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ABSTRACT

This study assesses whether there are differences in geographic access to and availability of a range of different amenities for a large group of persons diagnosed with severe mental illness (SMI) in Philadelphia (USA) when compared to a more general set of residential addresses. The 15,246 persons who comprised the study group had better outcomes than an equal number of geographical points representative of the general Philadelphia population on measures of geographic proximity and availability for resources considered important by people diagnosed with SMI. These findings provide support for the presence of geographic prerequisites for attaining meaningful levels of community integration.

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1. Introduction

Much is still to be learned about the quality of neighborhoods in which persons with severe mental illness (SMI) reside (Yasui and Berven, 2009; Zippay and Thompson, 2007). Initial studies on this topic, conducted in the 1970s and 1980s, presented evidence that persons diagnosed with SMI were, in the wake of deinstitutionalization, shunted to inner-city "service-dependent ghettoes" where they lived in proximity to community mental health services and amidst concentrated poverty (Dear, 1977). Low socioeconomic status, discrimination, and access to services were cited as factors that shaped this ecological niche. Much of this "landscape of despair" that Dear and Wolch (1987) describe has presumably changed with the emergence of such diverse dynamics as the waning influence of the psychiatric hospital, the upgrading of many of these erstwhile service-dependent ghetto areas, and the increasing attention paid to housing for persons with SMI after homelessness surged in the

1980s (Wolch and Philo, 2000). However, research in mental health geography has not kept up with these changes (Yanos, 2007), and has focused inordinately on services configurations at the expense of more general examinations of mental illness in the community (Deverteuil and Evans, 2009).

Research that has addressed this agenda confirms that the housing landscape for persons with SMI has indeed changed, with residential locations no longer as heavily clustered in poor, inner-city areas (Metraux et al., 2007; Zippay and Thompson, 2007; Wong and Stanhope, 2009). However, much of this research is limited in at least two respects. First, with the exception of Metraux et al. (2007), the studies focus on housing units that are part of publicly funded programs that couple community-based support services with provision of housing. While no precise data is available, residents of these housing programs represent a small fraction of persons with SMI living in the community, and the dynamics of where these housing units are situated differ substantially from how and where persons find housing on their own. Second, the studies that have examined neighborhood quality and persons with SMI largely use aggregated geographical indicators. These indicators, often taken from census data, are limited by neighborhood parameters based on the available data and are often inconsistent with residents' individual perceptions of their immediate environs (McWayne et al., 2007; Townley et al., 2008; Wright and Kloos, 2007; Yanos et al., 2007).

Instead of the neighborhood-level measures that are traditionally used in such geographic analyzes, this study assesses

relationships between locations of specific amenities, grouped by resource type, and residential addresses for 15,246 persons in Philadelphia who were eligible for Medicaid and were diagnosed with SMI, as well as for an equal number of geographical points that are representative of the residential distribution for the general Philadelphia population. Specifically, for each resource type, these relationships are measured in two ways: geographic access – the mean distance between addresses and the closest amenity, and availability – the mean concentration of amenities around addresses. What results is an analysis of whether or not the residences for the persons in the study group were, on average, comparable to the set of comparison points in terms of geographic access to and availability of amenities in various resource types. These resource types include supermarkets, public transportation, mental health services and others that were deemed important based on surveys about living preferences of persons with SMI.

Implicit to assessing these relationships between residence and resource types is assessing the geography of the city and its ability to facilitate geographic access and availability. Philadelphia is typical of other older, Northeastern and Midwestern US cities in a variety of characteristics that include high density residential patterns, mixed land uses, expansive public transportation systems, walkable neighborhoods, and a central business district which acts as a hub for the city. Philadelphia's deindustrializing landscape of the 1970s and 80s (Adams et al., 1991) created socioeconomic conditions conducive to service-dependent ghetto formation as the non-working poor took advantage of older, physically deteriorated neighborhoods that provided both low housing costs and ready access to needed services (Wolch, 1980). These inner city neighborhoods, while services rich, were presumed to be isolated from the mainstream economy and the presence of amenities that are vital elements of functional community (Wilson, 1996). More recently, however, forces such as gentrification and immigration have added economic and cultural heterogeneity to these areas (Simon and Allnut, 2007; Katz and Lang, 2003).

These trends have been linked to the fracturing of service-dependent ghetto areas and subsequent increases in homelessness and incarceration among persons with mental illness (Dear and Wolch, 1987). However, the changing characteristics of these neighborhoods also offer the opportunity for greater geographical access to and availability of a wider range of amenities that stand to improve quality of life and offer a platform for increased interaction within the community. Here the geography of a city such as Philadelphia, with its dense land use patterns and extensive public transportation network, offers particular advantage to persons with psychiatric disabilities and others that Wolch (1980) collectively referred to as the non-working poor.

