach to people without reliable transportation or housing.

1.8. Earn-a-bike program

Earn-a-bike programs are implemented across the nation with common goals of improving transportation, as well as providing basic bicycle maintenance and safety skills to underserved populations. Upon completing the education portion of the course, participants receive a bicycle free of charge. The earn-a-bike program studied for this research was delivered by *BikeWalkKC*, a local Kansas City pedestrian and bicycling advocacy organization, in coordination with a homeless resource center in Kansas City, Missouri. This course includes training on riding in a traffic-heavy downtown area, rules of the road, an introduction to maintenance and cleaning, and bicycle handling skills practice. Upon completion of the program, a bike and the appropriate safety equipment are provided to participants. Given that transportation, job-placement, job-training, and affordable housing are necessary for financial independence and stability, programs that affordably help homeless people meet those needs might be the most important to ameliorating the many other social problems associated with homelessness in the US (Acosta and Toro, 2000).

1.9. Literature gap

While there has been important scholarship exploring the impact of earn-a-bike programs upon youth, there is a gap in literature examining the effects of this program with adults and populations experiencing homelessness. While research evaluating the impacts of earn-a-bike programs upon low-income urban youth are limited, the results are promising (Hoffman et al., 2014; Kinnevy et al., 1999). For example, in one program evaluated, youth felt accomplished and empowered by the skills they acquired through the program (Kinnevy et al., 1999). Another study identified the program as establishing a safe environment for healthy behavior, potentially resulting in long-term behavior changes (Hoffman et al., 2014). While this research upon youth programs focused upon gained skills and confidence among participants, it suggests that there may be a more substantial impact among other social groups as well. Therefore, this study explores the impact of such programs on a broader range of social outcomes, including transportation, employment, health, and social capital.

1.10. Purpose

Specifically, the purpose of this study was to examine the effects of an earn-a-bike program in Kansas City, among adult participants experiencing homelessness. The study sought to examine how bike ownership, coupled with a bike safety training program, might impact the cyclist's (1) mobility, (2) physical health, (3) access to health care, (4) self-esteem, (5) social capital, and (6) employment status. These outcomes were evaluated through a qualitative study with previous participants from the program.

2. Methods

2.1. Recruitment

This research is based upon qualitative interviews with 16 men who had completed the adult earn-a-bike program in the past year. Each of these men had been experiencing homelessness at the time of participating in the program. Of the sixteen, ten had completed the earn-a-bike program in July of 2016 as part of a thirteen person cohort class. The other six men interviewed for this project had earned a bike through a similar program subsequently administered by local homeless resource center. Interviewees were asked to participate in the qualitative interview research study; each participant received a \$20 gift card for their participation in a 30-min interview. Interviews took place between August 2017 and May 2019. Based on the consistency of responses between the two cohorts of interviewees, the researchers believe theoretical saturation was achieved.

2.2. Data collection & analysis

An open-ended interview guide was developed by the authors to assess demographics and the impacts of the earn-a-bike program with specific focus upon the impact of the program upon health and wellbeing, access to healthcare and employment opportunities, and upon interpersonal relationships. It was explained to interviewees that participation was voluntary and that they could stop the interview at any time without penalty. Interviewees were provided with and walked through a consent for which they signed prior to the interview. Each interview was conducted in-person at either the homeless outreach center or at *BikeWalkKC*. Fourteen men participated in an individual face-to-face interview and two men participated in a face-to-face interview together. All procedures were approved by the Institution Review Board at BLINDED FOR REVIEW [IRB: # 17-157].

