Published in final edited form as:

Soc Psychiatry Psychiatr Epidemiol. 2014 March ; 49(3): 477–485. doi:10.1007/s00127-013-0712-0.

Cognitive Impairment in Public Housing Residents Living in Western New York

Adam Simning¹, Yeates Conwell¹, and Edwin van Wijngaarden²

¹ University of Rochester School of Medicine and Dentistry, Department of Psychiatry

² University of Rochester School of Medicine and Dentistry, Department of Public Health Sciences

Abstract

Purpose—Many older adults in the United States live in public housing facilities and have characteristics that may place them at risk for cognitive impairment. Cognitive impairment has been largely unexamined in this socioeconomically disadvantaged population, however. We therefore aim to characterize its prevalence and correlates, which may help determine which residents could benefit from additional assistance to optimize their ability to function independently.

Methods—We interviewed 190 English-speaking public housing residents aged 60 years and older in Rochester, a city in Western New York, to assess sociodemographics, mental health, physical health and disability, coping strategies and social support, and service utilization. The Mini-Cog dementia screen evaluated cognitive status.

Results—Twenty-seven percent of residents screened positive for cognitive impairment. In bivariate analyses, older age, less education, greater duration of residence, worse health, less reliance on adaptive coping strategies, and greater utilization of health services were associated with cognitive impairment; age and worse health remained correlated with cognitive impairment in multivariable analyses. Anxiety, depression, and history of substance misuse were not associated with cognitive impairment.

Conclusions—The high level of cognitive impairment in public housing could threaten residents' continued ability to live independently. Further examination is needed on how such threats to their independence are best accommodated so that public housing residents at risk for needing higher levels of care can successfully age in place.

Keywords

Epidemiology; mental health; urban health; African American

Corresponding Author: Adam Simning, Ph.D. Department of Psychiatry University of Rochester School of Medicine and Dentistry 300 Crittenden Boulevard Rochester, NY 14642, USA Phone: 1-585-474-9534 Fax: 1-585-273-1066 adam_simning@urmc.rochester.edu. **Other Authors:** Yeates Conwell, M.D. Department of Psychiatry University of Rochester School of Medicine and Dentistry 300 Crittenden Boulevard Rochester, NY 14642, USA yeates_conwell@urmc.rochester.edu Edwin van Wijngaarden, Ph.D. Department of Public Health Sciences University of Rochester School of Medicine and Dentistry 265 Crittenden Boulevard, CU 420644 Rochester, NY 14642, USA edwin_van_wijngaarden@urmc.rochester.edu.

Conflict of interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

Introduction

In the United States, approximately 900,000 older adults with limited incomes live in public housing, with racial and ethnic minorities comprising most of the tenants (1). Older adult public housing residents tend to have low levels of education, be socially isolated, and have high levels of medical illness and functional impairment (2-4). Each of these characteristics has been associated with an increased risk for cognitive impairment (5-7). Moreover, almost half of public housing residents are non-Hispanic blacks (1), a group that has an elevated risk for cognitive impairment, with a non-public housing sample of African Americans having a 4.4 times increased risk compared to whites (OR = 4.4; 95% C.I. = 3.2 to 5.7) even after controlling for age, education status, and medical comorbidities (8).

Cognitive impairment also has been associated with commonly occurring mental disorders, including anxiety, depression, and alcohol abuse (9, 10). In public housing, the prevalence of late-life mental illness is 1.5 times higher than in a community-matched sample (11) and there are high levels of late-life anxiety and depression (3, 12). Furthermore, cognitive impairment is a major predictor of institutionalization (13), which is in turn associated with decrements in quality of life and greatly increased cost. For public housing residents, cognitive impairment was one of the strongest risk factors for subsequent nursing home placement in multivariable analyses (OR = 10.2; 95% C.I. = 3.7 to 28.6) (4).