Studies in the geography of mental health, in limiting their focus on access and availability of psychosocial services, and have overlooked the role of other amenities in facilitating the efforts of persons with psychiatric disabilities to lead healthy, meaningful lives in the community. Geographic access to and availability of resource types matter, not only for quality of life but also as a fundamental (yet incomplete) prerequisite for community integration. Geographic access and availability facilitate community integration on social and psychological dimensions (Wong and Solomon, 2002). Conversely, unfavorable disparities in these dynamics would indicate a continuing *a priori* disadvantage among this group. Such a disparity would recall the legacy of the service-dependent ghetto and would raise practical impediments to realizing other aspects of community integration.

2. Background

In assessing housing for persons with SMI, researchers have focused more attention on housing characteristics than on neighborhood characteristics (Newman, 2001; Zippay and Thompson, 2007; Wong and Stanhope, 2009). The literature examining housing preferences among persons with SMI (Piat et al., 2008; Parkinson et al., 1999; Srebnik et al., 1995; Sylvestre et al., 2007; Tanzman 1993) is illustrative of this. Here the primary focus has been on preferences regarding the housing itself – the nature of its physical attributes, the presence of cohabiting residents, and the juxtaposition of living arrangements with services. This narrow focus belies findings by Massey and Wu (1993) in which mental health consumers, when expressing their housing preferences, attached substantially higher importance to convenient location and proximity to mental health services than did case managers. The study also cited consumers as identifying transportation as a substantial barrier (where case managers did not). These findings underscored the importance of nearby amenities, and the lack of awareness of this dynamic by service providers.

Zippay and Thompson (2007) found that nearby amenities did in fact figure prominently in providers' decisions on where to place group residences for persons with SMI. Interviews with mental health administrators revealed their preference for locating facilities near commercial districts and mental health services. Locations with such geographic proximity both facilitated access and were more likely to meet their agencies' affordability criteria. Situating these residences in these types of neighborhoods often put them in areas with above average rates of poverty, but the authors also found these locations to be most amenable to promoting independence and interaction. Such a description, in which many of the low income neighborhoods in question were considered vibrant, heterogeneous, and socially engaging for the residents, contrasts with the notorious service-dependent ghettoes depicted in the older literature (Philo, 2005; Milligan, 1996). (Fig. 1).

More generally, resource access and availability are parameters of what Wong and Solomon (2002) describe as the physical dimension of community integration. This physical dimension encompasses how an individual "spends time, participates in activities, and uses goods and services in the community outside his/her home or facility in a self-initiated manner" (18). Assessing the role of amenities in facilitating community integration is a complex undertaking that involves considering both the actual physical amenities and consumer attitudes and preferences towards these amenities. Yanos et al. (2007) combine such subjective and objective dimensions in what they term "perceived opportunity" for taking advantage of available community resources. In another, similar conceptualization, Beal et al. (2005) describe amenities as "facilitators" in their study of the processes used by persons with SMI in establishing and maintaining social interactions in their communities.

One of the most innovative studies to focus on the role of place in community integration is Townley et al. (2008), who use participatory mapping and GIS methods to integrate physical and mental experiences of place by people with SMI. Their results showed that, while home was the most important "activity location,"

> [a] considerable portion of participants also reported that *social/leisure* activities (e.g., churches movies, YMCAs, etc) and *activities of daily living* (e.g., grocery stores, shopping centers, and restaurants) were locations where they spend the most time, deem most important, and obtain a sense of belonging. (527, emphases in original)

Such amenities become central to the experience of place for persons with SMI, and represent staging areas which facilitate community integration.

Wong et al. (2007), in a fidelity study of supported independent living facilities for persons with SMI, also link resource access and consumer preference to community integration. More explicitly than the other studies, they cite proximity and availability of resources as key features of resource access, in consideration of their role in facilitating residents' participation in community activities. And while publicly funded housing programs tend to be located in neighborhoods that are "resources rich" (Wong et al. 2007; Zippay and Thompson, 2007), the extent to which others in the population with SMI enjoy similar geographic access and availability to various types of resources is unknown. This study, then, examines the extent to which amenities favored by persons with SMI are in fact accessible and available to them on a broader scale than previous studies have examined.

3. Data and methods

3.1. Selection of study group and comparison addresses

Data on persons with SMI came from an administrative database on Medicaid recipients maintained by Community Behavioral Health (CBH), a publicly run managed-care organization that funds behavioral health services for Medicaid recipients in Philadelphia. Records were selected for persons who were eligible for Medicaid over the course of the entire calendar year 2000 and who had claims records including at least one inpatient or two outpatient Medicaid-reimbursed claims for services in which ICD-9 diagnoses of affective disorder (296) or schizophrenia (295) were present. These are common criteria for defining severe mental illness using administrative records (Lurie et al., 1992; Blank et al., 2002). Addresses were obtained from the Medicaid eligibility records for 16,439 persons who met these criteria in the year 2000. Addresses for 15,246 individuals (92.7%) were successfully geocoded, and this became the study group. While information on personal characteristics was collected on this group, only the location points for their addresses are used in this study's analyses. More information on the data and the procedures used to identify the study group is available in Metraux et al. (2007).