After completion of the interviews, audio-recordings were transcribed into Microsoft Word by skilled transcriptionists. Once the interviews were transcribed, they were coded for emergent themes across the interviews, with a particular eye toward identifying issues related to physical health, self-esteem, and employment using Dedoose software. These narratives were coded using a grounded theory approach; grounded theory is an inductive methodology used to generate theory that is grounded in substantive data (Glaser and Strauss, 1967). In practice, this involves analyzing the data without trying to prove a pre-defined theory or test a hypothesis (Neutens and Rubinson, 2002). Instead, the researchers must read closely for themes and concepts that emerge through open, or substantive, coding (Glaser, 2013). Theoretical or selective coding is then employed to organize concepts into "coding families" of higher abstract concepts (Glaser, 2013), so that the theory is developed as a product of such themes and concepts directly derived from the data. All names and identifying information have been changed in the article in order to protect the privacy and confidentiality of

participants. While all the interviews were coded by the lead author, a subsample was coded by both authors to produce an intercoder reliability measure. This process yielded a Cohen's Kappa of 0.73, indicating substantial intercoder agreement. As such, we have confidence that the coding scheme is reliable.

3. Findings

3.1. Demographics

Table 1 outlines our participants' demographic data. Men interviewed, ranged between 30 and 65 years of age, with a mean age of 46 years. Half of the participants reported their ethnicity as Black or African American and the other half reported White. At the time of the interview 62.5% of participating men did not have permanent housing and most of them had experienced between two and three episodes of homelessness. Relationship status varied among participants, with 25% reporting having an unmarried romantic partner followed by 18.8% reporting never married and another 18.8% reporting currently married. Lastly, the majority of participants completed high school/GED (56.3%) followed by completing some college (25%).

3.2. Mobility

After collecting demographic information, each interview followed with inquiring how frequently and for what purpose the participant used their new bike. The men responded that they used their bikes primarily to run errands such as grocery shopping, getting to and from work, and for recreation or exercise. Some men did note that they were limited how much they could purchase in a single trip because of their bike, but this challenge was overcome by using backpacks, making multiple trips, or simply buying fewer groceries. For example, Sal, a 33-year-old Black man who has three children explains how some of the challenges of using his government assistance are overcome by the use of his bike:

'Oh, when I go to get our food stamps we got Aldi's five blocks away from us. I gotta take my backpack, I be at Aldi's like four times a day, that same day. Getting stuff, riding my bike all the way back to the house, going back, go another round. Yeah, bikes come in handy.'

Earl, a 54-year-old Black man similarly discusses the conveniences of his bicycle, how this new form of transportation has become his "way of dealing with life":

'Well, I be on it every day going to the grocery store or whatever I need to do. That would be my way of dealing with my life.'

For Sal, independence was the greatest benefit of the bike. As he explains,

'I mean, you can do everything with a bike. Like, all them people out there talking about, "Oh, can anybody help me?" and "I need." Okay, get yourself a bike. This is all you need is a bike. You can go out there and do anything you want, go get your information, go for a job. That's how I got my job, for real, is my bike.'

Symbolically, we can see how the bicycle affords freedom and independence that may otherwise be absent from the lives of men who experience homelessness. The perception of control over one's life has the potential to impact other outcomes, such as employment, social connection, as well as improved physical and emotional health.

Table 1
Demographic information for interview samples (n = 16).

Age			Family status		
18–29	0	0%	Never Married	3	18.8%
30–44	6	37.5%	Girlfriend	4	25.0%
45–59	8	50.0%	Married	3	18.8%
60+	2	12.5%	Divorced	5	31.3%
			Widowed	1	6.2%
Race			Education		
Black/African American	8	50.0%	Less than High School	1	6.3%
white	8	50.0%	High School/GED	9	56.3%
Current Permanent Residence			Some College	4	25.0%
Yes	6	37.5%	Completed College	2	12.5%
No	10	62.5%	# of Homeless Events		
			One	8	50%
			Two	3	18.8%
			Three	3	18.8%
			Three or More	2	12.5%

3.3. Changes to physical and emotional health

While we specifically asked about physical health changes later in the interviews, the men often volunteered this information at the beginning of the interview when we asked them how they used their bikes. They offered several unsolicited benefits, such as good exercise, saving money, keeping connected socially, or clearing the mind. For example, Bill describes how his friends and family ask why he began biking,

‘They say, “Man, why are you riding a bike? Why can’t you ride a bus?” Look, this is a machine. A bicycle. One thing, it will keep you in shape. It’ll get you from point A to point B as long as you take care of her..’