Although older public housing residents have demographic and medical characteristics that may place them at risk for cognitive impairment, the influence of these factors has been largely unexamined in public housing. A study conducted of 945 residents aged 60 years and older living in Baltimore public housing facilities estimated the prevalence of cognitive disorders to be 10.5% using a combination of the Mini-Mental Status Exam and criteria from the Diagnostic and Statistical Manual of Mental Disorders, 3rd Edition (11). A much smaller pilot study of rural older adult public housing residents ($n = 20$) estimated the prevalence of cognitive impairment to be 15% (14). Although the Baltimore study examined the correlates of unmet mental health care need, which included cognitively impaired residents with prominent psychiatric symptoms (15), neither study specifically evaluated the correlates of cognitive impairment in this population.

There is also limited understanding regarding the influence of cognitive impairment on the utilization of health and supportive services (e.g., transportation assistance, onsite social workers) among public housing residents. Some preliminary evidence from other settings suggests that those with advanced cognitive impairment may rely less on problem solving (an adaptive coping strategy) (16) and that cognitive impairment is associated with increased use of home health care (OR = 3.4; 95% C.I. 1.8 to 6.4) and social services (OR = 2.3; 95% C.I. 1.1 to 4.9) (17). Distinguishing public housing from many other communities with low income, community-dwelling older adults is that public housing complexes frequently provide a variety of onsite services including social worker and transportation assistance (18). Such onsite services may play an important role in helping residents with cognitive impairment maintain their independence.

Public housing residents comprise a vulnerable population with considerable social and medical needs. In addition to these resident characteristics, many public housing facilities provide a uniquely supportive environment for low-income older adults (e.g., inexpensive rent and utilities, security services, resident councils) with many onsite services. In consideration of these resident- and facility-level characteristics, it is possible that the prevalence of cognitive impairment may be much higher in public housing than it would be in a different sample of community-dwelling older adults living in a less supportive environment. For our study situated in Western New York, we aimed to add to the sparse

literature on the public housing setting by examining the prevalence and correlates of cognitive impairment and its association with service utilization. Based on prior research, we hypothesized that older adult public housing residents with cognitive impairment will have differences in the sociodemographic (e.g., less education), associated mental illness (e.g., more depression), physical health and disability (e.g., more functional impairment), coping mechanisms and social support (e.g., less social support), and service utilization (e.g., more utilization of services) domains compared to residents without cognitive impairment. Estimating the prevalence of cognitive impairment and identifying correlates (which may precede cognitive impairment, be a consequence of it, or both) will help determine which residents may require additional services to maintain optimal independent functioning.

Methods

Study setting

From 2009 to 2010 we conducted a cross-sectional study to examine psychiatric illness among people living in four public housing high-rises reserved for adults aged 50 years and older in Rochester, a city in Western New York. In these high-rises there were 553 residents; 53% were female, 75% were non-Hispanic, 61% were black, and 72% were aged 60 years and older.

Sample

English-speaking residents aged 60 years and older with capacity to demonstrate informed consent were eligible to participate in a 1 to 3 hour interview. The interview examined characteristics spanning multiple sociodemographic and health domains, with participants receiving \$25. We evaluated capacity to provide informed consent with questions assessing the participants' understanding of the study. Eight residents were unable to demonstrate capacity for informed consent, six of whom were too cognitively impaired to understand our study. The two other residents unable to provide informed consent could not speak or comprehend English well. We did not use proxy informants. This study was approved by the University of Rochester Human Subjects Review Board.

One hundred ninety (180 non-Hispanic, 10 Hispanic) residents participated in the interview. Some residents had incomplete cognitive information and, unless otherwise noted, the study analyses consisted of 188 residents. As described elsewhere (12), we estimated a 62% response rate for the eligible non-Hispanic residents, of whom participants were younger than non-participants (66 vs. 72 years; $z = 3.749$, $P < 0.001$), but did not differ by race or gender. We were unable to estimate a response rate for the Hispanic residents because English-speaking status was unknown for 52% of them. Of the 13 Hispanic residents known to be English-speaking, we interviewed 10.

