(Con)testing stigma against wheelchair users in built environments

By

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To my amazing wife, Brenda Detty

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CHAPTER 1

INTRODUCTION

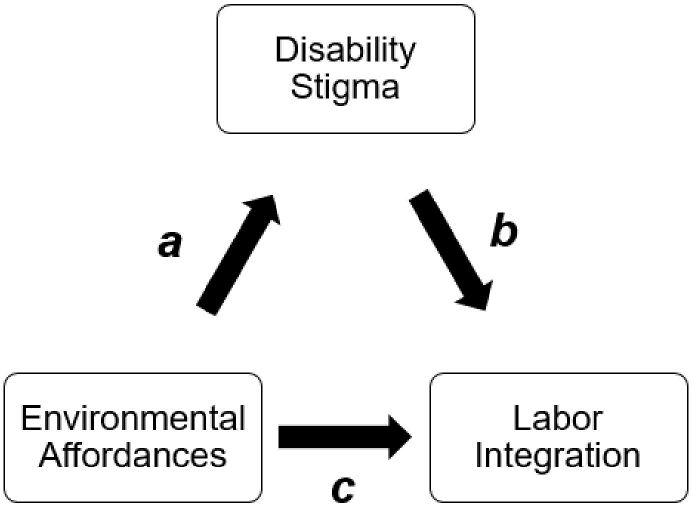
Although community and environmental psychologists have examined stigma against mentally and intellectually disabled people for decades, we rarely extend this analysis to wheelchair users. In addition, we tend to overlook the impact of built environments, or human-made spaces, on the degree and nature of stigma against wheelchair users. However, cross-disciplinary work led by disability theorists suggests that built environments both produce and challenge stigma against wheelchair users through the possibilities for action they allow (i.e., afford) and deny (i.e., disafford) (Gibson, 1979; Wittkower, 2016). Below, I provide the results of a dissertation designed to contribute to this work in three ways. First, I complement existing qualitative studies by measuring the quantitative relationships between stigma against wheelchair users and features of built environments. Second, I examine the extent to which these relationships limit work opportunities for wheelchair users and other mobility-disabled people. Finally, I extend key concepts from disability studies to the US region of Appalachia. This centers an intersectionally-erased group (i.e., Appalachian wheelchair users) while enhancing concepts from both disability and Appalachian scholarship (Crenshaw, 2016).

I present the chapters of my dissertation in the following order. Chapter 2 provides the theoretical framework that guides my dissertation. In it, I first review literature documenting stigma against wheelchair users. I next argue that built environments support stigma against wheelchair users through affordances and disaffordances. This claim relies upon insights from disability studies, science and technology studies, and ecological psychology. Finally, I present evidence that wheelchair users contest stigmatizing built environments by altering their features in practical and political ways.

Chapter 3 tests the relationship between affordances in built environments and stigma against wheelchair users. It specifically addresses discrimination, or the behavioral component of stigma (Link & Phelan, 2001). I begin this chapter by reviewing evidence that inaccessible transit options, sidewalks, and homes disafford community life for wheelchair users. Following this, I discuss literature indicating that wheelchair users experience discrimination in US housing markets. I then share the results of a multilevel study that examined the relationships between community affordances that misfit wheelchair users and housing discrimination against wheelchair users and deaf or hard of hearing individuals. This study utilized data from the American Housing Survey, the National Transit Database, Google Street View, and the US Department of Housing and Urban Development.

Chapter 4 argues that the stigma produced by inaccessible built environments may produce secondary challenges for wheelchair users and other mobility-disabled people. Specifically, I claim that it might impede opportunities for mobility-disabled people to participate in the labor force. I begin this chapter by reviewing literature on the connections between built environments, stigma, and mobility-disabled people's work opportunities. Following this, I share the results of a study that examined the relationship between affordances and stigmatizing attitudes. Using data from US Census records, the National Transit Database, and Project Implicit, this study also considered whether stigmatizing attitudes among a community's residents mediate the relationship between affordances and labor integration for mobility-disabled people. Figure 1 shows the relationships theorized by this study.

Figure 1. *Relationships Between Environmental Affordances, Disability Stigma, and Labor Integration*



Chapter 5 shifts attention from stigmatizing built environments to the ways in which wheelchair users resist them. In it, I considered the ways in which an intersectionally erased group, wheelchair users in the US region of Appalachia, alter affordances individually and collectively. I begin this chapter by describing Appalachia and the historical use of disability labels by those outside the region to oppress those within it. After reviewing the ways in which disabled Appalachians resist their oppression, I explore individual and collective 'fooling' as Appalachian forms of critical technoscience. Finally, I share the results of a qualitative study that explored fooling among Appalachian wheelchair users.

Positionality

Before continuing, I first need to clarify my relationship to the communities that this document addresses: wheelchair users and residents of Appalachia. I do not have any physical disabilities and do not use a wheelchair. I became interested in disability justice after reading many compelling books and articles written by disabled scholars and activists. Disabled friends and colleagues then guided me as I attempted to identify my role as a non-disabled person writing about disability issues. Although I do not identify *as* disabled, these experiences have led me to identify *with* disabled people. That is, I personally and politically align myself with the interests of disabled people (Schalk, 2013). I have attempted to keep this position in mind while writing my dissertation, and readers can judge the degree to which I have succeeded.

My relationship to Appalachia is more direct than my relationship to the disability community. I was born and raised in the rural, Appalachian town of Chillicothe, Ohio. My mother's family has inhabited the region for many generations, and I have traveled extensively throughout Kentucky, Tennessee, Virginia, and West Virginia. I culturally identify as Appalachian and speak an Appalachian dialect. Nonetheless, any Appalachian scholar will quickly note the region's variety of places, people, and political histories. Although writing Chapter 5 gave me the satisfaction of writing about my own people, I hope it also introduces a properly complex image of Appalachia to my readers.

Conclusion

Several researchers call for collaborations between disability studies and community and environmental psychology. Dowrick and Keys (2001) suggest partnerships between these disciplines based in shared values and methods. Balcazar and Suarez-Balcazar (2016) highlight community integration, employment, and transitions out of high school as topics amenable to these partnerships. Runswick-Cole and Goodley (2013) argue that disability scholars can help community psychologists reframe individualistic understandings of resilience in more relational and critical terms. Finally, White (2010) urges community psychologists to build trust with disabled participants through participatory action research. While I hope my dissertation will foster connections between disciplines, its most important purpose is to contribute modestly to the disability justice movement and the liberation of all disabled people. In the words of the late Stacey Milbern (2019), "There is a lot to do and it's going to take all of us."

CHAPTER 2

(CON)TESTING STIGMA AGAINST WHEELCHAIR USERS IN BUILT ENVIRONMENTS

Introduction

Although stigma is an important concept among community and environmental psychologists, we rarely consider its prominent place in the lives of wheelchair users. Likewise, community and environmental studies of built environments, or human-made spaces, tend to overlook the role these environments play in maintaining stigma against wheelchair users. Given stigma's role in producing material outcomes, these oversights place an upper limit on our capacity to promote disability justice. Following disability theorists, I contend that stigma and built environments co-produce each other (Garland Thomson, 2011; Hamraie, 2017). As such, community and environmental psychologists must address both if we hope to influence either in a meaningful way.

This paper has two parts designed to respond to the issues raised above. Part 1 reviews literature on stigma against wheelchair users for interested community and environmental psychologists. Disability scholars may also find its theoretical components useful to their work. Readers may note that this paper discusses the experiences of wheelchair users while neglecting those of other disabled people. In this way, it repeats a weakness of past work and deserves the same criticism that such work has received (Ben-Moshe & Powell, 2007; Guffey, 2018). Although the choice to center wheelchair users allows for a more focused analysis, I encourage readers to push beyond the limits of that choice.

Part 2 of this paper discusses how built environments support stigma against wheelchair users through the possibilities for action that they offer (i.e., afford) and deny (i.e., disafford) (Gibson, 1979; Wittkower, 2016). In it, I use concepts from community and environmental psychology to extend ideas from disability studies. Following this, I review research indicating that wheelchair users contest stigmatizing built environments by manipulating their dis/affordances. In doing so, they demonstrate overlapping concepts described by both community psychologists and disability theorists. (Dokumaci, 2016; Hamraie, 2015; Zimmerman et al., 1992). Finally, I consider ways in which community and environmental psychologists might advance the goals of disability researchers and disabled people in general.

Part 1: A Review of Stigma Against Wheelchair Users

Goffman (1963) used the term stigma to describe the use of individual or group attributes to disempower and devalue people in social interactions. According to Goffman, stigma attaches to three kinds of attributes: physical features, perceived character traits, and group identities. It also takes forms ranging from overt to subtle acts. Black feminist scholar Patricia Hill Collins (2002) highlighted how disability stigma interacts with stigma against other devalued identity groups to create a *matrix of domination*. Crenshaw's (1989) work further explains that wheelchair users with multiple devalued identities experience intersectional, or compounded, oppression. For example, a wheelchair user who identifies as a queer, Black woman will experience stigma differently and more severely than one who identifies as a heterosexual, White man. Although this paper does not attempt a full discussion of intersectional disability theory, Erevelles & Minear (2010) provide an excellent introduction.

Sociologists Link and Phelan (2001) extended Goffman’s concept, defining stigma as the co-occurrence of several processes enabled by group power differences. These processes include labeling, stereotypes, separation, status loss, and discrimination. According to Link and Phelan (2001), *labeling* occurs when an empowered portion of society identifies a human characteristic and uses it to classify people into ‘normal’ and ‘deviant’ groups. Labels acquire *stereotypes* when a society links them with arbitrary and often negative characteristics. Once a group’s negative stereotypes become taken for granted, other groups seek *separation* from them to avoid association with their presumed inferiorities. Separation rooted in effective stereotypes leads to *status loss and discrimination*, in which stereotyped groups are devalued and excluded. This occurs at the individual level when one person discriminates against another. It also occurs at the structural level when accumulated institutional practices restrict opportunities for a stereotyped group (Link & Phelan, 2001).

Community and environmental psychologists frequently examine stigma’s role in the lives of people with mental and intellectual disabilities (e.g., Corrigan et al., 2000). In addition, representatives of these fields conducted early research into stigmatized conditions such as chronic fatigue syndrome and multiple chemical sensitivities (Jason et al., 1999; Jason et al., 2000; Jason & Richman, 2007). Although few researchers in these fields specifically consider stigma against wheelchair users, their work shows how that stigma impacts experiences with sexuality (Prilleltensky, 2004a), pregnancy (Prilleltensky, 2003), parenting (Duvdevany, et al., 2008; Prilleltensky, 2003; Prilleltensky, 2004a; Prilleltensky, 2004b), self-advocacy (Balcazar et al., 1990; Fawcett et al., 1994; White et al., 2014), and community participation (McDonald et al., 2015; Radermacher et al., 2010; White, 1992; White, 2010). Building on the work of these authors, the following sections review wheelchair users' experiences with labeling, stereotypes, separation, status loss, and discrimination.

Labeling

Although physical and mental differences have been part of the human experience since the beginning of our species, not all differences receive labels. As Scheff (1975) notes in his writings on madness, societies reserve these for individuals who deviate from dominant norms. For example, as Western states industrialized, they began to apply variants of the label 'disabled' to physical and mental characteristics that were incompatible with norms supporting capitalism (Schweik, 2009). This connection to capitalist production continues to influence disability labels in Western states. For example, the United States Social Security Administration defines disabilities as specific medical conditions that prevent employment (SSA, 2019). Although wheelchairs did not become popular medical devices until the American Civil War (Guffey, 2018), newly capitalist states quickly assigned the disability label to bodily characteristics now associated with wheelchair use.

In 1937, Herbert Everest and Harry Jennings patented a foldable metal wheelchair that allowed both indoor and outdoor use and fit into vehicles for easy transportation (Guffey, 2018). This invention transformed wheelchairs from medical devices only used in hospitals to tools for community engagement. Soon, veterans returning from World War II began to use Everest and Jennings' wheelchairs to reenter their pre-war communities (Guffey, 2018). As they did so, they realized that local built environments frequently impeded their daily goals. In the late 20th Century, disabled thinkers built on this insight by shifting the meaning of the word 'disability' from impaired bodies to disabling environments. Adherents to this social model of disability claimed that people with impairments requiring wheelchairs remained non-disabled until physical and social spaces failed to accommodate them (Oliver, 1990; UPIAS & DA, 1976).

The social model remains popular in many academic and policy circles. For example, the World Health Organization defines disability as a mix of bodily functions and social and environmental barriers to life activities (WHO, 2015). Notably, the government of Bath, England realized the importance of removing environmental barriers to wheeled mobility in the mid-18th Century. This led them to adapt the local built environment for use by outdoor wheelchairs later called ‘Bath chairs’ (Guffey, 2018). The fact that Bath’s economy depended on wealthy disabled people who used the city’s spas for medical treatments may have inspired its innovative spirit.

As the 20th Century ended, critics of the social model argued that its focus on disabling environments failed to take embodied experiences into account and drew overly sharp distinctions between disability and impairment (Shakespeare, 2013). Such criticisms led critical theorists to reclaim the disability label as a positive identity. Psychologists developed the diversity model of disability, which among other principles insists on identity-first language (e.g., wheelchair user) instead of person-first language (e.g., person who uses a wheelchair) (Andrews et al., 2019; Mackelprang & Salsgiver, 2016). Disability theorists McRuer (2006) and Kafer (2013) reclaimed the derogatory term ‘crip’ to highlight the political dimensions of disability labels. In addition, writers with mobility disabilities began using the disability label to engage in activism through social media, websites, and podcasts (Barbarin, 2020; Thompson, 2020; Wong, 2020). Their work continues to highlight the contested nature of the disability label and examine its intersections with other identities.

Beneath each of these efforts to reclaim the disability label lies the disability justice framework (Sins Invalid, 2019). Formed by a collective of disabled, queer and trans femmes identifying as Black and Indigenous People of Color, disability justice claims the disability label as a rich and intersectional identity. Its followers seek cross-movement and cross-disability solidarity and insist that disabled people lead responses to their own oppression. Finally, disability justice rejects capitalism and forms of activism that internalize its focus on independence and productivity. As a result, its adherents collectively pursue liberation and community access through sustainable political action. (Sins Invalid, 2019).

Stereotypes

Stereotypes about individuals labeled as disabled range from clearly negative to seemingly benevolent (Nario-Redmond et al., 2019). On the negative end of this spectrum, data from experiments and ethnographic interviews suggest that non-wheelchair users perceive wheelchair users as incompetent (Louvet, 2007; Papadimitriou, 2008). Although activities designed to simulate wheelchair use attempt to counter this perception, they may increase it instead (Nario-Redmond et al., 2017). Additional studies using survey, interview, and focus group data find that non-wheelchair users perceive wheelchair users as physically weak, bitter, and unable to parent well or perform sexually (Duvdevany, 2008; Marini et al., 2011; Papadimitriou, 2008; Prilleltensky, 2003; Prilleltensky, 2004a). Participants in these studies resist negative stereotypes regularly. For example, a quadriplegic man in one study consciously engaged in physical fights to counter the stereotype that wheelchair users are physically weak (Papadimitriou, 2008).

Seemingly benevolent stereotypes about wheelchair users often rely on *supercrip* narratives, which depict wheelchair users as inspirational characters who ‘overcome’ their disabilities (Clare, 2015; White, 2010). These narratives obscure material, social, and legal barriers to wheelchair users’ goals (Clare, 2015). By setting able-bodiedness as a self-evident goal, they also legitimize assimilation, medical rehabilitation, and non-disabled bodyminds. My use of the term bodymind here reflects Price's (2015) insight that bodies and minds co-constitute each other and must be theorized together. In her discussion of the topic, Schalk (2016) highlights three kinds of supercrip narratives: regular, glorified, and superpowered.

The regular supercrip narrative presents wheelchair users as less capable than non-wheelchair users by praising their participation in mundane activities. For example, one focus group participant recalled receiving excessive praise for shopping in a wheelchair (Olkin, 2019). The glorified supercrip narrative presents most wheelchair users as lazy or bitter by praising the individual resolve of wheelchair users who perform remarkable acts. Examples of this include narratives about Superman actor Christopher Reeve, which applaud his resolve while ignoring his privileged identities (Schalk, 2016). Finally, the superpowered supercrip narrative frames the lives of wheelchair users as undesirable by erasing them through compensating abilities. An example of this is comic book hero Professor X, whose enhanced mental powers obscure his paraplegia.

Wheelchair users who are members of other oppressed groups encounter more complicated sets of stereotypes. For example, female wheelchair athletes interviewed by Hargreaves and Hardin (2009) reported being perceived as more sexual and passive but less athletic than male wheelchair athletes. Bešić et al. (2020) cited stereotypes about disruptive immigrant children to explain their finding that Austrians were more likely to support inclusive education for Austrian wheelchair users than for those who were Syrian refugees. Using Annamma et al.'s (2013) DisCrit framework, Banks (2015) found that urban teachers assumed Black individuals became wheelchair users due to gun violence. Gay wheelchair users also face stereotypes that they cannot perform sexually, and doctors may deny hormone therapy to transgender wheelchair users due to false beliefs about their health status (Guter & Killacky, 2004; Puckett et al., 2018).

Separation

Stereotypes about wheelchair users lead many non-wheelchair users to seek separation from them. One way to measure this is through explicit instruments like social distance scales, which measure the extent to which members of one group tolerate varying degrees of proximity with members of another (Hodgetts & Stolte, 2014). For example, one in four participants in a British study reported some discomfort with the idea of a physically disabled neighbor (Staniland, 2011). Nearly half of participants said they would be somewhat uncomfortable with physically disabled spouses, bosses, or members of Parliament. Other studies indicate that one in three college students would not form relationships with hypothetical, physically disabled peers. This pattern becomes more pronounced when students consider more intimate relationships or severe disabilities that might require wheelchair use (Marini et al, 2011; Miller et al., 2009). Interested readers can find a detailed review of social distance measures and their limitations in Nario-Redmond (2020).

Explicit measures of cognitive separation have limited validity for people who are not aware of their desire to separate from wheelchair users or feel uncomfortable expressing it. However, researchers also examine this desire implicitly. The Disability Attitude Implicit Association Test measures subconscious disability bias by testing how quickly and accurately individuals can match different concepts to disabled and non-disabled people (Pruett & Chan, 2006). Non-disabled participants consistently attach different and more negative concepts to mobility- and vision-impaired individuals than to non-disabled people like themselves. That is, they reveal separate perceptions of their in-group (e.g., non-wheelchair users) and their outgroup (e.g., wheelchair users). Researchers have replicated this pattern among nursing faculty and students training as physician assistants in the US (Aaberg, 2012; Archambault et al., 2008), undergraduates in China and Germany (Chen et al. 2011; Hein et al., 2011), and parents, educators, and health workers in Italy (Federici & Meloni, 2009). Implicit tests also suggest that race and gender intersect to influence preferences for non-disabled people. For example, Jiang et al. (2019) found that disabled White women held less pronounced biases against other disabled people than did disabled White men, disabled Black women, or disabled Black men.

A third way to measure the separation of non-wheelchair users from wheelchair users is through physical avoidance. Park et al. (2003) and Nario-Redmond et al. (2019) each discuss evidence that irrational concerns about contagion lead non-disabled people to avoid people with visible disabilities, such as those announced by wheelchairs. Wheelchair users in a study of London's transportation system reported being avoided by buses and taxi cabs, leading one participant to hide behind a planter while their friend hailed a taxi (Velho, 2019). Likewise, non-disabled people in another study avoided approaching a wheelchair user with cerebral palsy in a club setting (Lenney & Sercombe, 2002). Societies around the world have bolstered these individual acts of avoidance by segregating, imprisoning, sterilizing, and even executing disabled people. These policies have disproportionately targeted Black and Indigenous Women of Color in most if not all cases (Hamraie, 2017).