Addresses for this study group were compared to a set of 15,246 geographic points that represent the geographic distribution of Philadelphia's overall population. This set was generated using the Hawth's Tools Extension to ArcGIS (Spatialecology.com, 2009) and the shapefile of the Philadelphia street network from the US Census Bureau's TIGER-Line files (US Census Bureau, 2008). In this point generation process, locations were randomly selected from each Philadelphia block group, and the number of points generated for each census block group in Philadelphia was proportional to the population of that block group. This means that the number of geographic points for each block group was the block group population divided by 99.54, which is the quotient of the total Philadelphia population (1,517,550) and the number of observations in the study group (15,246). For each block group, each allocated point was randomly placed at a geographic location along a road in a process that simulated a residence location. The resulting set of comparison points could then be considered representative of residential locations for the Philadelphia population.

3.2. Selection of relevant resource types

Amenities were grouped here into resource types, and in order to determine important resource types, this study used results from a local survey of persons with SMI. This survey, a version of

the Community Resource Accessibility Index (CRAI) originally presented in Witten et al., 2003 and modified significantly by Brusilovskiy and Salzer (2010), was administered to 119 individuals at two community mental health centers in Philadelphia. Part of the survey involved asking respondents to rate the importance of having 47 resource types within 15 min walking distance or 5 min driving distance from their residence. The respondents rated the proximity of each resource type on a Likert scale ranging from not at all important (score of 1) to very important (4).

Twenty-one resource types received mean CRAI scores of at least 3 (somewhat important), and 17 of these resource types for which data on specific amenities were collected for this study are shown in Table 1 in order of their perceived importance by CRAI respondents. Of these 17, data on locations for 13 of these types were obtained from InfoUSA. InfoUSA is a commercial service that provides business and consumer databases for commercial applications. Information collected from this database was company name, location and the six-digit Standard Industry Classification (SIC) code that was used to categorize the data into each of the ten resource types. When resource types were based on InfoUSA data, Table 1 lists the SIC codes included as part of each resource type.

The resource type rated most important was supermarkets. Using InfoUSA data and adapting criteria from the California Center for Public Health Advocacy (2007), the resource type "supermarkets" included only the 125 establishments in the "Food Market" SIC category (541,105) that reported a sales volume of $1,000,000 or higher; were part of a chain; and had the word "supermarket" in their name.

Public transportation stops were rated second most important of the resource types. Data on public transportation stops were obtained from the Delaware Valley Regional Planning Commission for the year 2008. Geographic access to these stops was measured in three ways. The first used the entire set of 9491 public transportation stops run by the Southeast Pennsylvania Transportation Authority (SEPTA), resulting in a very high density of stops in essentially all parts of Philadelphia. Two subsets of these stops were also used as measures: the 136 stops that accommodated four or more bus and trolley routes, and the 135 subway and regional rail stops.

The next six resource types were related to health and mental health care. Location data on 40 Philadelphia hospitals, rated the third most important resource type, came from a list compiled by the Pennsylvania Department of Health and made available through the Pennsylvania Spatial Data Access (PASDA) Center at the Pennsylvania State University. Data on pharmacies (rated fourth), including chain stores and independent pharmacies; offices of medical doctors (rated sixth), including general practitioners and specialists; optometrist offices (rated seventh); and dentist offices (rated eighth) all came from InfoUSA. Information as to which of these providers accept Medicaid and would thus be accessible to the study group was unknown, but while Medicaid was widely accepted at hospitals and pharmacies, large proportions of Philadelphia physicians, dentists and optometrists did not accept Medicaid coverage.

Mental health services were rated the fifth most important resource type and this resource type includes both community mental health centers (CMHC) and mental health (MH) service providers. Along with CMHCs, the 128 MH services locations included partial hospitals, and outpatient MH providers who treated Medicaid-eligible patients in the year 2000. Data for the locations of these providers came from CBH.

Other resource types where location data came from InfoUSA were, in ranked order of importance, banks and credit unions; post offices; department stores; places of worship; dry cleaners

Table 1
Resources with CRAI importance scores of 3 or above[a,b].