Cognitive impairment

Cognitive status was determined by the Mini-Cog test, a brief cognitive impairment screening tool for dementia (19). The Mini-Cog is well-suited to our study because it relies heavily on the Clock Drawing Test, which performs well in an ethnically, linguistically, and educationally diverse group of older adults (20). In addition to the Clock Drawing Test, the Mini-Cog includes a three-item recall. A positive cognitive impairment screen on the Mini-Cog requires: 1) an incorrect clock drawing and at least one incorrect item on recall or 2) three incorrect items on recall. The Mini-Cog has a sensitivity of 99% and specificity of 93% for identifying those with a probable dementia diagnosis as determined by a protocol that was modified slightly from the Consortium to Establish a Registry for Alzheimer's Disease and included interviews with knowledgeable informants (19).

Covariates

We examined variables that spanned five domains to provide a context for characterizing cognitive impairment, analogous to our examination of anxiety and depression in this population (12).

Sociodemographics domain—Self-report provided information on age, education, gender, ethnicity, race, marital status, and living status.

Associated mental health domain—We assessed anxiety with the Generalized Anxiety Disorder (GAD-7) scale, a seven-item scale scored from 0 to 21. A score of 10 or higher has a sensitivity of 68% and specificity of 88% for detecting either panic, generalized anxiety, posttraumatic stress, or social anxiety disorder (21). We evaluated depression with the Patient Health Questionnaire (PHQ-9) scale, a nine-item scale scored from 0 to 27. A score of 10 or higher has a sensitivity and specificity both equal to 88% for detecting major depression (22). A lifetime history of a substance use problem was present if the participant: 1) stated that alcohol or drugs had caused a serious social, medical, legal, or occupational problem during her lifetime, 2) endorsed current or past use of illicit drugs (excluding recreational marijuana use), or 3) endorsed addiction to and overuse of prescription medications.

Physical health and disability domain—This domain examined activities of daily living (ADLs) (23), instrumental activities of daily living (IADLs) (24), and self-reported physical health status (very bad, poor, fair, good, or excellent). ADL and IADL total impairment scores ranged from 0 to 6 and 0 to 8, respectively. If participants reported having no difficulty with an ADL or IADL it was scored as a 0; when participants had difficulty or were unable to perform an ADL or IADL it was scored as a 1.

Coping mechanisms, social support, and life events domain—We used the Brief COPE scale with its 14 two-item subscales to evaluate coping (25). Based on prior coping research (25-27), we grouped these 14 subscales into adaptive (humor, planning, using instrumental support, positive reframing, acceptance, religion, using emotional support, and active coping) and maladaptive (substance use, behavioral disengagement, denial, self-distraction, self-blame, and venting) coping, with summary scores ranging from 0 to 48 and 0 to 36, respectively. To examine isolation, the six-item Lubben Social Network Scale assessed family and friend support, with a total score ranging from 0 to 30 (28). The Multidimensional Scale of Perceived Social Support evaluated perceived social support with 12 questions and a total score ranging from 12 to 84 (29).

Service utilization domain—We combined items from the Cornell Services Index, which evaluates health services use (30), with items from a list of human and healthcare services (31) to characterize the past three months of services use. Our modified services use index had summary scores for the number of health (0 to 12) and human services (0 to 13) used. Self-report indicated whether a participant had a regular primary care physician. The three-month history of receiving assistance from the onsite social worker (yes/no) was determined by examining social worker records.