Status Loss and Discrimination

Following separation, wheelchair users often experience status loss and discrimination. These sometimes manifest as microaggressions, or "brief and commonplace daily verbal, behavioral, or environmental indignities, whether intentional or unintentional" (Sue et al., 2007). In six focus groups with 30 female wheelchair users, Olkin et al. (2019) found evidence for 10 types of microaggressions. Participants most frequently reported experiences in which others praised them for simple activities, minimized their disabilities, denied them equal citizenship, or assumed they needed help. Participants also reported invasions of privacy, being devalued as sexual or romantic partners, and having important aspects of their identities ignored. Finally, some participants stated that others treated them like children, implied that mobility limitations affected unrelated capacities, and expected emotional rewards for being helpful.

Additional research provides support for Olkin et al.'s (2019) findings. Velho's (2019) participants reported being treated like second-class citizens while using London's public transportation system. For example, responsible parties left accessible features of buses and train stations in disrepair. Drivers also allowed non-wheelchair users to occupy spaces designated for use by wheelchair users and forgot to stop at their desired locations. According to respondents in Nario-Redmond et al.'s (2019) study, non-disabled community members referred to them as 'wheelchairs' and bent down to speak to them like children. A person at one wheelchair user's place of worship also offered unsolicited prayers, which the latter felt invaded their privacy.

Research further indicates that individuals and organizations in control of goods, services, and opportunities deny them to wheelchair users systematically. For example, rental property owners in a paired-test study in 30 US cities gave wheelchair users fewer appointments than non-wheelchair users, showed them fewer units, and responded ambiguously to requests for wheelchair accommodations (Aranda, 2015). Analyzing data from the American Housing Survey, Bo'sher et al. (2015) concluded that less than 1% of the US housing stock accommodated wheelchair users. Moreover, foreign-born householders and those who were Black or Asian were less likely to live in accessible housing than their native-born and White peers, respectively. Notably, the Department of Housing and Urban Development (HUD) offers housing programs designed to support low-income wheelchair users and those with other disabilities. However, most HUD-assisted households with a disabled member live in units not covered by these programs, and three in four low-income households with disabled members do not receive the HUD assistance for which they qualify (Dawkins & Miller, 2017).

Wheelchair users also encounter devaluation and discrimination in healthcare settings. An audit of 30 outpatient healthcare providers found many violations of the Americans with Disabilities Act (Frost et al., 2015). These included examining clients in their wheelchairs, referring them to more accessible providers, and requiring them to bring others to help with transfers. Interviews analyzed by Hassouneh-Phillips et al. (2005) revealed that one doctor denied a pap smear and mammogram to a wheelchair user because he found the procedures to be pointless. Other doctors refused anesthetic to wheelchair users whom they falsely believed could not feel painful procedures. Wheelchair users from stigmatized races and income groups may face additional discrimination. For example, poorer Black wheelchair users perceive more discrimination from hospital staff than their wealthier White counterparts (Hogaboom et al., 2019). Likewise, participants interviewed in Montreal indicated that dental practices were more likely to refuse services to wheelchair users if they received welfare benefits (Rashid-Kandvani et al., 2015).

In addition to housing and healthcare discrimination, wheelchair users also experience employment discrimination due to assumptions about their ability to work. For example, a study using correspondence tests sent to 144 companies in London found that employers consistently responded more favorably to non-disabled applicants than to those using wheelchairs (Stone & Wright, 2013). An experimental study similarly showed that wheelchair use negatively affected the hiring decisions of human resource workers even when applicants performed well in interviews. (Miceli et al., 2001). Once hired, wheelchair users continue to perceive discriminatory treatment, especially if they have other oppressed identities. For example, one female wheelchair user believed she received less pay than male workers and worked harder to receive fewer opportunities than non-disabled coworkers (Randolph, 2005). A study by Shaw et al. (2012) also suggested that physically disabled American Indian and Mixed-race women may experience increased workplace harassment.

Addressing Stigma

Reviewing stigma against wheelchair users remains academic unless we intend to contest it. Because that requires a theoretical framework capable of guiding action, Part 1 of this paper has reached its conclusion. I now turn to Part 2, which discusses stigma produced by built environments and the ways in which wheelchair users contest that stigma.

Part 2: Creating 'Misfits' Through Built Environments

According to Link and Phelan (2001) reducing stigma against wheelchair users requires addressing not just stigma's components but also the taken-for-granted cultural value patterns at their core. Compulsory able-bodiedness is the value pattern that stigmatizes wheelchair users most powerfully (McRuer, 2006). This pattern compels individuals to maintain the independent, flexible, and predictable bodyminds required by neoliberal capitalism. Like any cultural system, compulsory able-bodiedness is sustained by supportive discourses, or frameworks that encourage some understandings of the disability label over others. These discourses spread through material texts, which hold and transmit their messages (Phillips et al., 2004). Built environments constitute one class of texts that hold and spread discourses supporting compulsory able-bodiedness. Following Link and Phelan's (2001) logic, this indicates that built environments can also produce stigma against wheelchair users. The following sections provide a multidisciplinary theory meant to explain this process in detail.

Sowing Stigma

Hall (1973) coined the terms *encoding* and *decoding* to discuss how discourses spread through the medium of television. Whereas encoding is the act of embedding a message in a text, decoding is the act of interpreting that message (Hall, 1973). Put another way, we sow our assumptions and values for others to reap every time we create something. A large body of scholarship considers how people encode messages that support or challenge compulsory able-bodiedness into different texts. Haller (2006), Garland Thomson (1997), and White (2010) critique stigmatizing frameworks in television, film, newspapers, novels, and peer-reviewed research articles. However, Garland Thomson (1997) and Schalk (2018) also highlight the crip, queer, and generally anti-normative messages in Black women's fiction and autobiography. Likewise, McRuer's (2006) critiques of film, television, and photography reveal discourses intended to both discipline and liberate crip and queer bodyminds.

But movies and newspapers aren't the only kinds of texts. Built environments, or human-made spaces, form a class of *spatial* texts that community and environmental psychologists often examine (Brown & Perkins, 1992; Brown et al., 2009; Coulombe et al., 2016; Kuo et al., 1998; Madgin et al., 2016; Mihaylov et al., 2020; Ravelli & McMurtrie, 2016; Scannell & Gifford, 2010; Speer, 2008; Suarez de Balcazar et al., 1988; White et al., 1988; White, et al, 1995; Zhang & White, 2017). Several theorists argue that designers encode norms, assumptions, and values into spatial texts (Constanza-Chock, 2020), leading Garland Thomson (2011) to describe them as material objects capable of communicating discursive meaning. Like other creators, designers of spatial texts rarely intend to perpetuate oppressive patterns like compulsory able-bodiedness.

Nonetheless, implicit cultural understandings of normative bodyminds frequently lead to just this outcome (Hamraie, 2017; Imrie, 2003). Wheelchair users report spatial barriers to transportation (Velho, 2019), employment (Rudman et al., 2006), recreation (Rimmer et al., 2004), and worship (Tariah et al., 2018) that make it difficult to visit friends and family, travel with other wheelchair users, and maintain sexual relationships (Imrie, 2006; Sakellariou, 2006; Velho, 2019). This may lead wheelchair users to experience less sense of community than others, although positive disability identities, internet use, and participation in wheelchair sports seem to protect against this outcome (Forber-Pratt & Zape, 2017; Goodwin & Johnston., 2009; Obst & Stafurik, 2010).

Designers may communicate compulsory able-bodiedness through spatial texts even when they intend to be inclusive. Hamraie (2017) shares how depoliticized Universal Design principles often fail to meet the needs of wheelchair users. For example, the principle of Equitable Use calls for spaces that provide equal access to all users (Connell et al., 1997). But without explicit reminders, designers often forget to include wheelchair users in this group. This results in built environments like the Hunters Point Library in Long Island, whose only elevator skips several floors originally dedicated to fiction (Otterman, 2019). Williamson (2019) similarly discusses how attempts by the US government to provide accessible housing to disabled World War II veterans both supported their needs and devalued their identities. For example, changes to the GI Bill in 1948 gave valuable financial aid to veterans who made their homes wheelchair accessible. However, Congressional arguments for and against these changes made clear that accessible homes were intended to help veterans ‘overcome’ their newly disabled bodyminds (Williamson, 2019).

Garland Thomson (2011) describes the process of devaluing disabled people through spatial texts as creating ‘misfits’ out of ‘mis-fits’ (p. 593). That is, built environments designed for non-disabled users indicate the value of those users by *fitting* the forms and functions of their bodyminds. In contrast, the same environments devalue disabled users by *misfitting* their bodyminds. For example, Imrie (2012) argues that streetscapes built for sighted pedestrians but dangerous to their vision-impaired peers encode negative messages about the latter group's mobility and right to public space. This raises a question: what elements in built environments misfit disabled bodyminds, thereby encoding messages supporting compulsory able-bodiedness? Based on work familiar to environmental psychologists, I next argue that environmental affordances fulfill this function.

Environmental Affordances

When designers encode messages supporting compulsory able-bodiedness into their spatial texts, it is partly because implicit cultural assumptions about valuable bodyminds inform their internal guidelines for design. Hamraie (2017) calls these guidelines the *normate template of design*, or design for 'mythical average' users without disabilities or other stigmatized features (Garland Thomson, 1997; Hamraie, 2012). Designing according to the normate template leads to built environments that make desired actions possible for non-wheelchair users but difficult or impossible for wheelchair users. Theorists in ecological psychology and science and technology studies (STS) call these possibilities for action environmental affordances and disaffordances.

Ecological psychologist James Gibson (1979) defined environmental affordances as opportunities for action that environments offer to users. According to his definition, affordances emerge from the relationships between specific environments and individuals. For example, stairs afford climbing and thus ascending to non-wheelchair users. Drawing on Gibson, Heft (1988) used the concept of affordances to claim that people use functions as well as forms to make sense of their environments. Whereas a (seeing) painter might place a tree and a ladder into different categories based on their visible forms, playing children might categorize both objects as ‘climbable’ structures. Following Gibson and Heft, STS researchers used the concept of affordances to explain how humans and technology mutually shape each other (Nagy & Neff, 2015). They argued that the material properties of designed products like built environments contain not just affordances but *disaffordances*, or actions that are not possible for some users (Hutchby, 2001; Wittkower, 2016). For instance, the stairs in the previous example disafford rolling and ascending to wheelchair users.

But how do dis/affordances communicate compulsory able-bodiedness? Drawing on Hall (1973), Shaw (2017) notes that designers *intend* products to afford some uses but disafford others. Put another way, they encode *dominant* affordances into their designs. Dominant affordances may not be perceptible, and the matrix of domination ensures that they are never equally perceptible to all bodyminds (Constanza-Chock, 2020). For example, a wheelchair user with vision impairments may not perceive the street-crossing affordances of a crosswalk that provides only visual cues. Users also may decode perceptible dis/affordances in unintended ways,, as some wheelchair users have done by mixing sand and paint to give texture to slippery home-made ramps (Hamraie, 2017; Shaw, 2017). However, interpreters decode dominant affordances as intended in most cases. This decoding process allows affordances to transmit discourses supporting compulsory able-bodiedness.

In a society where compulsory able-bodiedness devalues disabled bodyminds, both designers and users of built environments will learn to interpret those bodyminds through discourses that stigmatize them. Designers using the normate template of design will tend to create dis/affordances that misfit wheelchair users, and observers unconsciously expecting this arrangement will have no reason to reflect on its legitimacy. In contrast, dis/affordances that fit wheelchair users might subvert the expectations of observers, leading them to actively consider wheelchair users' claims to space. In this way, dis/affordances either maintain or challenge stigma against wheelchair users.

Behavioral economists Thaler and Sunstein (2008) offer two concepts that clarify this point. First, *choice architecture* describes the contexts in which people make decisions and act on them. Second, *defaults* describe the choices people make within these contexts unless something prompts them to actively reject them (Thaler & Sunstein, 2008). In societies where compulsory able-bodiedness devalues disabled bodyminds, non-wheelchair users will tend to discriminate against wheelchair users by default in many circumstances. This occurs because maintaining the pattern of behavior that compulsory able-bodiedness has trained them to internalize is easier than changing it, and their choice architecture does not shift this balance. Fortunately, people can also design affordances that call stigmatizing defaults like discrimination into question. In doing so, they work to *culturally* disafford stigmatizing behaviors, or deny them as possibilities for social action (Ramstead et al., 2016). Importantly, the ability of a single dis/affordance to culturally dis/afford stigma is limited. Ramstead et al. (2016) claim that people learn stigmatizing cultural expectations through immersion in landscapes of affordances, or collections of possible actions in their environments (Rietveld & Kiverstein, 2014). That is, dis/affordances stigmatize wheelchair users at the *community* level.

Connecting Built Environments Back to Stigma

In order to connect the processes just described to Link and Phelan's (2001) components of stigma, consider the following example. Some swimming pools must be entered via ladders. This implicitly labels some wheelchair users as deviant because their bodyminds will not perform the action needed to enter the pool. Disaffording swimming to wheelchair users preserves stereotypes like ‘wheelchair users are not active’ and ‘wheelchair users are not fun.’ Non-wheelchair users may then find wheelchair users less relatable, and the physical segregation that the pool’s dis/affordances create between the groups will compound this sense of separation.

Although the pool’s dis/affordances already discriminate against wheelchair users, its discursive qualities will also support the status loss and discrimination they experience elsewhere. Alternatively, pools that afford entrance via chair lift remove the ‘deviant’ label. In doing so, they interrupt a potentially stigmatizing chain of events and force observers to reevaluate the discourses they take for granted. However, wheelchair users do not need to wait for professionals to design destigmatizing spaces. In fact, wheelchair alter built environments in ways that critique compulsory able-bodiedness every day. The remainder of Part 2 highlights the power and variety of these activities.

Changing Landscapes of Affordances

Designers maintain initial control over the dominant affordances encoded into built environments. However, STS scholars argue that users find unexpected uses for designed products within the limits they pose (Hutchby, 2001). Citing Gaver (1991) and Nagy and Neff (2015), Shaw (2017) discusses how users can imagine affordances beyond those intended by a product’s designer. These include negotiated affordances, or uses that designers encode by accident but might still endorse. For example, rural wheelchair users sometimes construct ad-hoc ramps from repurposed building materials or drive lawnmowers to visit their neighbors (Smith et al., 2010). Users can also imagine oppositional affordances, or uses that challenge the universe of correct uses imagined by designers. For example, members of Americans with Disabilities for Accessible Public Transportation (ADAPT) protested inaccessible public transit by chaining their wheelchairs to city buses (White, 2010).

Readers from community and environmental psychology may recognize a familiar concept beneath imagined affordances—psychological empowerment. Zimmerman et al. (1992) define empowerment at the individual level as ‘a process by which individuals gain mastery and control over their lives, and a critical understanding of their environment’ (p. 708). They further identify the *interactional* component of psychological empowerment as ‘the transactions between persons and environments that enable one to successfully master social or political systems. (p. 708). The ability to imagine negotiated and oppositional affordances allows wheelchair users to both achieve interactional empowerment and destigmatize built environments. In some cases, it also produces the *behavioral* component of psychological empowerment, in which people join with others to influence social and political environments.

For example, in 1990 wheelchair users and other disabled people crawled up the steps of the US Capitol Building to demand passage of the Americans with Disabilities Act. This collective action both exposed those steps as disabling and refuted stereotypes that framed wheelchair users as passive and apolitical. (Hamraie, 2017). It also turned the built environment’s unique power to influence separation to the advantage of the ‘Capital Crawlers.’ Climbing the Capitol steps brought the Crawlers into physical proximity with observers and forced those observers to identify with their frustration. Manipulating built environments does not eliminate stigma against wheelchair users by itself. This also requires redistributing material resources toward wheelchair users (Fraser, 2000), increasing positive contact between wheelchair users and non-users (Marini et al., 2011), and changing the value patterns communicated by other texts (Garland Thomson, 1997; Haller, 2006; McRuer, 2006). Still, the examples below show that wheelchair users can use dis/affordances to empower themselves, contest compulsory able-bodiedness, and reduce stigma.

Microactivist affordances and crip technoscience. Dokumaci (2016) introduced the concept of microactivist affordances to describe the fleeting, everyday ways in which disabled people alter environments to afford otherwise disafforded activities. For example, she describes women with rheumatoid arthritis in Istanbul and Quebec who use their teeth or rubber gloves to afford opening bottles (Dokumaci, 2019). Hamraie (2015) captures the political nature of these activities in their concept *crip technoscience*. This term describes the ways in which disabled people shape affordances for both practical and political ends. According to Hamraie and Fritsch (2019) crip technoscience commits to four principles. These include: 1) centering disabled people as knowers and makers; 2) highlighting the non-compliant nature of their designs; 3) promoting interdependence, and; 4) enacting the principles of the disability justice movement.

Many researchers have documented examples of microactivist affordances and crip technoscience among wheelchair users, and these often demonstrate features of interactional and behavioral empowerment. For example, Velho (2019) describes a variety of techniques that wheelchair users employ to create transportation affordances in the UK. These include hopping wheelchairs over gaps between trains and platforms, using handrails to move wheelchairs up and down escalators, and carrying tools for opening locked wheelchair ramps at train stations. Writers discuss similar activities among mostly White and middle-class wheelchair users in post-polio maker communities. For example, Hamraie (2017) describes individuals who improvised tools for getting wheelchairs through narrow doors and created wheelchairs from kitchen chairs and bicycle parts. Williamson (2012) offers additional accounts of individuals who constructed hinged ramps and hidden hallway doors to enter rooms and buildings, leveraged mirrors and extension cords to use household appliances, and crafted ‘mouthsticks’ to type or dial telephones without hands.

In addition to individual microactivist affordances, Dokumaci (2020) also explores those that involve multiple people. She calls this subset of her original concept *people as affordances*. As an example, she describes a Turkish man whose rheumatoid arthritis misfit the unpaved road between his home and school. Although this might have prevented his education, the man's father circumvented this by carrying him to school every day (Dokumaci, 2020). In addition to affording an otherwise disafforded activity, this action also critiqued the inaccessibility of the family's local built environment.

Like individual affordances, wheelchair users often employ people as affordances, challenging neoliberal notions of independence. Imrie (2010) interviewed wheelchair users whose loved ones carried them upstairs or grabbed out-of-reach items. Sakairi (2020) describes Japanese organizations who assist wheelchair users with sexual acts, and discusses the sex, gender, and class issues that complicate this practice. In addition, Piepzna-Samarasinha (2018) cites the many affordances that personal care attendants make available for her wheelchair-using friends. These include using the bathroom and transferring in and out of bed.