Resource importance	CRAI mean (SD)	No. of identified locations	Information source (with SIC codes for Info USA data)
Supermarkets	3.81 (0.57)	125	Info USA - 541105 - Food markets
Public transportation stops[c]	3.80 (0.63)	9491	Regional planning commission data
Hospitals	3.79 (0.47)	40	PA Department of Health (PASDA)
Pharmacies	3.78 (0.56)	371	Info USA - 591205 - Pharmacies
Community mental health (MH) centers and MH services providers	3.70 (0.65)	128	City of Philadelphia Community Behavioral Health
Offices of medical doctors	3.69 (0.61)	6158	Info USA - 801101 - Physicians and Surgeons
Offices of optometrists	3.68 (0.66)	141	Info USA - 8042XX - Optometrists
Offices of dentists	3.65 (0.66)	1187	Info USA - 802101 - Dentists
banks	3.53 (0.83)	503	Info USA - 602101 - Banks; 602201 - State Commercial Banks; 603501 - Savings or Loan Associations; 606101 - Credit Unions (CUs); 606102 - Federally Chartered CUs
Post offices	3.48 (0.84)	49	Info USA - 43XXXX - Post Offices
Department stores	3.26 (0.84)	65	Info USA - 531102 - Department Stores
Place of worship	3.24 (1.09)	2733	Info USA - 866102 - Bible Schools and Study; 866104 - Church Organizations; 866105 - Christian Science Practitioners; 866107 – Churches; 866110 - Religious Organizations; 866112 - Synagogues
Dry cleaners & laundry services	3.21 (1.08)	662	Info USA - 721101 - Laundries; 721201 - Cleaners; 721501 - Laundries Self-Service; 721603 - Cleaners - Wholesale
Libraries	3.19 (0.93)	77	Info USA - 823104 - City Government Libraries; 823106 - Public Libraries
Shopping centers	3.14 (0.88)	124	City of Philadelphia Zoning (PASDA)
Restaurants, and coffee and ice cream shops[d]	3.09 (0.84)	3958	Info USA - 581206 - Food To Go (Carry-Out); 581208 - Restaurants; 581209 - Delis; 581215 - Box Lunches; 581217 - Appetizers, Snacks, etc.; 581219 - Sandwiches; 81222 - Pizza; 581224 – BBQ; 581227 - Italian Food Products; 581229 - Deli-Bakery; 581230 - Restaurants with Food Delivery; 5813XX - Drinking Places (pubs, bars) , 581203 - Ice Cream Parlors; 581228 - Coffee Shops; 581214 – Cafes
Barber shops, hair salons, & beauty shops	3.07 (1.11)	1940	Info USA - 723101 - Skin Treatments; 723102 – Manicuring; 723106 - Beauty Salons; 723108 - Make Up Studios; 724101 - Barber Shops

[a] Based on results from CRAI survey item asking respondents (119 persons diagnosed with SMI living in Philadelphia) to rate the importance of having each resource in proximity to their residences.

[b] Resource types listed as "somewhat important" (mean rating of 3 or higher) by CRAI respondents but not included here include smaller grocery stores (mean rating 3.50, SD 0.74); clothing and shoe stores (mean rating 3.21, SD 0.83); employment opportunities (mean rating 3.12, SD 1.02); and Job training and related services (mean rating 3.05, SD 1.05).

[c] Of 10,804 bus and trolley stops, 136 offered access to 4 or more routes. These multi-route stops were also analyzed as their own separate category.

[d] The restaurant and coffee shop resource type was combined with the ice cream shop resource type.

and laundry services; libraries; and a combined resource type of restaurants and coffee and ice cream shops. Places of worship and religious organizations, at 2733 locations, encompassed a diverse set of religions and facilities, but also did not encompass some types of religious establishments such as mosques, ashrams and shrines. The other resource type was shopping centers, which were extracted from the Philadelphia zoning shapefile provided by the PASDA center. This dataset identified 124 parcels in Philadelphia that were designated for commercial use with the codes "ASC" (Area Shopping Centers) and "NSC" (Neighborhood Shopping Centers).

Four resource types were excluded from this study because the establishments could not be consistently and reliably categorized given the available data. Employment opportunities along with job training and related services were excluded because location data were unavailable. Smaller grocery stores were omitted because a careful examination of InfoUSA data showed a number of omissions and problems with SIC code classifications for this resource type. Lastly, clothing and shoe stores were excluded because many stores in that category specialize in a specific type of apparel or style of clothing which would often be gender-specific.

Finally, because there are often no distinct physical boundaries which separate Philadelphia from the surrounding Bucks, Montgomery and Delaware counties in the north, west, and south of the city, individuals living in Philadelphia may take advantage of resources which are outside of the city limits. Therefore, whenever possible, locations were acquired for resources not only in Philadelphia but also the neighboring parts of Bucks, Montgomery and Delaware counties which lie within half a mile of the city boundaries.

3.3. Measuring differences in geographic access and availability

The spatial relationship between amenities (categorized by resource type) and locations of the residential addresses of persons with SMI and the comparison points was assessed in two ways. First, geographic access was represented by proximity – the Euclidean distance between residence location (or comparison point) and the nearest location for each resource type (e.g., supermarket, place of worship, etc.) and was calculated using the Spatial Analyst Extension to ArcMap (ESRI, 2006). Second, availability was measured by the concentration of amenities in a resource type that were located within a half-mile of each residence location (or comparison point). A half mile can be viewed as a 10-min walk by a fully abled, ambulatory person and is considered the outer bounds of what is walkable (Dittmar and Poticha, 2004; Daisa, 2004). While walkability involves factors other than distance measures (Frank et al., 2009), distance is commonly used as a proxy for walkability (Carr et al., 2010).