Bill explains how having a reliable personal mode of transportation alleviated considerable stress and he also gained meaning from taking care of his bike, insuring continued reliability. Similarly, Jamal highlights that using a bicycle for transportation was not the norm among his friends and therefore he was initially ostracized for using one to get around. However, he dismissed their rebuffs, highlighting the physical and logistical benefits of bike ownership. He is proud to be able to get around quickly with few barriers as the bike affords mobility at a low cost, without having to deal with traffic, and with positive health benefits:

‘It’s so much easier to take a bike than driving. One, you save on gas. Two, you have less stress, and then three; you don’t have to worry about anything. Just go.’

The participants were asked to rank their physical health on a scale of one to 10, one being poor health and ten being great health. Over two thirds of the men indicated an increase in their physical health after the acquisition of the new bike, often by three or more points. In fact, two men rated their health as an 11 or 12 on a ten point scale after earning a bike. Norman, a 56-year-old white man who experienced an increase in health, described how after suffering a stroke, he was unable to walk. The bicycle offered him an alternative:

‘Yeah, and I also used [my bike] for a walking tool. In 2011, I suffered a stroke, so this has helped me with my lack of use of my right foot. So this has given me exercise to build strength back into that, which has helped a lot. ‘... ‘When I first started out I didn’t have a wind to go as far. I could go great downhill but the up hills were a challenge. But as I rode, the longer I rode, I stopped less frequently and was able to climb that hill later on.’

Norman further explained that he required fewer medications since regularly using his bike. Overall, he experienced a marked improvement to his health—gaining stamina and strength as well as reducing the need for medications. Similarly, two other men reported that they required fewer medication or services after getting a bike. They each attributed these changes to healthier lifestyles where they rode a bike for transportation. Norman explains,

‘I was taking a lot of calcium pills, I’m off of those. I was taking gabapentin for the numbness in the foot and in the ankle, I’ve reduced that to nothing. Yeah, [the bike has] helped me a lot.’

Similarly, Charles, a 56-year-old Black man, explained how the bicycle allowed him to get more physical exercise.

‘I ride my bike. I go to the park, I do pushups, sometimes I lock my bike up and walk around the track or something like that there.’

While we did not specifically ask about substance use, two men noted curbing unhealthy substance use because of their bike use. Charles, who has been housing insecure for 10 years, says that his biking has reduced his substance use as it offers him another outlet to manage stress and occupies his time, so he is able to distract himself from smoking:

‘My health has changed a lot. I don’t smoke as much as I used to.’

Similarly, for Mark, a 49-year-old Black man, explains how his passion for bikes has helped him curb problematic substance use:

‘It [the bike] also helps me with an addiction that I used to have, well still do, but it helps me tremendously with my addiction, because I look at my addiction and I take it very seriously. There’s people that, I’m not going to say names with people that has an addiction that’s doesn’t have a passion that takes over that addiction, well I do, and that’s bicycles, that’s building bikes, its riding bikes. You know, whenever I have the urge to go into my addiction, I look at my bike every time, every time, and I jump on my bike....I don’t jump into the addiction. This is, it’s, this is the experience right there. This is tremendously awesome for me. Yeah. It really works every, every moment.’

Substance use can have a significant impact on one’s ability to focus at work, as well as maintain good physical health and self-esteem. Using the bike as a tool to overcome drug use may be a novel approach to address many issues experienced by individuals experiencing homelessness.

Overall, participants perceived that bike use improved their health. Specifically, 13 of the 16 men ranked their health as better after having the bike than before. Two men believed their health remained the same. One man indicated a decline in health since obtaining the bicycle; however, he noted that if it wasn’t for the bike it would have declined more significantly, hence his decline in health may be attributed to external factors.