Microactivist affordances and acts of crip technoscience always offer some critique of existing environmental affordances. For example, tools for narrowing wheelchairs critique the width of doorways as well as the assumptions about bodyminds that guided their designers. However, disabled people also use affordances to make more overtly political statements about compulsory able-bodiedness. For example, Hamraie and Fritsch (2019) highlight actions by the disability activist group ADAPT, in which they destroy curbs with sledgehammers and use bags of cement to create new curb cuts. Similarly, artist Shannon Finnegan (Hamraie, 2020) protested an inaccessible public art piece in New York by creating an accessible 'Anti-Stairs Club Lounge' at its base. Wheelchair-using performers like Alice Sheppard (2019) and members of Sins

Invalid (Piepzna-Samarasinha, 2018) turn their mobility devices into tools for expressing anti-normative ideas. In one dance, Sheppard (2019) performs with both a manual wheelchair and two forearm crutches. By pairing these medically redundant devices, she forces her audience to search beyond medical discourses to interpret her work.

At the group level, creating political affordances takes the form of *collective access* (Mingus, 2010; Piepzna-Samarasinha, 2018). This term describes an intentional approach to mutual care in which members pursue disability access through intersectional solidarity. In accounts of the concept's creation during a social justice gathering, Piepzna-Samarasinha (2018) and Mingus (2010) describe the mutual creation of affordances by crip femmes who are Black and Indigenous People of Color. In one account, a neurodivergent group member uses a friend's spare wheelchair to afford carrying food back to the group. Actions like this allowed group members to meet immediate needs while also affirming each other's identities.

It is easy to recognize the interactional and behavioral components of psychological empowerment in the examples above. For example, Zimmerman et al. (1992) argue that interactional empowerment involves: 1) knowing the resources required for a desired action; 2) learning an environment's causal agents; 3) building decision-making and problem-solving skills, and; 4) developing a critical understanding of one's environment. By definition, microactivist affordances demonstrates at least the first three of these features, and crip technoscience demonstrates all four. In addition, the concepts of people as affordances and collective access involve various expressions the behavioral empowerment. Zimmerman et al. (1992) indicate that this component of psychological empowerment includes activities like helping others cope with hardships (e.g., mutual care) and organized political activity (e.g., ADAPT activism).

Conclusion and Future Research

Part 1 of this paper reviewed stigma against wheelchair users. Part 2 explored the ways in which built environments might contribute to that stigma and the methods that wheelchair users employ to contest it. But as I stated above, the material provided here serves best as a call to action. How might community and environmental psychologists act on what they have just read? In response to that question, I propose two lines of research. First, researchers can examine whether or not wheelchair users truly experience more stigma when built environments disafford their activities. Second, they can investigate whether or not changes to built environments that improve affordances for wheelchair users as a group reduce the stigma they experience.

Work by Collins (2002) and Costanza-Chock (2020) indicates that researchers should pursue these lines of work at personal, community, and institutional levels of analysis. Bronfenbrenner's (1979) ecological systems theory and Lewin's (1939) theories of social interactions give psychologists useful frameworks for conducting multilevel work. For example, researchers might pursue the first line of research by testing city-level relationships between sidewalk accessibility and housing discrimination against wheelchair users. The second line of research lends itself to analyses at the personal level. In particular, researchers and participants could both benefit from the use of participatory action research methods (White, 2010). This approach not only shares the empowering features of microactivist affordances and crip technoscience but also leverages psychology's connections to Dewey's (1896) functionalism, Lewin's (1946) action research, and Freire's (1970) critical pedagogy. Psychologists can play an important role in challenging built environments that stigmatize wheelchair users. I encourage them to pursue the agenda above and to expand on it. Most importantly, I encourage them to do so in the liberatory spirit of the disability justice movement

CHAPTER 3

ENVIRONMENTAL AFFORDANCES AND RENTAL DISCRIMINATION

Introduction

Work by disability scholars suggests that built environments, or human-made spaces, stigmatize disabled people through affordances, or the possibilities for action that they provide (Garland Thomson, 2011; Gibson, 1979; Hamraie, 2017; Imrie, 2003; Wittkower, 2016). According to Link & Phelan (2001), stigma manifests in several related ways, including labels, stereotypes, separation, status loss, and discrimination (Link & Phelan, 2001). The current study examines the relationships between discrimination and affordances in community-level built environments. In particular, it examines how affordances in transit, sidewalks, and housing relate to housing discrimination against wheelchair users. I begin by discussing how material affordances, organized into community-level landscapes, maintain cultural acceptance of discrimination against wheelchair users (Ramstead et al., 2016; Rietveld & Kiverstein, 2014; Thaler & Sunstein, 2008). Next, I review evidence that community features often *misfit* wheelchair users, or fail to accommodate their ways of being and moving in the world (Garland Thomson, 2011). Following this, I discuss housing discrimination against wheelchair users in the United States. Finally, I test the relationships between built environments that fit wheelchair users poorly and housing discrimination against them.

Wheelchair Users and Affordances

A designer trained to consider the needs of ‘average’ bodies tends to create built environments that deny actions to wheelchair users but provide (i.e., afford) them to others (Garland Thomson, 2011; Gibson, 1979; Hamraie, 2017; Wittkower, 2016). This results in built environments that convey a preference for non-wheelchair users in the designer’s community, which observers recognize (Costanza-Chock, 2020; Gibson, 1979; Garland Thomson, 2011; Hall, 1973; Ravelli & McMurtrie). Among a community's observers are rental agents, whose control over property gives them opportunities to discriminate against wheelchair users. If built environments convey values as suggested, then a rental agent who encounters inaccessible built environments might begin to regard discrimination against wheelchair users as a socially allowed activity. Ramstead et al. (2016) use the term *cultural affordance* to describe a social possibility for action like the one just described. They further define *conventional affordances* as a subset of cultural affordances discerned by interpreting the norms and expectations of those environments. For example, markers separating lanes in swimming competitions deny lateral movement through convention more than materiality. A swimmer who otherwise might move between lanes to disrupt a competitor refrains from doing so because they expect others, such as officials, to react negatively. Put another way, the markers conventionally *dis*afford cheating.

Ramstead et al. (2016) suggest that people learn cultural affordances through immersion in landscapes of affordances, or total collections of affordances available in a group's surroundings (Rietveld & Kiverstein, 2014). Landscapes of affordances can either challenge or reinforce existing behaviors. Behavioral economists Thaler and Sunstein (2008) offer two concepts that help to clarify this point. First, *choice architecture* describes the contexts in which people make decisions and act on them. Second, *defaults* describe the choices people make within these contexts unless something prompts them to actively reject them. In societies that devalue wheelchair users, many people will unconsciously discriminate against them by default (McRuer, 2006). For example, rental agents might show wheelchair users fewer apartments than non-users without malicious intent. Conversely, designers can create landscapes of affordances that change choice architecture and allow individuals to reflect on their default choices. The following sections show how built environments misfit the bodies of American wheelchair users through transit, sidewalks, and housing affordances.

Wheelchair Users and Transit

Research frequently highlights the misfit between transit systems and wheelchair users. For example, wheelchair users interviewed by Velho (2019) and Pyer and Tucker (2017) encountered stairs, broken ramps, and dangerous platform gaps within London's transportation network. Likewise, Vredenburgh & Zackowitz (2011) navigated wide platform gaps, inconveniently placed elevators, and quickly closing doors on a short journey through the District of Columbia's train system. Inaccessible transit does more than frustrate wheelchair-users. Material features of transit systems often expose them to bodily harm. For example, Swedish and American wheelchair users in two studies experienced rough bus and paratransit rides because stations designed to secure their chairs were too small or used confusing strapping systems (Buning et al., 2007; Wretstrand et al., 2008). In two additional studies, Frost et al. (2010; 2020) found that wheelchair users boarding and exiting city buses frequently became injured due to unsafe ramp designs.

Wheelchair Users and Sidewalks

Although a community's sidewalks can facilitate the daily travel of its wheelchair users, research indicates that they commonly obstruct it instead. Studies in the US, Mexico, and Canada show that inaccessible sidewalks and inadequate curb cuts disafford activities like work, shopping, and recreation for wheelchair users (Crowe et al., 2004; Hernandez et al., 2008; Mahmood et al., 2012; Rudman et al., 2006; Smith et al., 2010; Torkia et al., 2015). This may be truer during winter, when irregular snow removal prevents the use of sidewalks (Ripat et al., 2015; 2018). Like transit affordances, those related to sidewalks contribute to injuries among wheelchair users. According to both manual and power wheelchair users, sidewalk conditions and obstructions frequently cause fall-related accidents (Rice, 2019; Sung et al., 2019). This leads many to prevent additional falls by reducing their activities.

Importantly, wheelchair users have also leveraged sidewalks to critique inaccessible built environments. Hamraie and Fritsch (2019) highlight actions by the activist group ADAPT, in which they destroyed curbs with sledgehammers and created new curb cuts with bags of cement. Both Hamraie (2017) and Williamson (2019) connect these activities to prior work by the Rolling Quads, a group of wheelchair users who attended college in Berkeley, California. In the 1960s, the Rolling Quads lobbied the city of Berkeley to install curb cuts in sidewalks and ramps in newly constructed buildings. While they waited for construction, members of Berkeley's Center for Independent Living created ad-hoc, asphalt ramps to afford movement between streets and sidewalks. Over time, these actions fueled legends in which the Rolling Quads and their friends created curb cuts in the dead of night.

Wheelchair Users and Housing

Residential affordances also tend to misfit wheelchair users in the US. Research indicates that most US housing units fail to accommodate wheelchair users (Turner et al., 2005). For example, those interviewed by Imrie (2010) reported out-of-reach features, small rooms with steep grade changes, and whole floors made inaccessible by stairs. In response to these challenges, wheelchair users who could pay to do so altered problematic home features. Even accessible homes may be out of reach for low-income wheelchair users, as those homes tend to be newer and more expensive (Warnock, 2020). Although the Department of Housing and Urban Development reserves some housing for disabled people with limited incomes, most qualifying households do not live in units covered by these programs (Dawkins & Miller, 2017).

Finding accessible housing may be slightly more difficult for wheelchair users who are Asian, Black, or not US citizens (Bo'sher et al., 2015; Turner et al., 2005). Once again, income disparities may partly explain this. On average Black households report less wealth and emergency savings than their White counterparts (McIntosh et al., 2020). Likewise, immigrants to the US earn less than their native-born peers, especially those coming from the Caribbean and Central or South America (Budiman et al., 2020). Asian households in the US receive incomes similar to White households. However, a high percentage of Asian Americans live in metropolitan areas in California or the northeast (Gebeloff et al., 2021). On average, homes in these areas are much less accessible than those in other regions (Bo'sher et al., 2015; Levy et al., 2015).

Housing Discrimination

The Fair Housing Amendments Act of 1988 made it illegal to discriminate against disabled people attempting to buy, rent, or finance housing (FHAA, 1988). Since its passage, disabled people have filed more housing discrimination complaints than any other protected group. In 2019, more than half of complaints reported by the National Fair Housing Alliance, one in three reported by the Department of Justice, and two in three reported by the Department of Housing and Urban Development involved disabilities (NFHA, 2020). Like other disabled people, many wheelchair users rely on multifamily rental housing because limited access to resources prevents homeownership (Hoffman & Livermore, 2012; She & Livermore, 2009). Unfortunately, the market for such housing discriminates against wheelchair users systematically. Smith et al. (2010) even compare the practice of placing wheelchair-accessible entrances behind multifamily rental properties to racially segregated facilities in 20th Century America.

Using paired tests, Turner et al. (2005) examined rental discrimination against wheelchair users in Cook County, Illinois. After pairing 100 wheelchair users with similar non-users, researchers asked the members of each pair to visit apartments advertised by a representative sample of local rental agents. Findings revealed substantial discrimination against wheelchair users in Cook County's rental market. Following Turner et al.'s (2005) work, the Department of Housing and Urban Development conducted a larger paired-test study of rental discrimination against wheelchair users. It found that property owners in 30 US cities gave wheelchair users fewer appointments and showed them fewer units than non-users. They also responded ambiguously to requests for wheelchair accommodations (Levy, 2015).

The Current Study

The research discussed above shows that affordances in a community's transit, sidewalk, and housing systems often misfit wheelchair users. Work by Garland Thomson (2011) and others indicates that wheelchair users may experience discrimination as a result of these arrangements. Ramstead et al. (2016) also suggest that individual material affordances may influence rental discrimination most powerfully when combined into a broader landscape. That is, rental agents might believe discrimination to be most socially acceptable when several pieces of a city's built environment disafford actions to wheelchair users. If so, the most appropriate scale for applying Garland Thomson's (2011) misfit concept might be the neighborhood or city. Finally, research suggests that improving the attitudes of an ingroup (e.g., documented citizens) toward one outgroup (e.g., undocumented immigrants) may also improve attitudes toward others perceived to be similar (e.g., refugees) (Harwood et al., 2011). This means that landscapes that resist culturally affording discrimination against wheelchair users might also do so for people with other disabilities. In this study, I propose three hypotheses:

1. Rental housing agents will be less likely to discriminate against wheelchair users in metropolitan areas with more wheelchair-accessible:
    1. Transit
    2. Sidewalks
    3. Housing
2. A model adding transit, sidewalk, and housing affordances will explain significantly more variance in rental discrimination than a model accounting for types of disabilities and mobility devices and demographic factors.
3. Rental agents will be less likely to discriminate against deaf renters in metropolitan areas with more wheelchair-accessible transit, sidewalk, and housing features.

Methods

Sample

The current sample includes 1,265 paired tests from Levy et al.'s (2015) study of rental discrimination against wheelchair users and 1,665 tests from a parallel study with deaf and hard of hearing renters. Tests including wheelchair users occurred in 30 metropolitan areas in the United States, with 31 to 76 tests in each area. Those including deaf and hard of hearing renters occurred in 168 metropolitan areas. Levy et al. (2015) grouped 154 of these into geographic groups of 6 to 12 areas for analysis. This resulted in 30 strata with 16 to 78 tests each. I tested this study's hypotheses using a multilevel modeling approach. In the current study, paired tests and metropolitan areas served as first- and second-level units of analysis, respectively. Both Kreft (1996) and Maas and Hox (2005) suggest that multilevel studies use a minimum sample of 30 units at both the first and second levels of analysis. Huang (2018) reviews evidence that models may avoid bias with as few as 10 second-level units.

Data Sources and Measures

At the level of metropolitan statistical area, I measured transit, sidewalk, and housing affordances with data from the National Transit Database, Google Street View, and the American Housing Survey, respectively. Test-level measures of rental discrimination, type of mobility device, and type of disability derived from the Department of Housing and Urban Development's national study of rental discrimination against deaf and wheelchair-using renters.

The National Transit Database compiles and publicizes records related to US transit systems. In return for funding and regular reports, local transit agencies give the Database standardized information about their inventories, operations, and funding sources. Among other items, agencies report how many transit stations and vehicles they operate and how many meet the accessibility standards of the Americans with Disabilities Act. To create this study's measure of transit affordances, I first identified the transit agencies serving each metropolitan area in Levy et al.'s (2015) discrimination survey. I then calculated the percentage of stations and vehicles in each area that accommodate wheelchair users.

To measure sidewalk affordances, I used Google Street View images from 2013 to virtually audit the accessibility of each metropolitan area's sidewalks. Auditing refers to the systematic observation of a given area's physical and social environment. Researchers have used this method to connect local environments to neighborliness, crime, obesity, and physical activity (Browning et al., 2010; Perkins et al., 1990; Sampson & Raudenbush, 1999; Taylor et al., 1984; Zhu & Lee, 2008). Studies also suggest that multi-site audits provide excellent community-level measures of complex constructs (e.g., accessibility; Mooney et al., 2014; Mujahid et al., 2007; Raudenbush & Sampson, 1999). Financial and logistical barriers render multi-site, in-person audits impractical for most researchers (Carter et al., 1995). However, Google's Street View database allows researchers to circumvent these barriers. Studies in New Orleans, New York, Chicago, Atlanta, and the United Kingdom indicate that audits conducted via Street View are valid and reliable (Clarke et al., 2010; Curtis et al., 2010; Hwang & Sampson 2014; Odgers et al., 2012; Rundle et al., 2011; Vargo et al., 2012).

Google Street View provides a collection of street-level images that together form panoramic views of real locations. Google staff collect these images using vehicle-mounted cameras that photograph streetscapes at regular intervals and assign them geographic coordinates (Anguelov et al., 2010). This process allows Google employees to combine images into continuous displays of street segments. Researchers can then analyze large, representative samples of street segments using an application programming interface. Although Street View's data omit large sections of Africa, Asia, and the Middle East, they cover the North American cities I examined thoroughly.

In order to create a representative sample of sidewalk segments, I first randomly sampled 25% of census tracts in each of the 30 metropolitan areas (or strata for hypothesis 3) sampled by Levy et al. (2015). Next, I randomly sampled 25% of street segments within each tract. McMillan et al. (2010) show that this sampling rate produces accurate measures of built environments at the neighborhood scale, which census tracts approximate. Finally, I organized all segments in a random order and audited each with the Pedestrian Environmental Data Scan (Clifton et al., 2007). Although intended to rate the quality of American pedestrian environments more broadly, this instrument captures many sidewalk features that might afford or disafford mobility for wheelchair users.

Specifically, the Pedestrian Environmental Data Scan measures whether a sidewalk is: present; made of accessible materials; sloped at a manageable level; obstructed; separated from traffic by a buffer; continuous; connected to other sidewalks or crosswalks; equipped with curb cuts; and free from bumps, cracks, and holes. Using this instrument, I created a scale from zero (no sidewalk) to nine (wheelchair accessible sidewalk), which I then averaged at the metropolitan level. Agreement between raters using the Scan's protocol materials ranges from 60-100% for the items I will use, with kappa scores indicating fair to perfect agreement (Clifton et al., 2007; McHugh, 2012). To measure the reliability of my sidewalk scores, I recoded 1 in 50 street segments and used concordance correlations to compare new scores to their originals. Lin (1989) recommends this method for continuous and ordered categorical variables. Concordance coefficients range from 0 to 1, with higher scores indicating complete agreement between measurements. The reliability of my sidewalk measurements was 0.93, or 'good' by the standard applied by Clifton et al. (2007).

The American Housing Survey is a nationally representative, longitudinal survey of American housing units. Every two years the US Census Bureau partners with the Department of Housing and Urban Development to collect telephone and in-person data on the cost and features of US dwellings, the households who live in them, and the neighborhoods they populate. This study's measure of residential affordances relied on data from the 2011 American Housing Survey, which sampled approximately 155,000 housing units. That year the survey asked whether the following housing features accommodated wheelchair users: front entrances; electrical outlets; electrical switches; kitchen cabinets; climate controls; bathrooms; kitchens, and countertops. Using these items, I created a scale measuring the wheelchair accessibility of metropolitan rental units from zero (no accessible features) to eight (all accessible features). I then used this scale to average scores for rental units at the metropolitan (or strata) level.

In 2015, the Department of Housing and Urban Development published its first national estimates of rental discrimination against wheelchair-using and deaf renters in the US (Levy et al., 2015). Researchers conducted paired tests in which included one protected tester used a mobility device or telecommunication relay service and one control tester did not. Researchers asked pairs to report similar income and asset levels, jobs, family situations, and housing preferences. They also matched pairs according to age, gender, and ethnicity for all tests and race for tests with wheelchair users. For tests of wheelchair discrimination, members of each paired test first contacted rental agents to discuss available units. Following the initial call, during which protected testers disclosed their wheelchair use or deafness, testers who secured appointments visited rental agents in person and asked about available units in more detail. Wheelchair users also requested mobility accommodations, and participants documented any follow-up contacts with housing providers. Deaf testers collected information on calls or using the internet but did not visit rental properties. Researchers used multistage probability sampling to obtain a nationally representative sample of test properties.