Euclidean distance, rather than the substantially more computationally intensive along-road (i.e. network) distance, was used in our analyzes. However, recent research looking at ways to measure geographic access to urban health services reported very high Pearson correlations between the Euclidean and network distances in urban areas (Apparicio et al., 2008).

To summarize, proximity and concentration of amenities served as two related but conceptually distinct metrics of community resource presence: the former a measure of geographic access and the latter a measure of resource availability. For certain resource types, only one of those two measures was presented due to contextual factors. Any concentration measure

less than one (i.e., where on average there was less than one amenity of a particular resource type within a half-mile radius of addresses) was not shown in the results as it was not considered a valid measure of availability. For example, since there are only 46 post offices in the study area, getting to a post office would be a geographic access issue and not one of choosing which of the nearby post offices would be the best to use. The same reasoning applied to libraries, hospitals, both public transportation subsets (but not the full set of stops), department stores, and shopping center resource types. Conversely, concentration would be a much more suitable measure for something like places of worship. Here if an individual is Protestant but the place of worship nearest to her house is a Catholic church, the proximity measure would not be useful. This problem was ameliorated with the concentration measure, as having more places of worship within a half-mile radius would make it more likely that one of the nearby facilities would have suitable qualities (including denomination). Place of worship was the only resource type where the access measure is omitted.

T-tests assessed whether differences in the mean measures of proximity and concentration differed between the study group and the comparison points. Parametric *t*-tests were appropriate, even though the distributions of some of the amenities examined here were heavily zero-inflated or skewed, because the large sample size in our study invalidated the need for the non-parametric alternatives (Lumley et al., 2002). While demographic information and other characteristics were reported for the study group, they were not included in any of the spatial analyzes.

This research was approved by institutional review boards of Temple University, the University of Pennsylvania, the University of the Sciences, and the City of Philadelphia.

4. Results

The characteristics of the study group (which do not figure into the analyses presented here) were reported in detail in Metraux et al. (2007). To summarize, the majority of the study group was female (65%); 60% were over age 40 (with one-quarter over age 50); and just about half were non-Hispanic Black, one-quarter were non-Hispanic White, and 12% were Hispanic. Almost three-quarters of the population (73%) were Medicaid-eligible by

virtue of receiving SSI benefits and 14% were Medicaid eligible through receipt of TANF welfare benefits. Seventy-seven percent had diagnoses of affective disorders, as compared to 39% who were diagnosed with schizophrenia (these diagnoses were not mutually exclusive). Among Medicaid-reimbursed services, one-third of the group had a record of an inpatient psychiatric stay and almost all had histories of outpatient care.

Fig. 1 shows the spatial distribution of points for the study group and the comparison points. While no tests of difference were performed here, the distributions were clearly different. The figure indicates that the study group was not as widely distributed across the city as the comparison points; was more densely concentrated in an area approximately at the center of the Philadelphia map, which corresponds to the North Philadelphia area of the city; and was less densely distributed through numerous other parts of the city.

Table 2 shows the results of the *t*-tests comparing the study group and the set of comparison points in terms of proximity and concentration. For most resource types, there were highly significant differences for both types of measures. For all but four resource types, differences in proximity favored the study group. Three of the four exceptions – "bus stops with 4 or more routes" subset of public transportation stops, department stores, and shopping centers had mean proximity measures that disadvantaged the study group, and there was no significant difference in the proximity of dentist offices. Among the 12 resource types that had valid concentration measures, seven (supermarkets, public transportation stops, pharmacies, mental health services, places of worship, laundry and dry cleaner services, and restaurants) had concentration measures that favored the study group, while four resource types (doctor offices, dentist offices, optometrist offices, and banks and credit unions) were significantly less concentrated, on average, around the study group locations. There was no significant difference in concentration for barber shop resource type.

Assessing the geographic access findings from Table 2 necessitates considering, for each resource type, both the absolute mean proximity and the differences in the mean proximity between the study group and the control points. The shortest mean proximity to the nearest amenity in a resource type for the study group was 380 feet (for any type of public transportation stop), and four other resource types (restaurants, doctor offices,
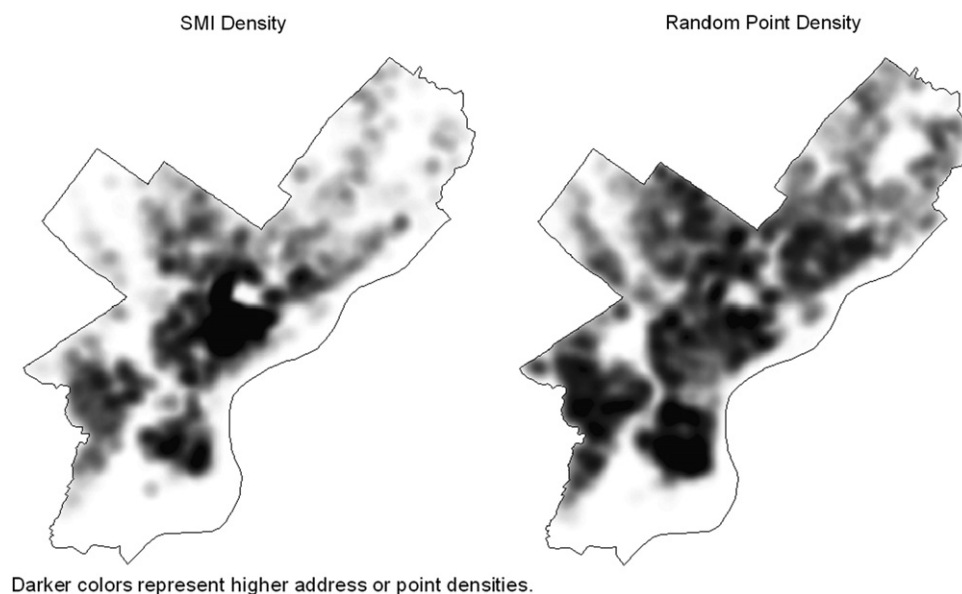