3.4. Improved access to healthcare

Access to healthcare was another impact of the bicycle upon the participant’s health. Six men specifically discussed how much easier it was to get to a clinic or other health care services with a bike. For example, Mark said he would not have gone to the dentist if he did not have his bike for transportation. Another man, George, a 45-year-old white man explains his challenges in getting his medication for depression,

'And there were times where I just thought, I don't have a reliable way to get there, and I have to do this every month. So, is it really worth it? And in the long run it is worth it, because having my mood stable is incredible gain for me. When you don't have the transportation, you ask yourself those questions.'

Likewise, Steve, a 65-year-old divorced white man, explains how his bike helped him access secondary healthcare services,

'It's made it easier, easier for me to get to, you know, secondary services, pharmacy, things like that. And when I need to go get my prescriptions, that type of thing'

Depression can be debilitating to one's motivation and self-esteem. When there are external barriers to receiving appropriate treatment and support, these symptoms can thwart efforts to get better. The bicycle is perceived to have a positive impact in this respect. The bicycle also helps men receive the services they need through homeless shelters and other agencies:

'Being able to get here [homeless outreach agency], and establish a relationship with them on a daily basis was ... There's nothing that I can say to describe that.'

Access to bicycles as a reliable form of transportation enables men to maintain connections to their support networks. This included access to regular healthcare providers and resources, which may have resulted in improved health, but also perceptions of self-efficacy and self-esteem.

3.5. Improved self-esteem

Men expressed feelings of low self-confidence prior to earning a bike, often feeling isolated or overly reliant on the bus or upon others for support. As Bill describes,

'I felt kinda left out because I had no way to get back and forth sometimes 'cause I only ride the bus or I only had to walk, and then it got too far and my legs started hurting.'

For Bill, being isolated from loved ones or having less control over his mobility and schedule contributed to feeling "left out" and alone. Harrison also described being tethered to a bus schedule as feeling "chained to a schedule" and therefore unable to do the things or see the people he wanted to

'Yeah, I was always a pretty confident guy, but when you know that you can get up and be somewhere, now I'm more prone to say "You know what, I can do that. I can work that in. Or I can stop on my way." Where I'm not like, how do you say, just kind of chained to the bus. Takes me to my location, I get off here, and if I veer from that then it's gonna mess up my whole day. I'm not so much chained to a schedule.'

Once Harrison had a bicycle of his own, he gained confidence in his ability to set his own schedule and connect with loved ones. It was common for the men to experience gains in confidence as a result of their increased mobility, extension of travel, and greater self-reliance. Charles describes how the earn-a-bike program 'gave [him] more confidence and more stability to get out there and don't be scared to go a little farther out there in the world.' He describes how he "was kind of a closed up person, but I'm opening up to more of the world out there.'

The men often linked self-esteem and confidence to physical health and ability. After noting their increase in confidence they would share stories of gains in physical strength and fitness. For men, physical strength is associated with prescribed societal gender roles. As such, gaining strength and endurance may impact their perceived sense of masculinity as well as self-esteem. For example, when Mark was asked about his self-esteem, he declared:

'I feel 100% more confident, you know, after riding, you know, for an hour, two hours, and sometimes I'll ride for four hours. You know, I really want to make sure that my body is fit. Cause I'm getting older.'

For Mark and others, the bicycle provided confidence in their ability to bike, take care of their health, and maintain social relationships. Similarly, for Jamal, a 43-year-old White man, the bike offered him symbolic independence that ultimately resulted in financial independence as well, two outcomes that can affect one's physical and mental health in powerful ways.