Levy et al. (2015) assigned many of the demographic details that testers reported to rental agents (e.g., income), and they matched participants on age, race, ethnicity, and gender. As a result, I did not control for these variables during analysis. Following Levy et al. (2015) and using their data, I controlled for types of wheeled mobility devices (i.e., manual wheelchair, power wheelchair, or scooter) and disabilities (i.e., quadriplegia, paraplegia, or neither) reported in tests with wheelchair users. I controlled for types of telecommunication relay services (i.e., video relay service, captioned telephone system, internet relay service) reported in tests with deaf renters. For tests with wheelchair users, I included three dependent variables captured in Levy et al.'s (2015) study. These were: 1) the likelihood that housing agents scheduled appointments only with non-wheelchair users; 2) the likelihood that agents had available units but told only non-wheelchair users about them, and; 3) the likelihood that agents told both testers about available units but let only the non-wheelchair users inspect them. Because deaf testers did not visit rental properties, analyses including these testers were: 1) the likelihood that hearing but not deaf renters successfully contacted housing agents, and; 2) the likelihood that agents had available but told only hearing users about them.

Analyses

I began descriptive analyses for tests with wheelchair users by computing rates of discrimination for each metropolitan area and each test-level independent variable. To avoid overestimating measures of discrimination, I used net measures that subtract tests favoring wheelchair users from those favoring non-users. Next, I used intraclass correlations to calculate the degree to which affordance and outcome measures varied within and between locations. The scale for these correlations ranges from zero to one, with scores approaching one indicating more similarity within sites. Finally, I examined bivariate correlations between affordances and outcomes.

Controlling for types of mobility devices and disabilities, I next used three pairs of multilevel regression models to determine the relationships between affordances and each measure of discrimination against wheelchair users. Whereas the first model in each pair of tests included only test-level variables, the second model added metropolitan-level affordances. Because my dependent variables were ordered and categorical, these analyses used a generalized linear model with a multinomial distribution and a cumulative logit link function. Following Levy et al. (2015), I weighted results to reflect geographic concentrations of wheelchair users. This adjusted for the clustered multi-stage sampling design and the small number of metropolitan areas observed. To account for missing housing data in two metropolitan areas, I used multiple imputation with the portion of an area's rental units built after 1990 serving as an auxiliary variable.

I began multivariate analyses by regressing each outcome on test-level variables (type of disability, type of assistive device) and metropolitan-level affordance variables. This allowed me to test hypotheses 1a-1c. To test hypothesis 2, I used a X^2 test to compare the deviance scores (-2ℓ) of models with only test-level variables to the scores of those adding metropolitan-level affordance measures. This indicated whether or not landscapes of transit, sidewalk, and housing affordances explained discrimination as a group. I tested hypothesis 3 by repeating the process used for hypotheses 1a-1c with deaf participants from Levy et al.'s (2015) study.

Results

Descriptive Analyses

Table 1 provides rates of discrimination against wheelchair users in 30 metropolitan areas. Numbers correspond to the difference between the percentage of tests that favored non-wheelchair users and the percentage of tests that favored wheelchair users. Positive numbers indicate a bias toward non-wheelchair users in a given area and negative numbers indicate the reverse. Net discrimination against wheelchair users attempting to make appointments with rental agents, identify available units, and inspect those units was highest in Orlando, Florida, McAllen, Texas, and Memphis, Tennessee, respectively.

Table 1. *Net Discrimination Against Renters Using Wheelchairs in 30 Metropolitan Areas*

	Percent of Tests Favoring Non-Wheelchair Users		
Metropolitan Area	Appointments (*n* = 1,265)	Availability (*n* = 1,176)	Inspections (*n* = 1,036)
Akron	-5.13	-2.70	3.23
Atlanta	5.00	0.00	2.94
Boise City	-4.44	-5.56	0.00
Bakersfield	5.71	3.45	-3.57
Chicago	1.92	2.00	2.04
Cleveland	0.00	0.00	2.78
District of Columbia	0.00	0.00	2.78
Dallas	0.00	-3.03	12.00
Denver	2.63	2.70	13.79
Dayton	0.00	2.70	0.00
Detroit	5.00	5.26	0.00
Greensboro	0.00	0.00	6.06
Houston	2.70	8.33	-11.54
Kansas City	2.38	2.71	9.68
Los Angeles	1.37	2.82	1.54
Las Vegas	2.38	10.53	3.03
Melbourne	8.89	7.69	2.86
McAllen	2.70	13.89	0.00
Miami	-6.67	-2.78	-2.85
Memphis	-6.98	2.78	24.24
New York	2.63	5.48	0.00
Orlando	9.52	8.11	0.00
West Palm Beach	0.00	-2.70	2.86
Philadelphia	2.22	5.00	8.57
Pittsburgh	0.00	2.70	0.00
Rochester	4.54	-2.78	5.88
Sacramento	2.70	-2.78	0.00
San Diego	0.00	5.41	0.00
San Francisco	2.63	0.00	0.00
Syracuse	8.11	-3.03	9.67

Notes. Negative numbers indicate favorable treatment toward wheelchair users.

Table 2 provides rates of discrimination against deaf renters in 30 metropolitan areas and regions. Net discrimination against deaf renters attempting to contact rental agents and identify available units was highest in the District of Columbia and the South Central region, respectively. The latter included renters in the following Texas cities: San Antonio, Austin, McAllen, Beaumont, Corpus Christi, Brownsville, Killeen, Lubbock, Odessa, and Galveston.

Table 2. *Net Discrimination Against Deaf Renters in 30 Metropolitan Areas and Regions*

	Percent of Tests Favoring Hearing Renters	
Location	Contact (*n* = 1,665)	Availability (*n* = 1,448)
Atlanta	12.25	7.50
Boston	0.00	7.50
Chicago	0.00	0.00
Dallas	2.70	3.13
Detroit	1.76	6.00
District of Columbia	**26.09**	11.76
Houston	0.00	0.00
Los Angeles	6.45	1.28
New York	14.57	5.33
Philadelphia	3.33	4.17
Phoenix	3.03	-3.34
Riverside	13.89	3.22
San Francisco	3.45	7.69
Tampa	0.00	0.00
Central	6.67	1.92
Midwest 1	10.29	10.35
Midwest 2	6.56	-5.66
Midwest 3	4.61	-1.73
Northeast 1	1.41	0.00
Northeast 2	5.77	-4.16
Northeast 3	0.00	0.00
South 1	1.33	0.00
South 2	-3.39	4.17
South 3	-4.23	-3.33
South 4	1.70	1.81
South Central	3.17	**15.52**
West Central 1	5.88	0.00
West Central 2	13.15	0.00
West Northern	-3.03	4.84
West Southern	0.00	6.82

Notes. Negative numbers indicate favorable treatment toward wheelchair users.

Table 3 shows rates of discrimination against wheelchair-using and deaf renters by the types of devices they used and the disabilities they reported. Wheelchair users who had paraplegia or who primarily used manual wheelchairs tended to experience less net discrimination than those who had quadriplegia or who primarily used power wheelchairs. Deaf renters who used video relay services tended to experience less net discrimination than those who used captioned telephone systems or internet relay services.

Table 3. *Net Discrimination Against Deaf and Wheelchair-using Renters*

	Percent of Tests Favoring Non-Wheelchair Users			Percent of Tests Favoring Hearing Renters	
Model	Appointments (*n* = 1,265)	Availability (*n* = 1,176)	Inspections (*n* = 1,036)	Contact (*n* = 1,665)	Availability (*n* = 1,448)
Mobility Device					
Manual Wheelchair	1.36	2.24	1.95	--	--
Power Wheelchair	2.05	2.27	3.95	--	--
Scooter	1.46	4.24	0.86	--	--
Reason for Wheelchair					
Quadriplegia	1.61	0.00	6.55	--	--
Paraplegia	1.81	2.86	0.71	--	--
Other Disability	1.61	2.01	5.44	--	--
Type of Relay Service					
VRS	--	--	--	3.02	0.97
CTS	--	--	--	6.97	4.45
IRS	--	--	--	5.35	4.85

Notes. VRS, CTS, and IRS denote video relay service, captioned telephone system, and internet relay service, respectively.

Table 4 shows intraclass correlations for each measure of affordances and discrimination. Correlations for transit, housing, and sidewalk affordances were 0.67, 0.78, and 0.92, respectively. These figures indicate that much of the variance in affordances indeed occurs at the metropolitan level, allowing a robust test of my hypotheses. Test-level discrimination varied more within cities, but discrimination in unit availability and inspections still clustered substantially within metropolitan areas. Researchers generally recommend using multilevel models for correlations of at least 0.10. These indicate that variables at one level of analysis (e.g., paired tests) cluster too tightly within groups at a higher level (e.g., metropolitan areas) to ignore (e.g., Shrout, 1998). Discrimination in making appointments did not meet the 0.10 threshold because this outcome varied little across metropolitan areas. I performed single-level analyses of this outcome in response.

Table 4. *Intraclass Correlations Across 30 Metropolitan Areas*

Variables	*ICC*	*95% CI*
Housing	0.78	0.77, 0.79
Transit	0.67	0.65, 0.69
Sidewalks	0.92	0.91, 0.93
Appointments	0.06	0.004, 0.12
Availability	0.24	0.19, 0.29
Inspections	0.18	0.13, 0.23

The mean score for transit accessibility was 83.30 out of 100 and ranged from 24.10 in Philadelphia, Pennsylvania, to 99.10 in San Diego, California. Transit was most accessible in western cities in general and California in particular. It was least accessible in southern cities. The mean score for sidewalk accessibility was 4.48 out of 9 and ranged from 1.96 in Atlanta, Georgia, to 6.15 in Chicago, Illinois. Whereas 8 of the 10 most accessible sidewalk networks were in western and midwestern cities, 8 of the 10 least accessible networks were in the south or along the east coast. The mean score for housing accessibility was 3.07 out of 8 and ranged from 1.41 in McAllen, Texas, to 5.33 in Melbourne, Florida. The western and south-Atlantic regions contained the five most accessible rental markets, although the middle- and south-Atlantic regions also contained 8 of the 10 least accessible markets were in the middle- or south-Atlantic regions.

Analyses also revealed that metropolitan-level measures of sidewalk and transit accessibility correlated as expected, $r = 0.14$, $p < .001$, although the correlation was modest. However, housing accessibility was negatively associated with both sidewalk accessibility, $r = -0.15$, $p < .001$, and transit accessibility, $r = -0.06$, $p < .05$. Further investigation revealed connections between these patterns and population density. Denser metropolitan areas had more accessible transit, $r = 0.08$, $p < .01$, and sidewalks, $r = 0.40$, $p < .001$. However, they had less accessible housing units, $r = -0.28$, $p < .001$. The latter finding might reflect the fact that density corresponded to the percentage of an area's rental properties that: 1) housed multiple families, $r = 0.75$, $p < .001$, and; 2) were built before 1990, $r = 0.48$, $p < .001$. Housing was more accessible in areas with fewer multifamily properties, $r = -0.28$, $p < .001$ and more buildings created after 1990, $r = 0.47$, $p < .001$.

Table 5 shows bivariate correlations between affordances and each measure of discrimination. Without controlling for other factors, wheelchair users experienced less discrimination at the inspection stage of their visit if their area had more accessible transit. They also experienced marginally less discrimination when inquiring about available units in areas with more accessible transit. Deaf renters experienced more discrimination when attempting to contact rental agents in areas with more accessible sidewalks and transit. They experienced marginally less discrimination when inquiring about available units in areas with more accessible housing.

Table 5. *Correlations between Accessibility of Built Environments and the Percentage of Tests Showing Discrimination Against Deaf and Wheelchair-using Renters*

	Discrimination Against Wheelchair Users (*n* = 30)			Discrimination Against Deaf Renters (*n* = 30)	
Affordance	Appointments (*n* = 1,265)	Availability (*n* = 1,176)	Inspections (*n* = 1,036)	Contact (*n* = 1,665)	Availability (*n* = 1,448)
Transit	-0.02	**-0.05†**	**-0.06***	**0.08***	-0.03
Sidewalk	-0.01	0.02	-0.04	**0.07***	0.03
Housing	0.04	0.01	-0.02	-0.01	**-0.04†**

Notes. †$p < .10$, *$p < .05$.

Multivariate Analysis

Table 6 shows results for multivariate models of discrimination against wheelchair users. For each outcome, the first model regresses discrimination on types of disabilities and mobility devices (at level 1). The second model adds affordances (at level 2). For wheelchair-users asking about available units, better transit accessibility corresponded to a lower probability of discrimination. Net discrimination against wheelchair users was 2.35 percentage points higher in the 10 least transit-accessible metropolitan areas than in the 10 most transit-accessible areas. Compared to people with quadriplegia, those with paraplegia experienced less discrimination at the inspection stage of their visit whether or not the model included affordances. Neither sidewalk nor housing dis/affordances was significantly associated with any form of rental discrimination. Finally, adding affordances failed to significantly improve models predicting discrimination in scheduling appointments, X^2 (3, N = 1,265) = 2.56; reporting available units, X^2 (3, N = 1,175) = 3.25, and; allowing inspections of those units, X^2 (3, N = 1,036) = 2.96.

Table 6. *Multivariate Models for Discrimination Against Renters Using Wheelchairs*

	Appointment (*n* = 1,265)		Availability (*n* = 1,176)		Inspections (*n* = 1,036)	
	B (*SE*)	*B* (*SE*)	*B* (*SE*)	*B* (*SE*)	*B* (*SE*)	*B* (*SE*)
Manual Wheelchair	-0.15 (0.27)	-0.14 (0.27)	-0.14 (0.26)	-0.15 (0.30)	-0.24 (0.54)	-0.27 (0.55)
Scooter	-0.12 (0.54)	-0.04 (0.54)	0.32 (0.31)	0.38 (0.39)	-0.74 (1.08)	-0.78 (1.08)
Paraplegia	0.11 (0.45)	-0.08 (0.46)	0.54 (0.34)	0.48 (0.43)	**-1.25*** **(0.53)**	**-1.26*** **(0.52)**
Neither	0.05 (0.45)	-0.16 (0.47)	0.32 (0.43)	0.18 (0.55)	0.30 (0.44)	-0.29 (0.45)
Transit	--	-0.01 (0.01)	--	**-0.02*** **(0.01)**	--	**-0.02*** **(0.01)**
Sidewalk	--	0.02 (0.11)	--	0.11 (0.14)	--	-0.18 (0.16)
Housing	--	0.24 (0.15)	--	0.03 (0.27)	--	-0.01 (0.19)

Notes. **p* < .05. Each outcome includes one model omitting metropolitan-level measures (left) and one model including them (right).

Table 7 shows results for multivariate models testing relationships between affordances and discrimination against deaf renters, controlling for types of communication devices. For deaf renters attempting to contact rental agents, an increase in transit accessibility corresponded to a slight *increase* in the probability of experiencing discrimination. Deaf renters experienced marginally more discrimination in areas with more accessible sidewalks. Compared to people using video relay services, those using captioned telephone systems and internet relay services experienced more discrimination when contacting rental agents and asking about available units, respectively. These relationships held in models with and without affordances. Adding affordances failed to significantly improve models predicting discrimination in contacting rental agents, X^2 (3, N = 1,665) = 9.07; and reporting available units, X^2 (3, N = 1,448) = 2.87.

Table 7. *Multivariate Models for Discrimination Against Deaf Renters*

	Contact (n = 1,665)		Availability (n = 1,448)	
	B (SE)	*B (SE)*	*B (SE)*	*B (SE)*
CTS	**0.44 (0.17)***	**0.42 (0.17)***	0.43 (0.28)	0.45 (0.28)
IRS	0.46 (0.33)	0.43 (0.33)	**0.65 (0.28)***	**0.68 (0.29)***
Transit	--	**0.02 (0.01)****	--	-0.01 (0.01)
Sidewalk	--	**0.15 (0.08)** †	--	0.06 (0.09)
Housing	--	-0.09 (0.23)	--	-0.01 (0.01)

Notes. $^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$. CTS, and IRS denote captioned telephone system and internet relay service, respectively. Each outcome includes one model omitting metropolitan-level measures (left) and one model including them (right).

Discussion

Hypothesis 1

Results offered little support for my first hypothesis, which predicted that a metropolitan area's affordances would be associated with rental discrimination against local wheelchair users. On one hand, rental agents in areas with more accessible transit discriminated against wheelchair users less during the availability and inspection stages of the rental process. However, I did not find relationships between discrimination and the accessibility of either sidewalks or housing. Why might transit affordances influence behavior while others do not? One possibility is that they hold more salience for observers. For example, 'kneeling' buses clearly accommodate wheelchair users, as do the ramps and designated spaces that many of them include. The presence and purpose of these features demand attention. By comparison, the factors that make sidewalks accessible are subtler and less clearly connected to wheelchair use. Even curb cuts, perhaps the most noticeable accessibility features of sidewalks, have been an expected part of city life for decades.

The distribution of high-quality, mass transit systems might also help to explain the relationship between transit affordances and discrimination. Mass transit systems tend to serve dense cities in which younger and less politically conservative residents live near more wheelchair users (Pew Research Center, 2018; Zhao et al., 2019). Research indicates that younger people, those with more liberal political leanings, and those who interact with disabled people more often tend to hold less stigmatizing attitudes about disabilities (Harder et al., 2019; Nosek et al., 2007). Regardless of material affordances, rental agents in this environment might perceive that their community does not culturally afford discrimination against wheelchair users. They would also have more opportunities to evaluate default behaviors due to more frequent interactions with wheelchair users in public. This explanation must contend with my finding that sidewalk accessibility, which also improves with urban density, was not associated with discrimination. Future studies should consider the possibility that transit and sidewalk affordances influence stigma in different ways or correlate with other, unknown influences.

Hypothesis 2

Hypothesis 2 tested the extent to which urban built environments influence discrimination as landscapes of affordances. X^2 tests of models with and without affordances did not support this hypothesis. Intraclass correlations indicated that transit, sidewalk, and housing affordances each varied considerably across metropolitan areas but little within them. However, correlations between types of affordances were neither strong nor consistently positive. This suggests that many cities simultaneously embody inconsistent and even conflicting ideas and values through their affordances, thereby challenging the idea that affordances form a coherent "landscape."

If systems like housing and transit have different accessibility patterns within metropolitan areas, can their affordances still influence stigma? Although transit affordances were related to discrimination as predicted in the current study, that relationship was modest and could be a function of the data used to identify it. Conversely, it might become stronger in cities where accessible transit does not compete with inaccessible housing. At minimum, the current results imply that many metropolitan landscapes do not send messages with enough coherence to influence stigma.

It is also possible that affordances influence stigma at a smaller scale than metropolitan areas, although this would require further study. Ramstead et al. (2016) discuss *fields of affordances*, or the parts of a landscape that a person engages at any given time. Although most people in urban spaces encounter a staggering number of fields over time, they encounter some much more frequently than others. For example, my daily routine typically exposes me to fields of affordances near my home and workplace. To the degree that affordances influence me, these probably do so more than the affordances at my local zoo. Future work should examine frequently encountered fields as media for conveying culturally accepted ideas and behaviors.

Descriptive statistics indicated some regional patterns in individual affordances. Transit systems in the current study were most accessible in western metropolitan areas but least accessible in the south. This mirrors existing measurements of transit quality. For example, the Center for Neighborhood Technology's AllTransit tool uses a 10-point scale to rate the connectivity, coverage, and service frequency of American transit systems. According to

AllTransit, western metropolitan areas contain 12 of the 20 best transit systems, and southern areas contain 16 of the 20 worst systems.