SMI Density   Random Point Density

Darker colors represent higher address or point densities.

Fig. 1. Densities of individuals with SMI and randomly generated points.

Table 2
Proximity to and concentration[a] of resources.

Resource Type	Proximity			Concentration		
	(Distance to nearest amenity in feet)			(Number of amenities within ½ mile)		
	SMI group mean	Random group mean	t-value	SMI group mean	Random group mean	t-value
Supermarkets	2,215	2,522	20.3***	1.2	1	17.1***
Public transportation						
All access points	380	435	15.4***	75.9	72.5	8.5***
Bus stops with 4 or more routes	10,804	9,777	16.6***	–	–	–
Subway or regional rail stops	3,064	3,645	20.8***	–	–	–
Hospitals	4,675	5,568	21.3***	–	–	–
Pharmacies	1,363	1,497	14.0***	3.6	3.1	14.8***
Community mental health (MH) centers & MH providers	2,461	3,253	32.4***	1.7	1.2	20.8***
Offices of medical doctors	952	988	4.9***	41.7	50.3	6.6***
Offices of Optometrists	2,868	2,944	4.0***	1	1.1	6.5***
Offices of dentists	1,364	1,351	1.3	7.8	9.8	9.4***
Banks & credit unions	1,672	1,727	4.8***	3.4	3.7	3.6***
Post offices	3,695	3,788	4.3***	–	–	–
Department stores	4,887	4,799	2.8**	–	–	–
Places of worship	–	–	–	25.26	20.89	22.6***
Dry cleaners & laundry services	984	1,180	22.5***	6.4	5.8	11.0***
Libraries	2,849	3,065	11.8***	–	–	–
Shopping centers	3,424	3,355	3.5***	–	–	–
Restaurants, bars, & ice cream & coffee parlors	545	701	26.3***	35.4	33.3	4.7***
Barber shops, hair salons, & beauty shops	752	851	13.9***	17.4	17.4	0.2

*$p < 0.05$; **$p < 0.01$.

*** $p < 0.001$.

[a] Accessibility measure for religious organizations and all concentration measures with mean less than one are not considered valid measures.

cleaners and barber shops) had a location, on average, less than 1000 feet from study group residences. These resource types all had differences in mean proximity between 100 and 200 feet and that favored the study group. Eight of the resource types had mean proximities to the nearest amenity of over a half-mile (> 2640 feet), and, among these resource types, four (optometrist offices, department stores, shopping centers, and multi-route bus stops) disfavored (i.e., were farther for) the study group. For department stores, optometrist offices and shopping centers, however, the relative differences, 90, 76, and 75 feet, respectively, were small relative to the mean proximity to the nearest location. The subset of bus stops with four or more routes, on the other hand, had both the farthest mean proximity to the nearest location and the biggest difference between the means for the study group and the comparison points.

Looking at concentration, 12 of the 19 resource types examined here had more than one amenity within a half-mile of the mean location point for the study group and the comparison points. Beyond that, the mean concentrations for the study group ranged from under four for four resource types to over 17 for four others. Four resource types – religious organizations, restaurants, doctor offices and dentist offices – had differences in mean concentration that were greater than one. The two former resource types favored and the two latter disfavored the study group.

5. Discussion

This study found that a large group of Medicaid recipients diagnosed with SMI had better outcomes, when compared to a representative distribution of Philadelphia locations, on measures of geographic proximity and availability for resources considered to be important to people diagnosed with SMI. These findings are contrary to the negative locational disparities associated with persons diagnosed with SMI and living in the community that were found in prior "waves" of geographical research on mental illness (Wolch and Philo, 2000). Furthermore, these findings

provide support for the presence of geographic prerequisites for attaining meaningful levels of community integration. Stated differently, while meaningful community integration involves much more than being geographically connected to desirable community resources, the findings here are encouraging.