3.6. Increased social capital

Several men mentioned how owning a bicycle has positively impacted relationships with friends and family. For example, Isaac, a 46-year-old Black man who has three children, said that he regularly rides with his wife to run errands or just have fun. Harrison described how he rides his bike with his grandchildren. For Isaac and Harrison, the bicycle offers a new shared activity with loved ones. Sal describes how he rides around with grandchildren. He notes how,

'We ride around the neighborhood, ride around 'cause we stayed over by Cliff Drive, so we stayed close to parks and stuff. So I used to take him, but my little one, I'm gonna have to get a basket to put on my bike to take him around.'

Mark found his bike to be a tool to strengthen his relationships with friends. He explains,

'I got a roomie. Uh, he is awesome. He's a good guy. And when I got the bicycle job, starting doing bikes, I built him a bike and he rides his bike just as much as I ride my bike and we just the same, you know what I mean? We've got a friendship relation and it grew and still grows because of the bike we ride through the park and go fishing'

In addition to relationships with family, men described how the bicycle helped them form new relationships with co-workers and friends. Martin, a 36-year-old White man who has experienced three extended episodes of homelessness, says,

'I guess in a way co-workers at the time were friends, and being able to go to work, and have that relationship with them. If I were to lose the car, and not had the bike to get back, and forth to work I wouldn't have been able to not only work, but establish friendships with them.'

Having a bike also incentivized men to break out of well-worn routines in order to explore new activities or meet new people, increasing one's social capital. For example, Harrison, a 63-year-old Black man, explains that,

'Having a bike gives you motivation to get out and go experience other things. You might hear of some event happening, and it's free, and it maybe something that peaks your interest. If you have to dread getting there and getting back once you got there, it tends to deter you from making that decision. Now, it's nothing to get on the bike and ride over and mingle, meet people that I normally wouldn't meet. Run into people who are riding along. You find out, the more you ride, the more people that are out there riding. It's like you really don't notice until you're part of the group.'

The bicycle has enabled him to form relationships with new people, attending more events and likely improving both social and emotional capital. This support also provides the means to pursue financial capital in the form of employment.

3.7. Access to employment opportunities

Newly acquired bicycles allow participants to travel to and from work. For a number of them, the bike made the commute easier and more efficient because the alternative was long walks or inconvenient bus stops and routes. The men also noted using the bike in combination with the city bus, by using the bike racks installed on the bus. For example, Bill, a 56-year-old Black man who dropped out of school in the 10th grade rides his bike to alleviate pain from long walks.

'Well, the reason why I ride my bike just back and forth to work. I stay about 40 blocks away both ways. Usually I ride it back and forth to work 'cause see sometimes my calves hurt so bad 'cause when I walk I be so sore. ... I just ride it back and forth to work, then I park it till next day, then I get up and make sure I ride it again.'

Prior to owning a bike, Bill would walk a considerable distance to work, which made it difficult to do his job working at the homeless resource center, which also required him to be on his feet all day, and work on bikes at the onsite bike shop among other things. The bike saved him time and pain from his commute. Similarly, Harrison, a 63-year-old Black man who has completed some college and is currently married, discussed how the bicycle allowed him to do multiple things in one day, such as "job interviews, to go to the grocery store, things like that." Owning a bicycle also broadened the geographic area in which the men could seek out or maintain employment. Harrison discussed how he was able to go on more interviews because he can now travel further distances reliably.

'I would say that because, again, [the bike] affords me more opportunity. It expands the areas in which I can look for work and also it gives me ... I'm trying to search for words. It gives me that peace of mind. I know that I can get here. I don't have to be dependent on someone's generosity to give me a ride to work. Or putting someone out like, hey would you do me a favor and run me over here. It gives you a little independence. You feel better about yourself.'

Financial dependence is something prioritized by agencies working with the homeless, but the sense of individual independence and control are something that appear to be offered by the bike. Two of them men described how their bike helped them maintain their jobs. One of the men, Harrison, was employed prior to earning a bike, but had lost his car when it was towed from work downtown and he could not afford to recoup it. As a result, he was left without reliable transportation to work. The bike remedied that problem,

'Because there were days when one bus may be running a little late, and the other might just be a little bit ahead of time, and if you don't have your bike you're not gonna catch that bus ... So it made it a lot easier. Like I said, gives you more options. I could leave about five or ten minutes later than I would have to leave normally. Instead of waiting on a bus to transfer and catch another bus, I could just go straight to the bus that I needed to catch in the first place.'