Sidewalks in the current study were most accessible in the western and midwestern regions of the US but least accessible in the south and along the east coast. These findings match previous work examining regional differences in sidewalk coverage. For example, Troped et al. (2011) found that women in western cities were more likely to report sidewalks on most streets than those in the south. Likewise, 80% of participants in a study by Whitfield et al. (2018) reported sidewalks on most streets. This compared to 64% of participants in the midwest, 63% in the northeast, and 50% in the south. Housing in this study was most accessible in western and southern metropolitan areas but least accessible in eastern areas. This is consistent with Bo’sher et al. (2015), who found that America’s northeastern region contains the least accessible housing for mobility disabled people.

One unexpected result from this study was that metropolitan areas with more wheelchair-accessible transit and sidewalks had less accessible rental housing. This calls attention to the opportunities and constraints that urban density creates for different types of affordances (e.g., sidewalks and housing). As cities become denser, they tend to concentrate destinations like homes, restaurants, and schools. This encourages pedestrianism, which in turn incentivizes cities to create sidewalks that are accessible to many kinds of people. Likewise, population density makes public transit a fiscally attractive option for city administrators.

In contrast, housing more people on less land requires a city’s developers to create multifamily rental properties. Replacing these properties with newer, more accessible buildings costs developers between 25% and 45% more over a 50-year period than acquiring or rehabilitating an existing property (Wilkins et al., 2015). Partly because of this, cities across the

US have large stocks of rental housing built before the Americans with Disabilities Act of 1990 mandated more accessible construction (JCHS, 2020). The current study found that denser metropolitan areas had more multifamily rental properties and more properties built before 1990. In turn, these factors were associated with less wheelchair-accessible rental housing. Bo'sher et al. (2015) similarly found that homes in non-metropolitan areas were more accessible to wheelchair users than their metropolitan counterparts. As in the current study, they found that single-family homes and those built after 1990 were more accessible than properties housing two to three households and those built before 1990. Importantly, properties with 50 or more units had higher accessibility rates than any other type, possibly because their developers can spread the cost of accessibility features over many units.

Hypothesis 3

Hypothesis 3 examined whether affording activities to wheelchair users was associated with decreased discrimination against deaf renters. The lack of support for this hypothesis may mean that non-disabled people correctly understand deaf people and wheelchair users to belong to mostly dissimilar groups. In reality, it is common for members of deaf communities not to identify as disabled at all. Instead, they identify as part of a cultural and linguistic group. However, some research indicates the beliefs non-disabled people hold about disabled people tend to underestimate their differences (Nario-Redmond, 2010).

Unexpectedly, wheelchair-accessible transit was associated with more discrimination against deaf individuals attempting to contact rental agents. Most commonly, this meant that agents hung up on deaf renters or claimed to be too busy to talk. Population density might play a role in this pattern as well, especially in light of the marginal relationship found between sidewalk accessibility and discrimination in contact attempts. Post-hoc analyses of the data used in the current study found that denser metropolitan areas not only had more accessible transit and sidewalks but also fewer rental vacancies. If a rental agent favors hearing over deaf renters by default, the choice architecture offered by a tight rental market will not challenge that behavior. High demand will allow the agent to discriminate without self-reflection. To explore this more, future research should examine discrimination against disabled renters in communities with varying rates of rental vacancies.

Limitations

Readers should consider some limitations of the current study when interpreting its findings. First, metropolitan statistical areas may be too large to properly represent landscapes of affordances. Testing the ideas in the current study at different geographic scales might produce different results than those reported here. Second, my results are not generalizable to either rural areas or communities outside the US. Finally, Levy et al. (2015) instructed testers to report incomes to rental agents that qualified them for occupancy. As Aranda (2015) states elsewhere, this prevents the current study from examining discrimination at the intersection of disability and class.

Conclusion

Wheelchair users and other disabled people continue to experience high rates of discrimination in the United States. The current study examined environmental affordances as one factor contributing to this state of affairs. Although the questions that inspired this study remain unanswered, several of its findings merit further study. For example, there is room for much more research on fields of affordances, their impact on attitudes and behavior, and their relationships to each other. I encourage readers who find this topic interesting to extend the present work in new and creative ways.

CHAPTER 4

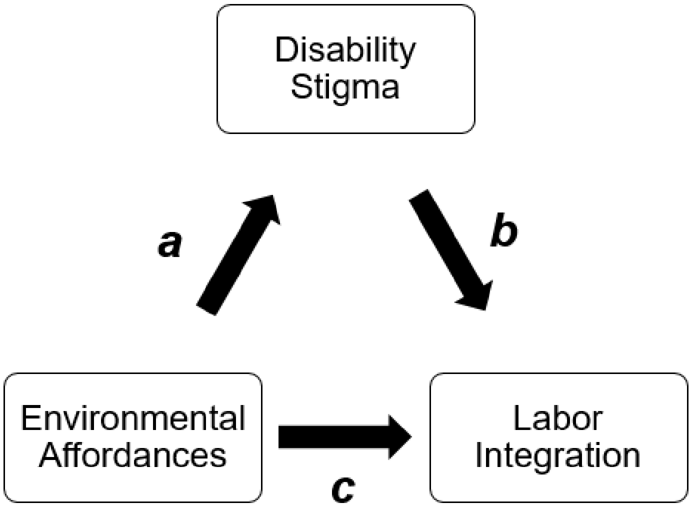
STIGMATIZING BUILT ENVIRONMENTS AND LABOR INTEGRATION

Introduction

According to Link and Phelan (2001), stigma manifests partly through people's attitudes. Research suggests that these attitudes prevent mobility-disabled people, including those who use wheelchairs, from engaging in community settings. Community and environmental psychologists call this engagement *community integration*, of which engagement in work settings (i.e., labor integration) is a part (Kweon et al., 1998; Terry & Townley, 2019; Townley et al., 2009; Ware et al., 2007; Wong & Solomon, 2002). Psychological studies show relationships between disability stigma and individual factors like the stigmatizing person's age and sex, indicating that these factors might influence labor integration through disability stigma (Harder et al., 2019; Nosek et al., 2007). Unfortunately, because they focus on individuals, these studies cannot show how to influence a community's *overall* degree of disability stigma (Snijders & Bosker, 2012). For example, the fact that individual women exhibit less disability stigma does not necessarily indicate that mobility-disabled people will experience less stigma in communities with more women.

Disability research also indicates that built environments, or human-made spaces, reduce mobility-disabled people's integration directly, and might do so indirectly by promoting stigmatizing attitudes against them (Garland Thomson, 2011; Hamraie, 2017; Imrie, 2003). Previous work argues that built environments influence attitudes about disabled people through the possibilities for action, or affordances, that they offer (Glendening, under review). Recent evidence suggests that distinct aspects of built environments, like a community's housing stock or transit system, do not influence disability stigma as a uniform collection (i.e., landscape) of affordances (Glendening, in progress). However, those pieces might still promote stigmatizing attitudes against mobility-disabled people individually. Together, these ideas imply the four theoretical relationships shown in Figure 1: 1) community affordances reduce labor integration among mobility-disabled people by failing to accommodate them (path *c*); 2) stigmatizing attitudes against mobility-disabled people reduce their labor integration (path *b*); 3) affordances that fail to accommodate mobility-disabled people promote stigmatizing attitudes against them (path *a*), and; 4) affordances reduce the integration of mobility-disabled people *through* the attitudes they produce (path *ab*). In the current study, I test the third and fourth propositions quantitatively for the first time, and complement existing evidence for the first two. I also attempt to determine the extent and directions of community-level relationships between demographic features and disability stigma.

Figure 1. *Relationships Between Environmental Affordances, Disability Stigma, and Labor Integration*



Labor Integration

The concept of community integration, as community and environmental psychologists understand it, emerged from mental health research. According to Wong and Solomon (2002), this concept has three dimensions. Physical integration refers to people's access to the spaces, activities, and resources in their communities. Social integration denotes people's opportunities to interact with community members and form social networks. Finally, psychological integration reflects people's perceived membership in, emotional attachment to, and influence over their communities. Benefits of community integration include improved mood, increased subjective well-being, and reduced post-traumatic stress (Fothergill et al., 2011; Herrero et al., 2011; Okech et al., 2018).

However, communities often fail to provide the benefits of community integration to mobility-disabled people. For example, mobility-disabled people seeking work frequently struggle to access employment in their communities. In 2019, 78.6% of America's non-disabled, working-aged civilians reported employment (Paul et al., 2020a). In contrast, only 26.2% of their mobility-disabled peers were employed. In general, disabled people who obtain a job are still less likely to stay employed, get promoted, or work full-time (Brucker & Houtenville, 2015; Meyer & Mok, 2019; Mitra & Kruse, 2016; Schur, 2003; Wilson-Kovacs et al., 2008).

A reasonable person could argue that disconnecting from normative work patterns has benefits, especially for people whose bodies and minds refuse to fit capitalist schedules (Kafer, 2013). However, studies show that most mobility-disabled people want to work and get satisfaction from their jobs (Ali et al., 2011; Saunders & Nedelec, 2014). In addition, work disparities cause material harm to mobility-disabled people and their households. Whereas 9% of community-dwelling, non-disabled people lived below the poverty line in 2019, 21% of mobility-disabled people did so (Paul et al., 2020b). Thus, understanding and removing physical and social barriers to labor integration could improve the lives of many mobility-disabled people.

Barriers to Labor Integration

Built Environments

Disability theorists argue that built environments physically prevent mobility-disabled people from enjoying workplaces and other community settings that support employment (Garland Thomson, 2011; Hamraie, 2017; Imrie, 2003). Research by community and environmental psychologists supports this argument (Fawcett et al., 1994; White, 1992). For example, a literature review by Prescott et al. (2020) found that inadequate travel surfaces, missing curb ramps, narrow or stepped pathways, and uncontrolled crosswalks prevent, or *dis*afford community travel for mobility-disabled people. Using experimental and participatory designs, other studies find that affordances influence opportunities for wheelchair users to leave their homes and enter government facilities that might support their employment (Aldersey et al., 2018; McDonald et al., 2015; White et al., 1995). Surveys in the US, Saudi Arabia, and Turkey indicate that stairs and poorly maintained sidewalks prevent mobility-disabled people from participating in community and religious organizations (Akyuz et al., 2014; Hoenig et al., 2003; Meyers et al., 2002; Tariah et al., 2018; Yang & Sanford, 2012). As Granovetter (1973) notes, connections made in these organizations can be vital for job-seekers. Finally, interviews and focus groups in several countries link stairs, inaccessible sidewalks, unpaved roads, broken or missing elevators, narrow doorways, and desks built for standing individuals to reduced work and recuperative leisure (Akyuz et al., 2014; Banda-Chalwe et al., 2014; Barker et al., 2006; Dorjbal et al., 2020; Levins et al., 2004; Östlund & Johansson, 2018; Reid et al., 2003; Rimmer et al., 2004; Rosenberg et al. 2013; Rossen et al., 2012; Rudman et al., 2006; Vergunst et al., 2015).

Stigma

Research from at five continents identifies stigma as one barrier to employment for mobility-disabled people. For example, interviews and focus groups in the US, the UK, Zambia, Turkey, Mongolia, and Australia revealed that stigmatizing attitudes reduced employment for mobility-disabled people and limited their access to resources needed to maintain jobs. The latter included social connections, education, and reliable transportation (Banda-Chalwe et al., 2014; Barclay et al., 2016; Dorjbal et al., 2020; Fawcett et al., 1994; Hammel et al., 2015; Velho, 2019; White, 1992). Aldersey et al. (2018) used participatory action research to obtain similar results in Bangladesh. There, wheelchair users cited pity and low expectations from family and community members as barriers to employment.

In addition to these mostly qualitative projects, several quantitative studies have connected stigma to mobility-disabled people's low rate of employment. Field experiments in Canada and Norway found that disclosing wheelchair use on a job application significantly reduced a person's odds of securing an interview (Bellemare et al., 2019; Bjørnshagen & Ugreninov, 2021). Likewise, a longitudinal survey of wheelchair users in two American cities identified rude community members as major barriers to accessing workplaces and other destinations (Meyers et al., 2002). Stigma's role in denying labor integration to mobility-disabled people highlights a need to understand and engage with the factors that support it. Research with individuals suggests that implicit disability stigma decreases with liberalism and contact with disabled people but is higher among men and older individuals (Harder et al., 2019; Nosek et al., 2007). However, it is not clear that *communities* whose residents are, for example, older or more conservative on average also exhibit more stigmatizing attitudes toward mobility-disabled people. This limits any intervention designed to reduce stigma, which works through communities as much as it does through individuals (Cook et al., 2014).

Connecting Affordances to Stigma Through Misfit

If both stigma and the affordances embedded within built environments can prevent mobility-disabled people from working, it is necessary to understand how these forces relate to one another. Garland Thomson (2011) coined the term *misfit* to describe the mismatch between a built environment's affordances and the people who encounter them. Critical theorists, including Garland Thomson, argue that built environments maintain stigma against disabled people by misfitting them (Constanza-Chock, 2020; Garland Thomson, 2011; Hamraie, 2017; Hendren, 2020; Imrie, 2003). For example, most designers in a society that systematically devalues mobility-disabled people (McRuer, 2006) will not imagine them as users. Instead, they will rely on implicit guidelines that assume users will not have disabilities or other stigmatizing features. Hamraie (2017) calls these guidelines the *normate template of design*.

Because the built environment's other users live in the same society as the designer, those users' default ideas about bodies will also stigmatize mobility-disabled people. By misfitting mobility-disabled people, spaces leave this understanding intact. In contrast, a built environment that fit mobility-disabled people would subvert the expectations of non-disabled people, leading them to actively consider the former's claims to space. In this way, built environments can either maintain or challenge stigma against mobility-disabled people. However, the ability of a single affordance to influence this stigma is limited. Ramstead et al. (2016) claim that people negotiate stigmatizing cultural expectations through immersion in *landscapes of affordances*, or total collections of possible actions in their environments (Rietveld & Kiverstein, 2014). That is, relationships between stigma and affordances may develop at the community level.

To review, theory implies that societies with a preference for non-disabled bodies maintain stigma against mobility-disabled people through collections of affordances that misfit them. In contrast, landscapes that fit mobility-disabled people disrupt this process. Evidence that stigma limits labor integration for mobility-disabled people indicates that accessible built environments might promote their integration by reducing disability stigma. Ramstead et al.'s (2016) work indicates that this process could occur at the community level, implying that community-wide changes to affordances that misfit mobility-disabled people can both support their labor integration and reduce stigma against them. Alternatively, communities with less stigmatizing attitudes toward mobility-disabled people may produce built environments that support their integration by fitting their bodies.

The Current Study

The sections above indicate direct relationships between: 1) environmental affordances and labor integration for mobility-disabled people, and; 2) stigmatizing attitudes against mobility-disabled people and their labor integration. They also imply relationships between: 3) affordances and stigmatizing attitudes, and; 4) affordances and labor integration *through* stigmatizing attitudes. Previous studies provide qualitative evidence for the first two relationships, largely relying on descriptions of individual experiences. A study using quantitative, inferential methods to measure affordances, stigma, and integration at the community level would complement their findings. Although the last two relationships remain untested empirically, they have important implications. Theoretically, these relationships suggest that affordances misfitting mobility-disabled people place upper limits on the ability of legal and educational interventions to reduce stigma against them and support their integration. Practically, they suggest that legislators could reduce stigma against mobility-disabled people by requiring the infrastructure under their authority to meet stronger accessibility standards. However, this assumes that built environments influence stigmatizing attitudes rather than simply reflecting them. The current study considered four directional hypotheses:

1. Mobility-disabled people experience less labor integration in metropolitan areas where affordances misfit them.
2. Mobility-disabled people experience less integration in areas where non-disabled people hold more stigmatizing attitudes toward them.
3. Non-disabled people hold more stigmatizing attitudes toward mobility-disabled people in areas where affordances misfit the latter.
4. Stigmatizing attitudes mediate associations between affordances and mobility-disabled people's integration, if such associations exist.

In addition to these directional hypotheses, I also examined: 1) whether or not variables that are associated with disability stigma at the individual level are associated at the community level, and; 2) the directions these relationships take.

Methods

Data Sources and Measures

For this study, I measured transit, sidewalk, and housing affordances with data from the National Transit Database, Google Street View, and the American Housing Survey, respectively. In addition, the Current Population Survey and Project Implicit provided measures of labor integration and disability stigma, respectively. I also obtained covariates from Project Implicit, a non-profit organization that collects and shares data on attitudes toward different groups of people.

To measure transit affordances, I used 2011 data from the National Transit Database. Using weighted averages, I then determine the percentage of each metropolitan area's transit stations and vehicles that accommodated wheelchair users. I measured sidewalk affordances by virtually auditing the accessibility of each metropolitan area's sidewalks using 2013 images from Google Street View. Using data from the US Census Bureau, I sampled 25% of census tracts in each of the 195 metropolitan areas in this study. Next, I randomly sampled 25% of street segments within each tract. McMillan et al. (2010) show that this sampling rate produces accurate measures of built environments at the neighborhood scale, which census tracts approximate.

Finally, I audited each segment of sidewalk with the Pedestrian Environmental Data Scan (Clifton et al., 2007). This instrument measures whether a sidewalk is: present; made of accessible materials; sloped at a manageable level; obstructed; separated from traffic by a buffer; continuous; connected to other sidewalks or crosswalks; equipped with curb cuts; and free from bumps, cracks, and holes. Using this instrument, I created a scale from zero (no sidewalk) to nine (wheelchair accessible sidewalk), which I then averaged at the metropolitan level. Agreement between raters using the Scan's protocol materials ranges from 60-100% for the items I used, with kappa scores indicating fair to perfect agreement (Clifton et al., 2007; McHugh, 2012). To measure the reliability of my sidewalk scores, I recoded 1 in 50 street segments and used concordance correlations to compare new scores to their originals. Lin (1989) recommends this method for continuous variables. Concordance coefficients range from 0 to 1, with higher scores indicating complete agreement between measurements. The reliability of my sidewalk measurements was 0.91, or 'good' by the standard applied by Clifton et al. (2007).

I relied on data from the 2011 American Housing Survey for this study's measure of housing affordances. That year the survey asked whether the following housing features accommodate wheelchair users: front entrances; electrical outlets; electrical switches; kitchen cabinets; climate controls; bathrooms; kitchens, and countertops. Using these items, I created a scale measuring each housing unit's wheelchair accessibility from zero (no accessible features) to eight (all accessible features). I then averaged household scores on this scale at the metropolitan level.

The 2013 Current Population Survey provided the current study with two measures of labor integration. The Current Population Survey is a monthly survey conducted by the US Census Bureau and sponsored by the Bureau of Labor Statistics. Using a probability sample of approximately 60,000 occupied housing units, surveyors collect telephone and in-person data on the demographic and labor characteristics of each unit's residents. In addition, Current Population Survey staff often collect supplemental data needed by labor market analysts. I measured labor integration by calculating: 1) the percent of mobility-disabled people in each metropolitan area's labor force that reported being employed, and; 2) the mean number of hours worked per week by mobility-disabled people reporting employment.