The commercial resource types examined here, excepting shopping centers and department stores (both hardly neighborhood fixtures) were more geographically accessible and available for the SMI study group. The mean distances to the nearest restaurants, barber shops, and cleaners – typical neighborhood fixtures – were all the equivalent of less than three city blocks away for the study group. And while there was less than 100 feet difference in the mean distances for the comparison points, when these differences were cast in terms of the mean distances themselves, the resulting proportions were substantial. This suggests that people with SMI in this study were more likely than the typical Philadelphian to live near a commercial area featuring clusters of small businesses. Obviously this is not desirable in all cases, as personal preferences and the qualities of these commercial areas may not be compatible. Seen in the aggregate, however, these dynamics appear consistent with the siting decisions made by mental health administrators (Zippay and Thompson, 2007). These dynamics are also consistent with traditional neighborhood design concepts and their emphasis on spatially integrating housing with surrounding amenities as a means of community-building, and that have been best known in the context of the New Urbanism movement (Calthorpe, 2001; Kelbaugh, 1997).

It was not just small neighborhood establishments that were more available to the study group. Also proximate and more available to the study group were supermarkets, which represent a key amenity from the viewpoints of mental health consumers, advocates for low-income urban neighborhoods (California Center for Public Health Advocacy, 2007), and public health researchers (Laraia et al., 2004; Morland et al., 2006; Powell et al., 2007). Furthermore, mental health facilities, another key amenity cited by both mental health consumers and mental health

administrators (Zippay and Thompson, 2007), were also more available to the study group. This greater proximity to mental health facilities provides a degree of continuity with the old mental health geographies, however the availability of other amenities speaks against the spatial isolation that was characteristic of the service-dependent ghetto. This will be addressed in more detail shortly.

There were mixed results in the other health provider categories – doctor, dentist, and optometrist offices, hospitals, and pharmacies – as well as in the public transportation measures. These instances of mixed results underscore some of the challenges to interpreting the proximity and concentration measures used here. First, while proximity and concentration measures usually were consistent, as seen with the health provider resource types this was not always the case. These measures represent different dynamics, and it is unclear how to assess the comparative utility of each measure when they diverge, especially as the relative significance of proximity and concentration will vary with different resource types.

The mixed findings related to public transportation highlight the impact of qualitative factors on these resource types. In this case, the three different measures used in this study (all stops, subway stops, and multi-route bus stops) were borne of the difficulty in identifying the most useful set of locations for this resource type. As the results show, in a city such as Philadelphia, with most of its area consisting of dense, heterogeneous land uses serviced by an extensive public transportation system, most addresses are close to numerous transit stops. Some stops are more useful than others, and in an effort to identify such stops the other two measures were also included. What the optimal relationship between residence and transit stop would be remains unclear, and conclusions about this can differ based on the measure used. Regardless of this, these results show no clear disadvantage in geographic access and availability of public transportation for the study group.

These results suggest that persons in the study group were not more isolated from the amenities examined here as compared to addresses that represented Philadelphia's general population. More generally, this would imply that the residences of a large part of the Philadelphia's population diagnosed with SMI were not disadvantaged in terms of their relationships with their preferred amenities. Put in the context of older mental health geographies, the changes that Dear and Wolch (1987) saw as transforming the service-dependent ghetto led to positive externalities for its erstwhile residents along with the higher rates of homelessness, incarceration, and other collateral damage that also followed in its wake.

Three limitations to this study modify the positive nature of these findings. The first is that the study group was not representative of adults in Philadelphia diagnosed with SMI. The majority of the study group were both predominantly poor, based on the categories by which they are eligible for Medicaid, but also relatively stable, based on their having maintained Medicaid eligibility for at least one year. Specifically, the study group excluded persons with SMI who had income above the poverty level (i.e., those likely to work), as well as those with income below the poverty level but who did not participate in Medicaid or participated only sporadically (less than a year). All persons in the study group maintained Medicaid eligibility for at least one year and almost three-quarters were Medicaid eligible by virtue of their SSI receipt, indicating a regular income source and relative economic stability. Destabilizing phenomena such as extreme poverty, homelessness (and more generally, residential instability), and incarceration all would have made maintaining Medicaid eligibility for one year either difficult or impossible. There is no way of quantifying the number of people excluded by

this selection criteria, but it is clear that the study group over-represented persons with SMI whose living situations, judged by their ongoing receipt of medical and financial assistance, indicated a reduced degree of volatility.

Despite such qualifications, the size of the study group, with records for over 15,000 persons (approximately 7% of Philadelphia's overall adult poverty population), would mitigate against excessive selectivity. Furthermore, it is inherently worthwhile to examine the existence of locational disparities among those impoverished persons with SMI who presumably would have been best able to integrate into the community along other dimensions as well. However, those excluded from the study group because they were unable, unwilling or ineligible (not all poor persons are eligible for Medicaid) to maintain Medicaid eligibility would likely have had very different outcomes than those in the study group with regards to the measures presented here. This omitted group, by virtue of a mix of social, economic and mental health issues, also would have faced the most substantial barriers to more general community integration, and would have been most prone to the negative outcomes associated with the transformation of service-dependent ghetto areas. While the needs of this group should not be ignored, they should also not be construed as representative of the more general population diagnosed with SMI in Philadelphia.