3.8. Challenges of bike ownership

Overall, the participants we spoke to described the bikes as a positive addition to their lives – it reduced stress and anxiety by affording them independence and reliability. However, there were a number of challenges to bike ownership. Most significantly, bike theft was a common concern. Three of the men interviewed had their bikes stolen since participating in the program. Charles describes how his bike was stolen.

'I went to a convenience store and no more than two seconds to get a pack of cigarettes, and I come out, and my bike was gone.'

Further, several men discussed the challenges of riding around town. While some men felt there were a decent number of bike lanes and places to lock up bikes while running errands, others thought there was too few of both. Norman wishes that there was,

'a little more consideration from the drivers. I mean they have a pretty good set bike route and everything but sometimes the vehicles don't tend to obey those.'

Similarly, George explains that

'You're really not supposed to ride on the sidewalk. [However] That place where you feel safe is riding on the sidewalk. And there's just very few bike lanes.'

Men experiencing homelessness learn to navigate this new world of biking that was previously an inaccessible form of transportation.

Lastly, some men noted a lack of low-cost resources available to them to repair, replace, or purchase bike parts and accessories.

While they did note that the homeless resource center had a bike shop with basic parts and tools available, it was not always accessible. For example,

'well with my limited income, getting the accessories for the bicycle, uh, a good dependable lock so that somebody can't steal it. Most of the places in the downtown area understand the situation with most of the homeless and they have made accommodation for a lot of stores ... and repair services for flat tires. Um, you know, it's great if you're associated with hope faith here because they do have a guy that takes care of tires and things like that, but you know, he's off couple of days a week and, you're not always available to here, to be able to, to get it repaired.'

4. Discussion

In this study, we set out to determine the impact of bicycle acquisition upon the physical health, access to health care, social capital, and employment of individuals experiencing homelessness. We were interested in how the bicycle was used and how it impacted perceived physical, financial, and emotional independence. Based on our interviews we found that the men who experience homelessness nearly uniformly experienced increases in physical health, independence, and self-esteem. While not all participants had positive changes in employment status, nearly all of the men who were looking for work noted the increased geographic region they could search for work due to the bike. The participants also saw increases in social capital and access to healthcare, although perhaps less impactful than the previously described benefits.

It is well established that people experiencing homelessness have lower quality health than those with stable living situations (Brown et al., 2012; Lebrun-Harris et al., 2013; Schanzer et al., 2007; Sun et al., 2012) and are at higher risk for both morbidity and mortality (Hwang, Wilkins, Tjepkema, O'Campo and Dunn, 2009; O'Connell, 2005). Given this disparity, it is noteworthy that increased physical health was consistently included in the men's discussion. Participants recognized the impact bicycling could and did have on their physical health. When asked broadly how they used their bikes, many participants noted the physical benefits of riding and helping them to stay in shape. Thirteen out of the sixteen men interviewed said that their health improved since owning a bike, often attributing the improvement directly to the act of cycling itself. For some that improvement was the result of cycling to grocery stores or work, but for others it also included cycling as recreation.

While most of the men interviewed utilized health care services both before and after earning a bike, many did note that owning a bike made it easier to continue with their clinic visits and to get their necessary medications. By reducing this barrier to healthcare services, frequent visits to the emergency department, which is often over-utilized by the homeless population, may be reduced due to what would be a previously neglected health issue. Notably, 3 of the 16 men noted their reduced need for medical interventions (i.e. tests and medications), which could be an indication of a measurable health benefit, albeit limited in scope.