Data on disability stigma derived from Project Implicit. Because research participants are less willing to share attitudes that they believe are socially unacceptable (Antonak & Livneh, 2000), Project Implicit measures implicit attitudes, or automatic and unconscious mental reactions to stimuli (Prestwich et al., 2008). They accomplish this using the Implicit Association Test (Greenwald et al., 1998), a computer-based test that measures implicit attitudes validly and reliably when aggregated across participants (Cunningham et al., 2001; Egloff & Schmukle, 2002; Greenwald & Nosek, 2001). The Implicit Association Test scores how quickly and accurately a person can match two groups of attributes (e.g., good and bad) with two identity groups (e.g., Black and White) (Lane et al., 2007). Matching positive attributes to one identity group more quickly and accurately than the other indicates that a test-taker unconsciously connects the first group to positive attributes more easily (Lane et al., 2007). This further indicates an implicit preference for the first group.

The Implicit Association Test begins by pairing each group of attributes with an identity group and assigning a computer key to each pair. It then instructs participants to press each key as quickly as possible when its assigned attribute or identity group appears on a computer screen. After performing this task several times, the test switches the pairings and participants repeat the activity. Following the second pairing, participants receive an implicit bias score indicating the extent to which they favor one group over the other. This score reflects the participant's tendency to pair a favored group with positive attributes more often and more quickly.

The current study used 2011 and 2012 data from the Disability Attitudes Implicit Association Test, which measures attitudes toward disabled and non-disabled people by associating positive and negative words with two sets of images. One set features people walking, running, and skiing, whereas the other features images invoking visual and mobility disabilities. I used 2012 test data to compute metropolitan-level measures of disability stigma from the individual scores of each metropolitan area's respondents. Project Implicit researchers created these scores by comparing the accuracy of participants' responses during the two parts of their tests and the speed of those responses in milliseconds. Metropolitan areas chosen for the current study had between 20 and 890 respondents.

I obtained the current study's demographic measures from several sources. I used 2011 data to measure the percent of test-takers in each area who had a disabled friend or family member. Data from the 2011 American Community Survey provided measures of each metropolitan area's median age and percentage of residents identifying as female. Each year, the US Census Bureau distributes this survey to more than 3.5 million households. Its results provide timely, detailed, and nationally representative data on the characteristics of the US population. Finally, records from the Massachusetts Institute of Technology's Election Lab provided my measure of community-level liberalism. Specifically, these records indicated the percent of each metropolitan area's voters who selected Barack Obama in the 2012 presidential election.

Analyses

I began preliminary analysis by using intraclass correlations to calculate the degree to which variables aggregated from individual data varied within and between metropolitan areas. The scale for an intraclass correlation ranges from zero to one, with scores approaching one indicating more similarity within groups and less between them. Researchers generally recommend using higher-level measures (e.g., metropolitan areas) for correlations of at least 0.10. These indicate that variables at one level of analysis (e.g., individuals) cluster too tightly within groups at a higher level to ignore that clustering (e.g., Shrout, 1998). In my planned sample of 195 metropolitan areas, disability stigma's correlation reached 0.08. This indicated that some areas had too few tests of disability stigma to form a community-level variable. However, removing these areas from my analyses would also reduce their statistical power. In order to balance the needs of correlations and sample size, I compared changes to both across the inclusion thresholds featured in Table 8. This led me to conduct my analyses in 143 metropolitan areas with at least 20 implicit association tests.

Table 8. Number of Metropolitan Areas and Intraclass Correlations for Disability Stigma When Requiring Different Numbers of Implicit Association Tests Per Site

Number of Tests	Sample Size	Intraclass Correlation
10	195	.08
20	143	.15
30	113	.18
40	91	.22
50	78	.22
60	68	.26
70	59	.26
80	50	.28
90	48	.30
100	46	.24

Controlling for covariates, I next conducted a series of regression analyses to examine hypotheses 1-3. I used the full information maximum likelihood method to account for missing housing data in 6% of metropolitan areas (Graham, 2003). I tested hypotheses 1 and 2 by regressing measures of labor integration on each measure of affordances and disability stigma. Next, I examined hypothesis 3 by regressing disability stigma on each measure of affordances.

Depending on results from hypotheses 1-3, I intended to test hypothesis 4 in two stages. Controlling for covariates, I would first regress labor integration on housing, transit, and sidewalk affordances without controlling for disability stigma. Next, I would test the indirect relationships between each set of affordances and integration by subtracting beta coefficients in a model including stigma from those in a model not including stigma. Preacher and Hayes (2004) indicate that this difference equals the multiplied effect of the relationships between affordances and disability stigma and between stigma and integration. Finally, I would test the resulting difference for significance at $p < .05$ using a two-tailed t-distribution. Following Preacher and Hayes (2004), I would use Sobel's test and a bootstrap procedure to test each mediation model. This involves drawing 5,000 random samples from my list of metropolitan areas, obtaining an average mediation estimate across samples, and testing that average for significance. Using this method reduces the number of cases needed to detect mediation to less than 50 because it does not assume a normal sampling distribution (Preacher & Hayes, 2004).

Theoretically, I expected the relationships examined in this study to be causal, with improved affordances for mobility-disabled people increasing labor integration by reducing stigma. However, the correlational data that I used cannot demonstrate causality. Therefore, planned to repeat hypothesis 4's analyses with affordances and stigma reversed to explore an alternative pathway between stigma and integration through affordances. This model suggests a strategy of intervention focused on attitudes rather than built environments. Although the non-nested nature of the competing mediation models would prevent me from testing the superiority of one over the other, results would offer descriptive supplements to other analyses.

Results

Table 9 shows intraclass correlations for variables in 143 metropolitan areas. These areas had a median population of 625,039, and an average of 50.8% of their residents identified as women in 2011. On average, 80.8% identified as White, 7.9% as Black, 8.1% as Hispanic or Latino, 3.0% as Asian, American Indian, or Pacific Islander, and 4.6% as another race or multiple races. The median age was 36 and the annual median household income was $50,009 in 2011 dollars. Finally, Barack Obama's average share of presidential votes in 2012 was 50.3%. This figure ranged from 9.8% in Provo, Utah, to 75.4% in San Francisco, California. No measure of affordances had a significant relationship with any other in the final sample.

Table 10 shows the results of regressing labor integration among an area's mobility-disabled people on affordances and disability stigma. Contrary to hypothesis 1, affordances were not associated with mobility-disabled people's rate of employment or the number of hours they worked each week. Consistent with hypothesis 2, mobility-disabled people had significantly lower employment rates in metropolitan areas with more disability stigma. Those who were employed also worked marginally fewer hours in areas with more stigma. Finally, mobility-disabled people had marginally lower employment rates in areas with higher median ages. Table 11 shows the results of regressing disability stigma on affordances and community demographic characteristics. Contrary to hypothesis 3, an area's affordances were not significantly related to disability stigma among its residents.

Table 9. *Intraclass Correlations Across 143 Metropolitan Areas*

Variables	*ICC*	*95% CI*
Contact	0.24	0.22, 0.26
Housing	0.70	0.69, 0.71
Transit	0.58	0.57, 0.59
Sidewalks	0.85	0.83, 0.87
Stigma	0.15	0.13, 0.17
Employment	0.55	0.54, 0.56
Hours Worked	0.45	0.44, 0.46

Table 10. *Regressing Employment and Work Hours of Mobility-Disabled People on Affordances and Disability Stigma in 143 Metropolitan Areas*

	Employment (%)		Hours Worked (*M*)	
Model	*B*	*SE*	*B*	*SE*
Age	**-0.20†**	**0.11**	-0.13	0.11
Female	0.15	0.11	0.08	0.11
Liberalism	0.07	0.10	0.13	0.10
Contact	0.05	0.09	0.03	0.10
Housing	0.09	0.11	0.18	0.12
Transit	0.13	0.08	0.01	0.09
Sidewalks	-0.05	0.10	-0.03	0.10
Stigma	**-0.20***	**0.08**	**-0.16†**	**0.09**

Notes. $^{\dagger}p < .10$. $^{*}p < .05$. All coefficients standardized. Employment rate calculated for individuals in the labor force. Work hours calculated for employed individuals.

Table 11. *Regressing Disability Stigma on Affordances in 143 Metropolitan Areas*

	Disability Stigma	
Model	*B*	*SE*
Age	-0.12	0.10
Female	0.09	0.10
Liberalism	0.04	0.10
Contact	-0.01	0.09
Housing	-0.08	0.12
Transit	0.09	0.08
Sidewalks	0.03	0.09

Notes. All coefficients standardized.

After removing disability stigma from the model, the relationship between a metropolitan area's median age and the employment rate of its mobility-disabled residents disappeared. However, mobility-disabled people who were employed worked more hours in areas with more accessible housing. Hypothesis 4 predicted that disability stigma mediated relationships between labor integration and environmental affordances. I also proposed an alternative hypothesis in which affordances mediated the relationship between stigma and integration. However, neither disability stigma nor affordances significantly mediated any of the relationships in these analyses. Because a variable arguably cannot mediate a relationship that does not exist, I do not show results for hypothesis 4 or discuss them in the next section.

Discussion

Hypotheses 1 and 2

Hypothesis 1 predicted that mobility-disabled people would integrate less into workplaces where community affordances misfit their needs. Affordances were not associated with either employment rates or the number of hours worked each week by mobility-disabled people. Although housing accessibility was marginally associated with increased work hours in one model, this relationship disappeared in a model that included disability stigma. Similarly, the finding that mobility-disabled people had marginally lower employment rates in areas with older residents disappeared when I removed disability stigma from the model. Because these associations were weak and unstable, it is inappropriate to interpret them here.

Consistent with hypothesis 2, disability stigma was significantly related to employment and marginally related to work hours. These findings are consistent with studies reporting negative relationships between stigma and work for mobility-disabled people (Hammel et al., 2015; Rudman et al., 2006). Regarding work hours, employers may place mobility-disabled workers in jobs with less predictable schedules. For example, Kaye (2009) finds that employers' stereotypes lead them to overlook mobility-disabled workers for steady positions requiring information and communication skills. Alternatively, experiencing stigma from employees and coworkers may encourage mobility-disabled people to spend less time at work.

Hypothesis 3

Disability stigma was not related to any measure of affordances in the current study. The The relationships between these measures may partly explain this finding. Ramstead et al. (2016) indicate that individuals discern a community's expectations through landscapes of affordances. But what if the components of that landscape send incoherent messages? Mattern (2021) notes that generations of actors create a community's spaces over time. These actors do not always communicate, and at times they oppose each other's worldviews directly. This can result in cityscapes in which some systems afford actions to mobility-disabled people and others do not.

In the current study, the messages embedded in housing, transit, and sidewalk affordances had almost no relationship to each other. The strongest relationship, between housing and sidewalk affordances (r = -.14, p = .17) hinted at competing messages. These findings resemble those of a previous study, which also found that housing, transit, and sidewalk affordances had weak and sometimes inverse relationships (Glendening, in progress a). Together, these studies highlight the possibility that messages communicated through different types of affordances limit each other's influence. Phillips et al. (2004) propose that messages lead to shared beliefs most effectively when they cohere internally and do not compete with existing and accepted ideas. Many writers have shown that disability stigma is both pervasive and accepted in Western societies like the US (e.g., McRuer, 2006). Given that, a landscape with conflicting affordances may not be able to improve attitudes about mobility-disabled people passively.

However, a few unusual pieces of architecture with explicit messages about mobility-disabled people might reduce stigma more effectively than a landscape. In the late 1950s, members of the Situationist International developed détournement, a method of coopting parts of dominant society to expose its flaws (Debord & Wolman, 1956). Hamraie and Fritsch (2019) argue for a similar technique called crip technoscience, urging accessibility projects not to blend smoothly into their surroundings. These projects create *friction*, making observers consider the subtle politics of spatial inequality in liberal societies. If landscapes of affordances have limited influence over disability stigma, as this paper suggests, mobility-disabled people might still alter that stigma through strategic, friction-inducing changes to built environments.

Stigma and community demographic features

As noted above, an individual's age, sex, political ideology, and degree of contact with disabled people influence that person's degree of implicit disability stigma. But in the current study, none of these factors were related to disability stigma at the community level. This finding may reflect the study's sample and definition of community. For example, other studies find associations between neighborhood-level conservatism and mental health stigma (Gonzales et al., 2017; Gonzales et al., 2018). However, it is also possible that disability stigma operates differently at the community level than between individuals.

Identifying the causes and correlates of community-level disability stigma is key to addressing that stigma in the future. The primary reason for this is that community-level stigma harms disabled people materially. However, communities also serve as the context in which interventions designed to reduce individual-level stigma take place. As such, a community's general attitudes may prevent otherwise successful interventions from succeeding (Hatzenbuehler, 2016). Given this sobering fact, what community features might we expect to influence community-level stigma?

A community's degree of rurality and its general economic conditions offer possible answers. In a study with 300 adults experiencing serious mental illnesses, Leickly et al. (2021) found that participants perceived more stigma in rural areas. Likewise, Gonzalez et al. (2018) identified a neighborhood's socioeconomic disadvantage and low housing density as factors related to stigma against people with psychiatric disabilities. Because psychiatric disabilities differ substantially from those affecting mobility, factors that influence stigma against the former may not do so against the latter. Nonetheless, the fact that communities tend to minimize differences between disabled people justifies investigating these factors (Nario-Redmond, 2010),

Limitations

This study had several limitations that readers should consider. First, the data used in the current study are 9 to 11 years old because I required variables from the 2011 American Housing Survey. They provide a snapshot of the period in which researchers collected them, and readers will likely agree that the world has changed since then. Second, voting behaviors do not reflect political ideology perfectly. A person who supports one party's candidate in an election cycle may support that party's opponent or simply not vote in the next cycle. Third, metropolitan areas may be too large to constitute landscapes of affordances. Ramstead et al. (2016) define a *field of* *affordances* as the parts of a landscape that a person engages at any given time. It is possible that built environments influence attitudes or integration through these fields, which by definition are more salient to individuals than landscapes.

Finally using the Disability Attitudes Implicit Association Test limited my study in two ways. First, the test measures general disability stigma instead of stigma specific to mobility-disabled people. Specifically, the 2012 test used depictions of both mobility and vision disabilities to measure stigmatizing attitudes. This means that I could not separate attitudes about mobility-disabled and blind people in the current study. However, research suggests that non-disabled people hold general attitudes toward disabled as a group rather than tailoring those attitudes to people with specific disabilities (Nario-Redmond, 2010). Second, the test did not randomly sample participants. Like all tests maintained by Project Implicit, it relied on data from volunteers who do not perfectly represent the overall US population (Nosek et al., 2007).

Conclusion

The goal of the current study was to better understand the relationships between environmental affordances, disability stigma, and labor integration. Its results provided several takeaways. First, coherent landscapes of affordances seem to be few and far between in American cities. Second, a community's level of disability stigma may impede mobility-disabled people's access to local work opportunities. Finally, factors associated with implicit disability stigma among individuals may not predict that stigma at the community level. The current study examined formal labor and accepted its value as a proxy for community integration. Future work can expand its findings by focusing on other forms of integration and informal labor among mobility-disabled people from different communities.

CHAPTER 5

REDNECK CRIP TECH

Introduction

In previous studies, I examined the claim that built environments, or human-made spaces, stigmatize wheelchair users (Glendening, in progress a; Glendening, in progress b). In this paper, I explore how wheelchair users resist stigma by altering possibilities for action, or affordances, in their environments. I focus on wheelchair users in the US region of Appalachia for three reasons. First, academic studies of stigma against either Appalachians or wheelchair users tend to exclude people belonging to both groups. Crenshaw (2016) calls this pattern intersectional erasure. Second, Appalachia's particular forms of tinkering can complement existing work on the ways in which disabled people manage affordances. Finally, the spatial and technological distance between many Appalachian wheelchair users gives them insight into how people in rural settings engage in the collective manipulation of affordances.

Disability in Appalachia

The Appalachian region contains 420 US counties in and around the Appalachian Mountains. More than 25 million Americans live in this region, which covers parts of 13 states from Mississippi to New York (Pollard & Jacobsen, 2020). Popular portrayals of Appalachians depict them as White, low-income families of Scots-Irish descent. For example, infamous accounts like Caudill's (1963) *Night Comes to the Cumberlands* and Vance's (2016) *Hillbilly Elegy* follow this formula. But Appalachian scholars critique this image for excluding a large portion of Appalachian people (Brashear, 2019; Catte, 2018; Turner, 2019).

Disability represents one important dimension of Appalachia's diversity. Approximately 16% of Appalachians report personal disabilities, exceeding the US average by 3.5 percentage points (Pollard & Jacobsen, 2020). But disability plays a complicated role in the region’s history, leading many residents to distance themselves from disabled identities. As early as the 17th Century, English colonial leaders equated the ‘waste land’ in and around the Appalachian mountain range with lower-class ‘waste people' (Isenberg, 2016). What made these people waste was an alleged predisposition to mental and physical weakness inherited from Scots-Irish ancestors prone to criminality and taboo sexual behaviors. Similar stereotypes about disabled Appalachians appear across a range of media sources, including books, films, and cartoon strips (Caudill, 1963; Harkins, 2004; Price, 2018; Vance, 2016).

As Americans embraced eugenics in the early 20th Century, they developed more aggressive stances toward disabled Appalachians. Writers in newspapers and medical journals called for exterminating and sterilizing them to prevent violence and mental illness (Harkins, 2004). In 1924, Virginia legalized compulsory sterilization for ‘mental defectives’ in state institutions. This broad category included individuals thought to have heritable traits like ‘idiocy, imbecility, feeble-mindedness or epilepsy.’ Three years later, the Supreme Court ruled in Buck v. Bell that Virginia’s law did not violate the 14th Amendment. In fact, Chief Justice Oliver Wendell Holmes argued that sterilizing the case’s disabled plaintiff would protect the public gene pool (Catte, 2018; Isenberg, 2016). Several Appalachian states passed compulsory sterilization laws during the next decade (Isenberg, 2016).

After the US established the Shenandoah Valley National Park in 1926, the Virginia State Colony for Epileptics and Feeble Minded once again protected industrial capital from disabled Appalachians. At the time, the park’s land housed about 500 Appalachian families. Before local business owners and politicians could benefit from tourism related to the new park, they first needed to evict its residents. They justified this by framing the valuable tracts of land in

Shenandoah Valley as literal breeding grounds for disabled individuals. The government moved at least 11 people from one family to the Virginia Colony (Catte, 2018).

Disabled Activism in Appalachia

Met with continuing marginalization, many Appalachians adopt politicized disabled identities. For much of the late 20th Century, Appalachian coal miners used wildcat strikes, mutual aid, and other tactics to secure disability benefits for black lung survivors (Carrol, 1999; Eller, 2008; Judkins, 1993; Long, 2019). Other disabled Appalachians protested environmentally harmful practices of regional coal companies, often by sabotaging equipment or placing their bodies in its path (Allen, 1993; Catte, 2018; Eller, 2008). Although the political activities of Appalachian wheelchair users have been documented less often than those of other disabled people, notable exceptions exist. Long (2019) discusses Jack Smith, a West Virginian wheelchair user and former coal miner. During a strike demanding benefits for black lung survivors, Smith’s wife wheeled him in front of a train to interrupt mine activities. Appalachian wheelchair users also helped block coal production in three states during a 1970 wildcat strike against dangerous mine conditions (Derickson, 1983). More recently, they joined other retired miners in Washington, DC to support the Miners Protection Act of 2015 (Parker, 2016).