The second limitation is that the data examined here only provided a limited amount of contextual information on amenities themselves and the neighborhoods in which they were located. Regarding the former, consumer preferences were taken into account in choosing specific resource types, however qualitative differences within these categories were not assessed. For example, a resource type such as "restaurants" included fast food and haute cuisine, and one type is unlikely to satisfy a preference for the other. Furthermore, places such as drinking establishments may facilitate interaction among community residents, or they may be regarded as nuisances and detract from a neighborhood's livability. Examining differences within resource types, using approaches such as those found in Lewis et al. (2005) and Sister, Wolch and Wilson (2010), would provide opportunities to address questions related to the quality of specific locales in a more general category, and add an additional level of nuance to the results found in this study.

There are other neighborhood-related factors that are also not addressed in this study. This includes omitted resource types such as parks, libraries, adult education centers, and social service centers. As mentioned, we limited our choice of resource types to those chosen as most important by a local survey of persons with SMI. While consumer preference provides a solid rationale for choice of resource types, the categories chosen here are clearly not exhaustive. Furthermore, the presence of other neighborhood factors – crime, pollution, housing quality – that can also speak to differential neighborhood quality are not addressed here but represent important vectors for continuing this research focus on spatial aspects of community integration.

In a final limitation, the geographic features of Philadelphia, discussed earlier, which stand to facilitate geographic access and availability to persons with limited means of mobility, also run the risk of being simplified in these analyzes. Densities in the city vary and are correlated with socioeconomic status, with the central city areas surrounded by considerably less dense neighborhoods in far Northeast or Northwest sections of the city. These areas have considerably more suburban characteristics—fewer businesses, more space between residences, less walkability, and less access to public transit routes. In contrast, individuals whose residence locations are examined here lived mainly in the denser North and West Philadelphia neighborhoods–areas which are considerably poorer, more affordable, and less likely to oppose

residences for persons with psychiatric disabilities (Metraux et al., 2007). Thus, while the findings from this study support parity in geographic access to and availability of amenities, they should not be construed to suggest that persons with psychiatric disability enjoy complete and equal integration into all areas of the city.

The unique features of Philadelphia geography also limit the generalizability of these findings. Insofar as they share such characteristics, these findings would likely be replicated in other "rust belt" US cities. But just as the concept of service-dependent ghetto is limited in its transferability (Milligan, 1996), the levels of geographic access and availability of amenities for persons with SMI will differ in locations with other geographic patterns. Given this, the generalizability of this study to locations and populations outside of Philadelphia is limited. Early studies on the geography of mental illness focused on urban centers that were, on one hand, services rich but nonetheless shunted and concentrated persons with SMI into less desirable neighborhoods. Several decades later, this study now presents evidence that persons with SMI have access to resources that are comparable or more advantageous than those of a representative set of addresses in Philadelphia. Studies specific to other localities, and other types of localities, would be needed to determine whether such findings apply more generally.

These analyzes looked at diagnosis of SMI as the common factor in the study group, comparing it to a set of comparison points that are geographically representative of the general Philadelphia population. These comparison points do not represent actual people, so factors influencing residential location such as income, race and ethnicity, and family status, could not be controlled for. The SMI diagnoses among the study group members are not monolithic, and diversity of specific diagnoses that fall under this rubric may influence residential opportunities and preferences. However, no significant or substantial differences emerged when those in the study group diagnosed with schizophrenia (DSM IV diagnosis of 295) were compared to the rest of the group for the mean distances and concentrations that are assessed in Table 2.

The resources data used in this study reflected a static "snapshot" of neighborhood amenities, and did not capture the dynamic nature of neighborhoods. Persons were selected for the study group based on their Medicaid records in 2000, the comparison point data was selected based on 2000 Census data, and much of the amenities data used here were current in 2000. A prominent exception to the latter, however, was the InfoUSA data, which were from a 2003 dataset. The extent to which the study group and comparison point data were temporally "mismatched" to the amenities data should not be substantial or systematic. A related concern is that this study, as a snapshot, cannot take into account neighborhood change over time, including (but not limited to) gentrification.

6. Conclusion

The findings in this study show that persons diagnosed with SMI living in the community were not disadvantaged with respect to geographic access to and availability of a variety of resources that matter to them and that may potentially serve as facilitators of community integration. As such, it is an indicator of spatial integration that is both prerequisite to deeper levels of community integration and underscores the need for incorporating more spatial aspects into research that examines the extent to which community integration is being realized. There are numerous directions for building upon this research, such as looking more directly at the relationships between accessible and available

resources and measures of community participation, and the role of neighborhood organization as building off of the former, and acting as a mediating factor for the latter. Much remains to be learned about the role of the built environment on community integration, to which this paper provides an initial step.

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