Riding one's bike increased social capital for these men in a variety of ways. Previous research has similarly linked bike-supportive environments to improved social interactions and social connectedness (Litman and Doherty, 2009; Whitaker, 2005). Men discussed biking with a partner, children, friends, and co-workers—sometimes for transportation but also often for recreation. Interestingly, several noted developing new friendships as a result of their bicycle. The ability to get to work consistently and reliably allowed many to establish relationships with co-workers. This was often credited to having bike access. Participants also experienced a sense of comradery with other bicyclists on the road, noted by "hellos" and instances of brief conversation.

Owning a bicycle allowed men to find new jobs and maintain existing ones. The bicycle expanded the geographic radius in which they could both look for jobs and reliably maintain a job. Becoming self-reliant and extending one's geographic mobility may have also positively impacted these men's self-esteem, given that prior research has found a strong correlation between self-esteem and employment (Bandura, 1997; Guindon and Smith, 2002).

Given that this was a pilot study with a small sample size, it would be beneficial to replicate with a greater number of interview respondents. However, such recruitment can be difficult, given the challenges in tracking down individuals without a permanent residence or reliable mode of contact, in addition to the fact that the earn-a-bike program was just launched in 2016. The earn-a-bike classes are small and given that the interviews took place one year after the program, it was often difficult to track down eligible interviewees. Adding to this challenge, people without reliable housing tend to be more transient and lack a consistent means of communication. As such, it is often more difficult to follow up with them. However, we are confident that we reached some level of theoretical saturation based upon the consistency of responses and the high levels of participation from the first cohort. Based on these preliminary findings, we plan to interview more graduates of earn-a-bike programs to elicit a broader range of responses.

5. Recommendations & conclusions

These in-depth interviews provide evidence to support non-traditional, low-cost interventions such as earn-a-bike programs, which directly address transportation issues among those experiencing homelessness, and also are likely to improve participants' health and self-esteem. These ancillary achievements related to health and self-esteem are correlated with gainful employment (Carlier et al., 2014). Therefore, we recommend that the intervention be more broadly adopted by homeless resource centers, especially in urban areas, like Kansas City, Missouri. Often, organizations such as *BikeWalkKC*, will host earn-a-bike programs available to the broader community, but it may not be well known to the homeless community. As a result, we also suggest that homeless resource centers or the community organizations that provide earn-a-bike programs specifically target homeless populations or to people who work directly with the homeless to heighten their awareness of such programs. This intervention is likely best used in conjunction with other homeless services to improve self-dependence, health, and help maintain employment as demonstrated in this case study.

The men reported bike theft, lack of bike parking and bike lanes, as well as limited repair options or ability to pay for bike locks as challenges they encountered while adapting to their new mode of transportation. As with other urban environments, Kansas City is improving their biking infrastructure, though still has many needed improvements to protect bicyclists. For example, the city recently passed a complete streets ordinance, ensuring safe, reliable, and connected multimodal transportation system for all users, including bicyclists. As a result of this ordinance, more bike lanes are being added throughout the city, but with a car-centric culture these changes take time. The city also recently reduced the cost of bike rack permits to be obtained by businesses, which may reduce the barriers for businesses to install bike racks. Increased number of bike racks and the distributing bike locks with each bike earned, which is a low-cost solution, can further mitigate challenges such as bike theft. Policies, such as these, are important to making bicycling a sustainable form of transportation.

Overall, having access to a bike far exceeded the role of increasing transportation. The men gained self-confidence, enhanced their relationships, improved physical health, and were able to maintain or gain new employment. As such, the bicycle might offer a holistic approach to improving the well-being of homeless persons. Future research should expand on concepts that were not of focus in this research, but emerged thematically. Notable topics that emerged include, the use of the bike for exercise, reduce drug dependence, and the mental health benefits achieved through the earn-a-bike program.

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CRedit authorship contribution statement

Amanda Grimes: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing - original draft, Writing - review & editing, Funding acquisition. **Michelle Smirnova:** Conceptualization, Methodology, Writing - original draft, Writing - review & editing.

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