Fooling

The tactics highlighted above are not the only forms of political activity available to Appalachian wheelchair users. They can also level political critiques by changing environmental affordances (Dokumaci, 2018; Gibson, 1979; Hamraie & Fritsch, 2019). When done in the Appalachian context and informed by the history of activism discussed above, Wise (2019) calls such changes ‘fooling.’ She describes her term as Appalachia's regional expression of bricolage, in which people creatively combine available materials into something new and useful (Lévi-

Strauss, 1962). Following Wise (2019), I argue that fooling among Appalachian wheelchair users constitutes a unique category of critical tinkering refracted through disabled Appalachian culture and history.

According to Wise (2019), fooling can mean ‘tinkering with or repurposing objects in ways that resist stereotypically class-based forms of taste’ (p. 340). This form of fooling has deeply political roots. Brashear (2019) reminds readers that corporations extracting salt, timber, coal, and gas have exploited Appalachia’s land and people for more than a century. As a result, many Appalachians have experienced periods of extreme poverty. As Hopper (2003) states in his discussion of people experiencing homelessness, people enduring such poverty often perform an ‘alchemy born of necessity’ (p. 191), turning society’s discarded objects into means of survival. Therefore, it should come as no surprise that the ability to perform this alchemy is central to the identities of many Appalachians.

Like oppositional affordances, fooling can also mean ‘using an object to ends for which it was not intended’ (Wise, 2019, p. 340). This form of fooling can be intentionally critical in the tradition of crip technoscience. For example, Wise (2019) shares that her joy with ‘stretching out the life of a thing’ comes partly from a feeling that doing so gives ‘a middle finger’ to capitalism’s preoccupation with technological novelty (p. 337). Her statement reflects the insights of science and technology scholars who favor maintenance of material environments over innovation. They argue that, while innovation promotes capital circulation, most socially important labor involves maintenance (Mattern, 2018; Russell & Vinsel, 2016). Attaching value to discarded materials can also be a way to turn classist logic on its head. As Isenberg (2016) documents, wealthy Americans have often justified the oppression of Appalachia and the Ozarks by comparing poor White Americans to ‘trash.’ By repurposing objects that others might throw away, Appalachians symbolically assert their own worth whether they mean to do so or not.

Collective Access

Although Wise (2019) does not define fooling as an inherently individual activity, her examples tend to describe single agents. Psychologists and technology researchers might call the affordances that these agents manipulate *intrapersonal* (Richardson et al., 2007). However, work from disability scholars outside Appalachia suggests the possibility for collective fooling. Sins Invalid (2019) defines collective access as a form of mutual aid in which disabled individuals work together to meet each other’s access needs. This allows them to achieve self-determination through *interpersonal* affordances, or possibilities for joint action (Richardson et al., 2007).

Many disabled writers and their allies document examples of collective access. For example, several authors discuss the group of blind, wheelchair-using, and non-disabled individuals who created mobility affordances at the University of California, Berkeley and formed the first Center for Independent Living (Hamraie, 2017; Hendren, 2020; Williamson, 2019). Others recount efforts by Black and Indigenous People of Color to interpersonally afford activities at a professional conference in Detroit (Mingus, 2010; Piepzna-Samarasinha, 2018). Hendren (2020) also highlights how wheelchair users at the Saling House near Boston use architecture and relationships to afford activities like gardening and community dining. But these accounts, like others in their genre, highlight collective access in or near major cities. As an Appalachian practice, collective fooling would occur mostly in rural areas with lower population densities and less developed infrastructure. Investigating collective fooling among Appalachian wheelchair users would strengthen collective access theory by applying it in a rural context. It would also enhance Wise’s (2019) fooling concept by considering its collective forms.

The Current Study

To date, neither psychologists nor disability scholars have examined critical tinkering among Appalachian wheelchair users explicitly. Likewise, authors have not yet explored how wheelchair users might alter affordances to pursue collective access in a rural context. The current study addressed these points with the following research questions:

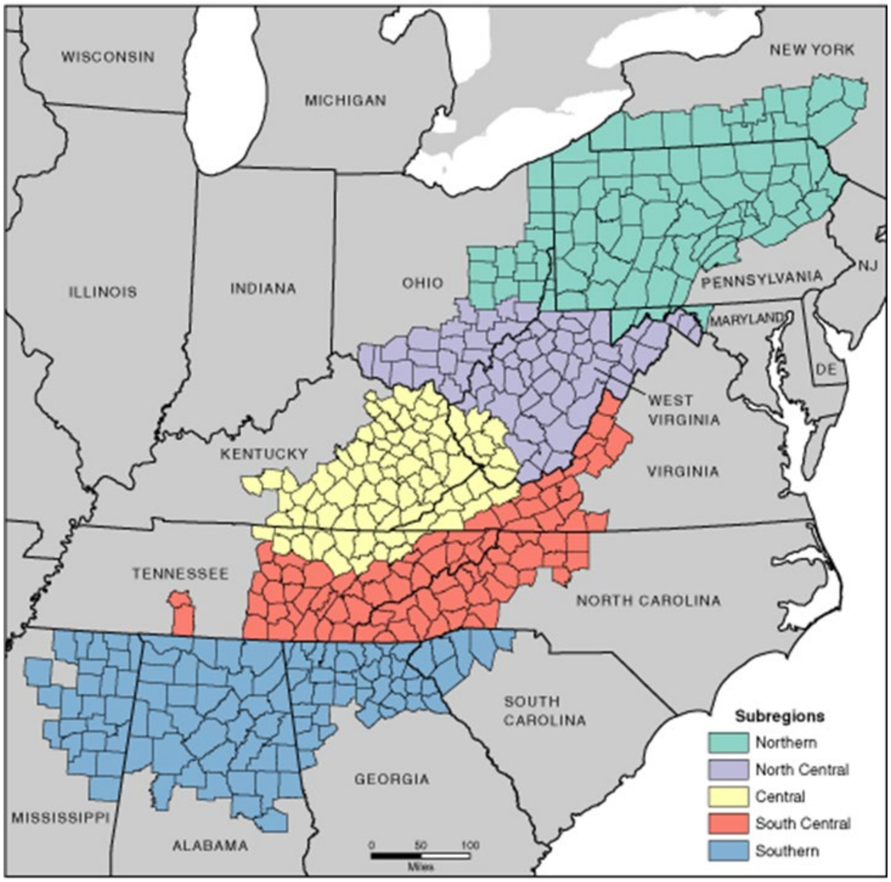
1. What kinds of fooling do Appalachian wheelchair users employ alone?
2. What kinds of fooling do they employ with others (i.e., collectively)?
3. To what extent is their fooling consciously critical?
4. How do non-wheelchair users react to their fooling?
5. How do their fooling practices compare to similar practices by wheelchair users outside Appalachia?

Methods

Setting

The Appalachian Regional Commission recognizes five Appalachian subregions. The current study primarily involved participants in North Central Appalachia, the subregion that includes southern Ohio and most of West Virginia. (Figure 2; Pollard & Jacobsen, 2020). In 2018, the North Central subregion had 2,396,063 residents with a median age of 41.8 years and a median household income of $63,356. In total, 50.3% of residents identified as female, 92.3% as White, 3.1% as Black, 2.9% as Another Race, and 1.7% as Hispanic or Latino. In addition, 58.9% of residents had a high school education, 12.9% had less than a high school education, and 28.2% had an Associate’s degree or more. Finally, 9.2% of adults were veterans, and 18.6% were disabled (Pollard & Jacobsen, 2020; US Census Bureau, 2019).

Figure 2. *Subregions of Appalachia*



Map by: Appalachian Regional Commission, November 2009.

Participants and Sampling

Participants for this study included 11 wheelchair users in North Central Appalachia, whom I identified through purposive snowball sampling. That is, I ended each interview by asking participants to recommend other qualified individuals. I also contacted willing participants connected to regional Veterans Affairs facilities and Centers for Independent Living. My final group of participants included seven men and four women. One participant identified as a Black woman, with the remaining individuals identifying as White. Participants' ages ranged from early twenties to late forties, and all but one person used a wheelchair full-time. Finally, 5 participants used power wheelchairs, 3 used manual wheelchairs, and 3 used both.

Data Collection

I conducted 11 semi-structured, one-hour interviews with wheelchair users and interested partners or caregivers. In order to avoid exposing participants to COVID-19, I conducted all interviews via Zoom or telephone. This approach allowed me to record and automatically transcribe each interview. Following each interview, I corrected each transcription for minor errors by comparing it to its associated audio recording. Each interview produced approximately 20 pages of text, providing more than 200 pages for analysis. I supplemented transcript data with observational notes taken immediately after each interview. These documented audiovisual data from interviews that transcripts could not capture. Finally, I obtained 23 images by asking willing participants to submit photographs depicting the results of their fooling.

Data Analysis

I analyzed transcribed data using Corbin and Strauss's (1990) constant-comparative method and qualitative analysis software. This process involved three phases. During the open coding phase, I read through transcripts and labeled concepts that emerged in response to each research question. In the axial coding phase, I combined open codes into major themes based on the frequency with which they appeared. During selective coding, I chose 'core' conceptual categories and developed a theoretical model relating all categories to one another. In order to ensure the credibility, dependability, and confirmability of my findings, I performed member checks with willing participants and triangulated data from transcripts, observations, and photographs.

Results

Individual fooling

When asked how they fool with their environments without involving others, participants tended to structure their answers according to Vicente and Rasmussen's (1990) *means-end hierarchy of affordances*. According to these authors, nearly all environments afford an overwhelming number of actions. To cope with this complexity, people organize affordances from most to least abstract. That is, we first identify a desired goal, then behaviors that will achieve that goal, and finally the actions that compose those behaviors (Vicente & Rasmussen, 1990; Wagman and Morgan, 2010; Wagman et al., 2016). For example, a person whose goal is to satisfy hunger may perform the behavior of cooking. Cooking further requires actions like cutting and stirring. Table 12 provides an abbreviated list of goals, behaviors, and actions related to my participants' individual fooling. It also shows the settings in which fooling occurred and the materials that participants used.

Individual differences. Participants listed many personal factors that influenced their fooling, one of which was height. For example, 6'5" Jason commonly encountered restaurant tables with legs built too short for him to use. To circumvent this problem at home, he extended the legs of his own tables with pipes made from polyvinyl chloride (i.e., PVC; Figure 3). In contrast, Keifer's limited arm span limited her ability to reach important items while seated. To compensate, she used a Reacher Grabber to operate light switches and pull up her socks.

Table 12. *Components of Individual Fooling by Appalachian Wheelchair Users*

Goals	Care for pets • Cleanliness • Comfort • Convenience • Employment • Fun • Health • Independence • Money • Movement • Occupy mind Personal growth • Privacy • Purpose • Safety • Self-expression
Activities	Cook • Customize • Cut • Decorate • Design • Drink • Drive • Exercise Game • Hunt • Invest • Paint • Park • Sew • Use toilet • Walk dog
Means	Crawl • Fold • Grab • Hop • Lie • Lift • Listen • Pull • Push Reach • Roll • Speak • Tie • Turn • Wrap
Materials	Bag • Battery • Bike cable • Board • Bottle • Bow • Box • Dowel rod • Drill Gloves • Gun • Harness • Hook • Hose • Kneepads • Pulley • Ramp Rope • Screwdriver • Shoestring • Steel • Stick • Stickers • Tape
Participants	Family • Friends • Online community • Professionals • Strangers
Settings	Home • Online • Outdoors • School • Work

Participants also varied their fooling practices according to the kinds of injuries and conditions they experienced. For example, Charma regularly trained her upper body, which her paraplegia did not affect. As a result, she could use her grip and arm strength to hop eight-inch curbs and descend stairs by holding onto railings. In contrast, Jason's paraplegia limited the fine motor skills he needed to open jars. However, he could complete this task by placing a rubber shelf liner between his palm and the jar's lid before turning his wrist.

Figure 3. *Table Leg Extended With PVC Pipe*

Some conditions resulted in different degrees of bladder control. Participants with little or no control purchased catheters and modified them to fit their needs. One person used a soda bottle to hold urine for later drainage. However, participants with full bladder control faced different elimination challenges. For example, urinals at one person's workplace allowed him to avoid the cumbersome process of entering restroom stalls. However, he found it difficult to use these urinals while wearing pants with buttons or zippers. By wearing Velcro pants, this participant managed to use the urinals and thereby remain at his office throughout the day.

Wheelchair differences. Due to insurance requirements, most participants replaced their wheelchairs only every five to seven years. Because different wheelchair models deteriorated at different rates and in different ways, my participants used a variety of fooling techniques to keep their chairs functioning between replacements. For example, Faith's wheelchair allowed her to rise to a standing position. This both helped her reduce blood clots and allowed her to grab items that Keifer might use her Reacher Grabber to reach. However, using an electric wheelchair led Faith to use her arm rests more frequently than a manual wheelchair user might. In response to the damage this caused her chair, she duct taped her arm rests at regular intervals.

As a manual wheelchair user, Andrew had fewer issues with arm rests but more with seats and wheels. When his seat began to separate from the rest of his chair, he initially used duct tape to reattach it. In fact, he briefly used duct tape *as* his seat when the original collapsed entirely. In another instance, Andrew taped a stick to his chair to replace a missing front wheel. This allowed him to maintain balance while using his other three wheels to move and change direction. Unfortunately, it also sometimes stopped his momentum abruptly, causing him to fall.

Collective fooling

Participants. Although participants engaged in collective fooling with wide range of people, they most commonly partnered with family members. They were especially likely to collaborate with their parents. For example, Case and his parents installed a flashlight on his cane, allowing him to light his surroundings during evening sporting events. Likewise, Keifer shared the following about her mother:

> Mom does a lot for me. She'll try to set things closer to the places that I need to reach. She's rearranged stuff for me that she knows I'll need throughout the day. She tries to keep things out of the walkway and stuff.

Participants also identified friends as fooling partners. Jason worked with a friend to design and install a device that allows him to drive (Figure 4). Likewise, he regularly plays online, point-and-click videogames with friends from college. By choosing to play games that accommodate his motor skills, Jason's friends co-create gaming as an affordance that he can access.

In addition to friends and family, professional workers participated in collective fooling with my participants. For example, Mecah uses speech-to-text technology to study Communications at a community college. Because this requires her to speak test answers aloud, she reserves rooms and takes exams alone. In order to afford this process, Mecah's accessibility coordinator rearranges the furniture in her exam rooms prior to testing. Likewise, a janitor at Faith's high school used a screwdriver to fix a recurring mechanical issue with her wheelchair. This helped her to move between classes when her wheelchair failed to operate as expected.

Figure 4. *Hand Controls and Armrest for Vehicle*

Settings. Relative to individual fooling, the collective fooling in which my participants engaged tended to occur in more public settings. For example, a considerable amount of collective fooling took place in educational settings. Faith's interactions with the janitor who fixed her chair occurred in her high school hallways. Likewise, Mecah collectively fooled with her accessibility coordinator on the grounds of her community college. In addition, Jason's college friend taught him to hang his wallet from a lanyard around his neck.

Workplaces also provided opportunities for collective fooling. My participants worked in a range of settings, including box stores, law firms, a construction company, and a sheriff's office. Because these settings varied in their capacity to accommodate wheelchairs, participants collaborated with friends, family, and coworkers to afford employment. At the time of this writing, Keifer was planning a return to work with her employer. Because she works in in a small space filled with wires that might obstruct her movement, their plans will involve arranging the office in a way that affords her work activities. This process will likely include moving furniture, clearing floor obstructions, and repositioning electrical cables. Likewise, Andrew and his father widened his work desk so that his wheelchair could fit beneath it.

Several of my participants discussed collective fooling that either took place outdoors or allowed them to engage in outdoor activities. For example, the flashlight attached to Case's cane helped him to navigate his family's farm safely during weekend campfires. Keifer and her parents used a long, flat platform called a slide board to transfer from her chair to family vehicles. At least once a week, they drove through their local park to enjoy its natural scenery. After his injury, regaining the ability to hunt deer was one of Justin's main goals. To afford this activity, he worked with friends and family members to alter his weapons. Justin described one such alteration as follows:

> I like to hunt. So I made my own bite trigger to put on my gun. I shoot with my teeth. We also made a rest for my muzzleloader rifle and shotgun. I had an electronic rest that had its own joystick and stuff. I'd aim it with that and hit the button to fire.

Finally, participants cited the internet as a setting that facilitated collective fooling. Sometimes this occurred directly, as shown by Jason's online gaming. Online forums also directly afforded community interactions that participants found inherently valuable. For example, Andrew regularly used an online forum to communicate with wheelchair users from around the country. However, the internet also indirectly inspired collective fooling in the physical world. The forum that Andrew frequented served as a key point of information exchange between wheelchair users. Recently, a person shared a negative experiences with an inaccessible virtual reality games. Forum members quickly flooded the post with nearly a dozen wheelchair-accessible games that the individual could enjoy with friends and family.

Reasons for fooling

Push factors. Most participants did not reference critical intent when asked why they fooled with their environments. That is, their actions were not designed to highlight the shortcomings of an inaccessible world. Instead, participants listed *push* factors that made fooling necessary and *pull* factors that made it appealing. Distance from services was one push factor for several of my participants. Andrew shared the following story:

> I lost a front caster when I was young. I put my chair in a canoe and I accidentally knocked my foot rest down into a lake about 40 feet. I dived in after it but it sank faster than I could swim to it. So, you know, I just lost stuff and I broke stuff. But [town] was an hour and a half away for us. And that was the closest wheelchair repair shop. Yeah. So you just figured out how to do stuff.

The cost of professional equipment was another factor pushing participants to fool. This was especially true when insurance failed to cover an item that a participant needed. As Brad noted:

> [Wheelchair equipment] companies know that people need [equipment]. So they know that there's a market for it. And they'll pay top dollar and they'll expect top dollar. You just got to deal with it and go with what you got. Because if they have equipment for a task, it's like hundreds of dollars. It's like okay, I'll just figure it out on my own.

Pull factors. The 'goals' section of Table 1 lists many of the factors that pulled participants toward fooling. These tended to be abstract ends that participants could better achieve by intervening in their environments. For example, most participants fooled in order to live more independently. When asked why he valued a tool that allowed him to release his catheter's bag with a button, one participant said: "It's huge. It gives you a ton of independence." Participants also fooled in order to work, enjoy human and interspecies relationships, express themselves, and have fun. For example, Andrew walked his dog by wrapping a leash around his wheelchair's foot pedals. Faith expressed her love of Star Wars by placing a sticker bearing her favorite character's image on the back of her chair (Figure 5). In addition, both Faith and Mecah took advantage of hands-free audiobooks to satisfy their shared love of science fiction novels.

Figure 5. *Sticker Placed on Wheelchair*

Reactions to fooling

Participants reported that reactions to their fooling were generally positive or neutral. Several people recounted times when others described their projects as cool or funny. For example, Faith used a sticker of a popular movie character to create opportunities for self-expression. When asked how people reacted to this fooling, Faith stated: “They don't really say nothing except it looks nice.” Likewise, Case shared that the flashlight attached to his cane drew “all kinds of attention, in a positive way.”

Surprise was another common response to fooling by my participants. For example, Justin uses a set of thick tires with prominent treads to participate in outdoor activities like mudding. As a result, he conducts many public activities with a mud-covered wheelchair. According to Justin, the sight of a muddy, all-terrain wheelchair prompted many people to express their surprise at his active lifestyle. Charma’s daily activities also drew surprise from those she encountered, causing her to reflect on their expectations. For example, Charma considers actions like grabbing doorframes to cross thresholds or holding railings to descend stairs to be mundane parts of moving through inaccessible environments. However, witnesses to these activities tend to praise Charma to degrees that she finds excessive. As she shared in our interview, “It’s like [people] think it’s amazing that I’m out living life.”

In addition to approval and surprise, fooling by my participants often elicited curiosity. The nature of this curiosity differed between those who did and did not use wheelchairs. Curiosity from non-wheelchair users usually developed from surprise. As Justin explained: “People see something they don't know. And they're just curious. They want to ask a bunch of questions.” In contrast, wheelchair users expressed a more practical curiosity after witnessing my participants’ fooling. According to Jason: “[Wheelchair users], when they notice something that they haven't seen before, they'll ask like ‘how'd you make that’, you know? We'll steal [ideas] from anybody to make our life a little bit easier.”

Significance of Appalachia

Natural and built environments. Living in Appalachia influenced my participants’ fooling in several ways. Multiple participants enjoyed outdoor activities offered by the region. This led them to fool in ways that made these activities possible. For example, Charma shared the following:

> We were riding four-wheelers at my friend’s house. And we used this stick to shift gears so we could ride.

Unfortunately, Appalachia’s terrain and weather patterns also challenged my participants’ activities. Sometimes this forced them to abandon their goals. For example, extreme heat during the summer of 2020 made Faith postpone her usual fishing activities. Likewise, rain and grassy terrain limited Charma and Jason’s opportunities to exercise, respectively. However, participants also found ways around these environmental barriers to their goals. For example, Mecah’s family pushed her heavy power wheelchair when it got stuck in one of Appalachia’s many gravel driveways.

Community values. Participants noted that their local community’s values also influenced their fooling. For example, several people described their community members as hard-working and persistent. When asked how his background influenced his activities, Jason answered: “I guess I just won’t give up. I stick to things I like to do.” Brad also connected the persistence he learned while growing up to his ability to create affordances, saying: “Don't let somebody tell you ‘no you ain't gonna [achieve a goal].” If you’ve got a great imagination, you can do anything. Just don't give up.”

Other participants highlighted kindness and willingness to help as Appalachian features that opened previously closed affordances. For example, Kiefer noted the following: “One of the benefits of a small town is that people are kind of always willing to help. Finally, participants connected their fooling to Appalachia’s tendency to encourage creative tinkering. For example, Andrew made the following connection between his identity and his love of fooling: “I'm a redneck at heart I guess. So it's fair to say that I'm okay with tinkering with stuff.” Likewise, Brad described an improvised exercise device he was designing as “a drawing in my portfolio of redneckery.” Brad intended to create this device by attaching pulleys to studs in his door frame.

Discussion

Individual Fooling

Participants in the current study were practical but willing to improvise. They often avoided fooling when an easier solution presented itself. For example, when Jason found that his quadriplegia prevented him from playing some videogames, he found games that did not require fine motor control. But participants who exhausted simple and affordable solutions fooled until they got what they wanted. When a threshold in Brad’s home made it difficult to move between rooms, he covered it with an affordable strip of aluminum instead of purchasing the expensive product recommended to him.

I argue that broken world thinking allowed my participants to respond to disaffordances with fooling instead of resignation. In contrast to worldviews that frame breakdown and decay as interruptions to normal societal processes, broken world thinking treats them as central features of human existence (Jackson, 2014). As my interviews revealed, few Americans are better positioned to embrace this worldview than Appalachian wheelchair users. As noted above, the same wheelchairs that offer mobility-disabled people independence also break down almost constantly. Appalachia's natural environment and unreliable infrastructure only encourage this process. This presents Appalachian wheelchair users with a choice: expect the world to function smoothly and experience regular frustration or expect it to break and prepare to fix it.

That being said, participants did not romanticize their fooling practices. As Andrew shared:

> People jerry rig [i.e., fool] because they don't have the funds or the means to do something. And you know, I've gotten older and now I have funds. And less time. So I do end up buying more stuff and fixing less stuff.

Andrew's statement reflects Nolan's (2018) insight that powerful actors idealize creative survival strategies to "enable and justify the perpetuation of economic instability." Moreover, exploitation of this kind has a long Appalachian history. For example, 20th Century mine owners used the gardens their Appalachian employees planted for survival to justify decreased wages (Stoll, 2017).

Collective fooling

In my introduction, I compared collective fooling to Sins Invalid's (2019) concept of collective access. However, the current study's results reveal the limits to this comparison. By definition, collective fooling is a form of mutual aid. This means that participants not only meet each other's survival needs but also reflect on and critique the conditions that left those needs unmet (Spade, 2020). For example, early members of the Black Panther Party provided services like food and medical care while also discussing structural racism with their neighbors (Spade, 2020).

When the current study's participants engaged in collective fooling, they rarely intended to critique existing social conditions or transform them through a larger social movement.

Instead, their actions seemed to be examples of *people as affordances*. Dokumaci (2016) defines *microactivist affordances* as fleeting, everyday ways in which disabled people alter environments to afford otherwise disafforded activities. According to Dokumaci (2020), people co-create and even become affordances through the daily care that they provide to their disabled loved ones. For example, Mecah's family enacted people as affordances by pushing her chair out of gravel driveways.

When discussing people as affordances, Dokumaci (2020) describes pain as a "leaky" experience that prompts action from disabled people's loved ones. That is, caregivers in her study intuited the pain of her disabled participants and felt compelled to reduce it. Through their actions, caregivers revealed interpersonal dimensions to disability and pain. In the current study, affordances displayed the same leaky quality as pain. It was common for parents, friends, and others to perceive and remove disaffordances from participants' environments. For example, Kiefer's mother placed items within Keifer's reach without explicit requests to do so. This reveals an interesting aspect of affordances. Although one person cannot *experience* another's affordances directly (Gibson, 1979), environmental barriers to the latter's goals can prompt the former to *behave* as if they experienced those affordances.

Reasons for fooling

When asked why they fooled with their environments, participants listed general goals that fooling helped them achieve. Readers familiar with Nussbaum (2013) will notice that these goals overlap considerably with her central capabilities. Building on work by Sen (1999), Nussbaum (2013) describes a capability as the freedom to perform a valued action or fill a desired role. She also argues that all people have the right to 10 central capabilities, which constitute minimum conditions for a fully human life. The first central capability is *life*, or the opportunity to avoid premature death. *Bodily health* refers to access to nutrition and shelter. *Bodily integrity* adds a person's ability to move freely and safely through an environment, enjoy sexual satisfaction, and make reproductive decisions. *Senses, imagination, and thought* indicate a person's ability to think, imagine, and express themselves. *Emotions* include opportunities to form attachments and experience the experience the full range of human feelings.

Nussbaum's *practical reason* is a person's ability to fill desired social roles and to examine and plan their own life. *Affiliation* includes opportunities to form relationships and experience empathy. It also requires freedom from social interactions that debase or humiliate a person. *Other species*, as the name implies refers to the ability to interact with plants, animals, and nature. *Play* includes opportunities to laugh and enjoy recreational activities. Finally, *Control over one's environment* has both political and material components. Political control refers to the freedom to engage in political activity without limits to speech or free association. Material control includes opportunities to hold property, maintain privacy, and seek meaningful employment.

The goals that prompted my participants to fool reflected nearly all of Nussbaum's central capabilities. For example, Faith pursued senses, imagination, and thought by placing a Star Wars sticker on her wheelchair. A desire for *bodily integrity* prompted Case to place a flashlight on his cane and Jason to use gloves to grip his wheels during inclement weather. Andrew's technique for walking his dog and Justin's weapon alterations both showed a desire to experience *other species*. In addition, Keifer's efforts to return to work show a keen interest in the material component of *control over one's environment*.

As Nussbaum notes (2013), her central capabilities implicitly assume non-disabled bodies and minds in some places. Many disabilities prevent individuals from seeking employment, holding property, or even living into old age. Moreover, central capabilities may interfere with each for many disabled people. For example, unbearable emotions threaten life and bodily health when those emotions trigger self-harm (Price, 2015). Still, the fact that the current study's participants mentioned central capabilities so frequently lends more support to Nussbaum's already respected framework.

Reactions to fooling

As participants moved through their communities, their fooling elicited approval, surprise, and curiosity in observers. Approving reactions likely reflect a mix of genuine affirmation and benevolent ableism, in which people attach admirable qualities to disabled people engaged in mundane activities (Nario-Redmond, 2019). But reactions of surprise and curiosity highlight fooling's potential to destigmatize wheelchair use. Disability stigma persists partly because people's assumptions about bodies rarely reach their conscious awareness. However, encountering a wheelchair user whose actions deviate from those assumptions requires an observer to resolve a contradiction between expectation and reality. To do so, they must either absorb the unexpected encounter into their existing worldview or alter it.

As Garland Thomson (2006) notes in her analysis of staring, disabled people can use this moment of sense-making to nudge observers toward new understandings of disability. For example, the surprise that Justin's muddy wheelchair evokes from observers offers him a chance to describe his outdoor activities. Likewise, neighbors who stop to ask about the flashlight on Case's cane may also learn about his love of high school sports and weekend campfires. These encounters may not prompt epiphanies in those who meet Justin or Case. However, they will force such individuals to acknowledge mudding and sports fandom as activities open to wheelchair users.

Significance of Appalachia

As disability scholars note, tinkering and persistence are necessary parts of life for disabled people living in a world built for their non-disabled peers. Given this reality, it was not surprising when several participants connected their fooling practices to their wheelchair use. However, it was interesting to hear a similar number of participants root their fooling in their Appalachian identities and values. These individuals identified their fooling as both a product of their community and a way to remain connected to that community. Wise's (2019) account of her path to studying Appalachian literature parallels this sentiment. According to Wise, discovering Lévi-Strauss's (1962) bricolage concept both affirmed her family's existing traditions and anchored her identity during a fellowship at Harvard University.

Appalachia's natural environment was a double-edged sword for my participants. Under the right conditions, the region's forests, fields, and rivers allowed them to fool in ways that afforded valued activities. At the same time, steeply graded terrain or inclement weather could stymie their plans. Disaffording factors became especially acute when combined with inadequate infrastructure. This is consistent with previous research on wheelchair use in rural areas. For example, Ripat et al. (2015, 2018) found that snow-covered sidewalks and icy surfaces kept Canadian wheelchair users from participating in their Manitoba communities during winter.

Limitations

The current study has several limitations that readers should consider. First, it focuses primarily on wheelchair users from a single Appalachian subregion. As such, my participants do not represent wheelchair users from other parts of Appalachia. Second, all but one of my participants identified as White. This means that the current study's results offer little insight into the lives of wheelchair-using Appalachians of color. Finally, I do not use a wheelchair or have any physical disabilities. Although I have attempted to foreground the ideas of my participants, each of my interpretations includes some element of my non-disabled worldview.

Conclusion

Disabled Appalachians have a long history of participating in visible movements against their corporate oppressors. Historians have documented this participation dutifully, and their accounts sprinkle university libraries across America. In contrast, few studies highlight the more mundane, daily rebellions that individuals like my participants launch against their stigmatizing surroundings. This study offered just one of what I hope will be many such studies. Disabled Appalachians have valuable things to say, and it behooves the rest of us to listen to them.

CHAPTER 6

GENERAL DISCUSSION

Several researchers call for collaborations between disability studies and community and environmental psychology. One goal of this dissertation was to answer that call by developing connections between built environments, affordances, and disability stigma. However, I also set out to draw connections between systems that fail disabled people and the methods disabled people use to circumvent those failures. This final chapter of my dissertation serves two purposes. First, it summarizes the chapters that precede it. Second, it integrates their most important lessons into a complementary whole.

Summary

Chapter 2 provided the theoretical framework on which I built chapters 3 through 5. I began this chapter by reviewing research on stigma against wheelchair users. Following Link and Phelan (2001), I defined stigma as a combination of labeling, stereotypes, separation, status loss, and discrimination in the context of group power differences. Next, I argued that environmental affordances that fit non-disabled bodies stigmatize wheelchair users. I based this argument on theoretical work from disability studies, ecological psychology, and science and technology studies. Finally, I discussed how wheelchair users alter built environments in ways that transform and critique their stigmatizing qualities.

In chapters 3 and 4, I found that a community's housing, transit, and sidewalk affordances had little connection to how its residents understood or treated wheelchair users and other mobility-disabled people. Although more accessible transit correlated to reduced rental discrimination in some cases, affordances did not have any detectable relationships to stigmatizing attitudes. In fact, affordances had weak and sometimes inverse relationships with each other. This challenged my assumption that cities form coherent landscapes of affordances, in which different aspects of their built environments communicate a clear preference for non-disabled people. Chapter 4 further revealed that disability stigma occurs at the community level and may reduce labor integration by mobility-disabled people. In addition to directly harming mobility-disabled people, this stigma may provide a hostile context for anti-stigma interventions.

Chapter 5 focused on the ways in which wheelchair users in Appalachia resist stigmatizing surroundings by 'fooling', or tinkering, with affordances. In general, participants identified goals that motivated their fooling, then behaviors that achieved those goals, and finally actions that composed those behaviors. They also identified a number of factors that cause fooling practices to vary from one person to another. Across a range of settings, participants collectively fooled with friends, family members, and professional workers. When asked why they fooled with their surroundings, they listed several abstract goals that closely matched Nussbaum's (2013) central capabilities. Finally, participants identified natural and built environments as well as community values as factors separating their fooling from that of wheelchair users outside Appalachia.

Synthesis

Incoherent landscapes of affordances

What lessons can we learn from the preceding chapters? First, American cities do not create coherent landscapes of affordances. Chapters 3 and 4 identified weak and sometimes conflicting relationships between affordances in transit, housing, and sidewalks in two different but overlapping samples of cities. Given this point, it is unsurprising that landscapes of affordances were almost completely unrelated to stigmatizing behaviors and attitudes in these chapters. According to Ramstead et al. (2016), people determine conventional affordances by predicting how those around them will react to a given behavior. We calibrate these predictions over time by learning which interpersonal cues correspond to others' intended actions. For example, I generally know whether someone in my community will let me speak with them by their words and body language. The same words and body language indicate this affordance for most people, even if I have never met them.

Built environments have the same discursive properties as speech or gestures (Ravelli & McMurtrie, 2016). That is, they convey meaning and thereby the cues needed to predict others' behaviors. However, my findings suggest two factors that give direct social cues (e.g., posture) a discursive advantage over built environments. First, most people who share a community use similar cues to convey similar intentions. In contrast, the meanings imparted by sidewalks and homes tend to have less consensus, and this is only complicated further by the unreliable relationships I found between aspects of built environments (Rosenberger, 2017).

Second, observers never interpret all the cues around them when attempting to determine conventional affordances. Instead, they seek some reliable cue of others' intentions and stop once they have found that cue. Compared to built environments, interpersonal cues are less *polysemous*, or open to interpretation. This makes them a faster and more salient way to determine local possibilities than built environments. Future studies should attempt to clarify the qualities that affect communication through built spaces. For example, how would the direct, confrontational messaging of crip technoscience affect community-level attitudes if applied through neighborhood- or city-level projects?

Community-level stigma

My findings also indicate that stigma operates at the community level as well as the individual level. Intraclass correlations from chapters 3 and 4 showed that stigmatizing behaviors and attitudes varied considerably between cities. Further, those stigmatizing attitudes were related to work participation by wheelchair users. Although the direction of this relationship remains unclear, it is at least plausible that community-level stigma reduces work opportunities for mobility-disabled people. That alone highlights the need for research that identifies the causes and correlates of disability stigma in American cities.

Unfortunately, systematic reviews report few robust evaluations of interventions designed to reduce stigma against disabled people at any level of analysis (Heijnders & Van Der Meij, 2006; Smythe et al., 2020). Existing evaluations also produce inconsistent results, and they rarely focus on wheelchair users. Researchers interested in reducing stigma against wheelchair users have ample room to design anti-stigma interventions and evaluate their effectiveness. Heijnders and Van Der Meij (2006) highlight advocacy campaigns and policy interventions as promising but understudied anti-stigma strategies. If data exist, researchers might compare community-level attitudes toward wheelchair users before and after the passage of major disability legislation.

Inadequate built environments

A third lesson from this dissertation is that cities across America routinely fail to provide wheelchair-accessible built environments. In doing so, they prevent wheelchair users from moving through their communities, affiliating with loved ones, and living in adequate homes. Nussbaum (2013) argues that these and other basic rights constitute capabilities, or fundamental entitlements that a just society must provide to each of its members. She further states that legislators, courts, and administrative agencies bear responsibility for enforcing these entitlements. Unfortunately, these entities continue to fail wheelchair users in the United States.

Public entities should, at minimum, enforce the entitlements that they already promise to wheelchair users. This would include enforcing the legal protections outlined in the Americans with Disabilities Act, the Fair Housing Act, and the Rehabilitation Act. However, even full enforcement of current laws will not guarantee Nussbaum's entitlements to American wheelchair users. This will require government agencies to take new actions. For example, Atlanta passed the first "visitability" ordinance in the United States in 1992. This ordinance required all builders to include wheelchair-accessible features in single-family homes and duplexes built with city funds. Related initiatives passed in cities and states across the country in the two decades that followed, although many of these had few if any enforcement procedures (AARP, 2014). In 2010, the United Kingdom changed its building regulations to require key accessibility features in *all* new, privately constructed dwellings (Imrie, 2006).

Appalachian fooling

The fourth lesson from my dissertation is that many factors drive fooling by Appalachian wheelchair users, most of which are not explicitly political. Fooling provides joy, practical solutions to daily problems, and meaningful interactions with loved ones. Although these things have political components, my participants tended not to address them. Using Nussbaum's (2013) language, fooling was how my participants "created capabilities" that their environments failed to produce. If doing so required a bit of "redneckery", it simply made the process more interesting.

That being said, fooling sometimes revealed implicit critiques of America's flawed social infrastructure. For example, several of my participants fooled because insurance companies will not pay for a replacement wheelchair until long after the original chair deteriorates. In a better scenario, the federal government would recognize wheelchairs as necessary instruments for daily living and require insurance companies to pay for regular replacements. Alternatively, the government could provide free and universal healthcare that covers wheelchairs for all who use them. Universal healthcare has broad support in the United States, and many similar nations have implemented it in some form.

The element of surprise

Finally, my dissertation emphasized surprise as a tool for countering disability stigma. Chapter 2 outlined crip technoscience, which uses non-compliant designs to force observers to reflect on their assumptions about bodies (Hamraie & Fritsch, 2019). In Chapter 3, I argued that transit's unexpected affordances might allow it to influence rental discrimination against wheelchair users. Later, I revisited this idea and connected it to the Situationist concept of détournement, in which artists critiqued capitalist society by retooling its parts for their own ends (Debord & Wolman, 1956). Finally, Chapter 5 discussed how fooling by Appalachian wheelchair users might surprise their neighbors into reflecting on stigmatizing assumptions. A famous line from a recent film reads: "If you live long enough, you see the same eyes in different people" (Abrams, 2015). I would add that if you read enough disciplines, you see surprise as one of our best tools for fighting disability stigma.

Conclusion

As I write these closing lines, one of COVID-19's many variants hovers over the world like an infectious storm cloud. Weakened by 50 years of disinvestment, the systems designed to protect us from acute threats to public health fail to fulfill their purpose. Many people can no longer endorse dominant ideas about embodiment or the social and economic systems that these ideas support. However, we also find that our societies have not prepared us to identify alternative ideas and systems. Now more than ever, we need to imagine worlds we have not experienced, and the work of disabled people offers us hope. Forced to live in communities built without their survival in mind, disabled people have had no choice but to critique the existing world and imagine alternatives. Enduring this disaster and the next will require us to embrace disabled praxis and the future it pursues.

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