Statistical analyses

We used basic descriptive statistics (e.g., medians, interquartile ranges) to describe the prevalence of cognitive impairment and the characteristics of the residents. Bivariate analyses characterized differences between residents who screened positive for cognitive impairment and residents that did not. Differences in categorical variables were tested with Pearson Chi-Square and Fisher's Exact tests, and differences in continuous variables were

examined by the non-parametric Mann-Whitney Test. Based on the bivariate analyses, we included variables with a $P \leq 0.10$ in a multivariable logistic regression model with cognitive impairment status as the dependent variable. We considered variables with a $P \leq 0.05$ in either bivariate or multivariable analyses to be statistically significantly associated with cognitive impairment. Analyses were performed with SAS statistical software version 9.2 (SAS Institute, Inc., Cary, NC).

Results

Cognitive impairment prevalence

The Mini-Cog results are shown in Table 1. About half of the residents were unable to correctly perform the Clock Drawing Test (46.5%) or correctly recall all items on three-item recall (50.3%). In total, 27.1% of the residents screened positive for cognitive impairment.

Correlates of cognitive impairment

In bivariate analyses, residents who screened positive for cognitive impairment were older (71.5 vs. 65.6; $P < 0.001$), received less education (< 12 grade: 66.7% vs. 39.4%; $P < 0.001$), lived in the apartment complex longer (median years in apartment complex: 7.0 vs. 5.0 years; $P = 0.036$), reported worse physical health ($P = 0.001$), relied less on adaptive coping strategies ($P = 0.016$), and used more types of health services (median number of services: 2.0 vs. 2.0; mean number of services: 2.6 vs. 2.3; $P = 0.042$) than residents without cognitive impairment (Table 2).

Of the seven covariates with a $P \leq 0.10$, two reached statistical significance in a multivariable model. In this model, older age and worse self-reported physical health were associated with cognitive impairment (Table 3). Specifically, each additional year of age was associated with a 7% increased risk of having cognitive impairment (OR = 1.07; 95% C.I. = 1.00 to 1.15), while those with a self-reported physical health of poor or very bad had a 456% increased risk (OR = 4.56; 95% C.I. = 1.74 to 11.96).

Discussion

In consideration of the social and medical vulnerabilities of the public housing residents, as well as the supportive environment provided by the public housing facilities, we anticipated and subsequently found a high level of cognitive impairment. Of the older adult public housing residents who participated in our interview, more than one in four screened positive for cognitive impairment, which is higher than the cognitive disorder prevalence of 10.5% reported in a prior study of older public housing residents (11). The estimate of cognitive impairment in our study population may be conservative, however, as it only includes residents who had the cognitive capacity to provide informed consent. Furthermore, if we used either an abnormal Clock Drawing Test or an incorrect three-item recall as an indicator of possible cognitive impairment, 70.4% screened positive. For comparison, a community sample of older adults aged 75 to 79 years had cognitive impairment levels of 11.2% (32), much lower than in our sample of interviewees with a median age of 66 years. The younger age of our sample makes the elevated levels of cognitive impairment more concerning because, consistent with our findings, one of the most important risk factors for cognitive impairment is increasing age (nearly half of individuals aged 90 years and older have cognitive impairment) (32).

There are several possible explanations for the high level of cognitive impairment reported in our sample. First, public housing residents are known to have low levels of education and poor physical health, cognitive impairment correlates previously identified in other

populations (5-7); in our public housing sample, less education and worse reported physical health were associated with cognitive impairment. Congruent with our findings, a national study of older adults found that worse self-reported general health had a dose-dependent relationship with risk for cognitive impairment (33). Moreover, hypertension (5, 34), diabetes (34), and smoking (34) also have been associated with cognitive impairment, providing further evidence of a link between physical and cognitive health. Second, the social histories experienced by the public housing residents interviewed are important to consider, especially since alcohol abuse is associated with dementia (10). Third, cognitive impairment often co-occurs with mental illness (9), the prevalence of which is elevated in this setting (3, 11, 12, 35). Fourth, most of our study participants were African American, and African Americans are at greater risk than whites for cognitive impairment (8) and vascular dementia (36). In a sample similar to ours in race and age (i.e., African Americans with a mean age of 69 years), 22% were suffering from cognitive impairment (37).

Interestingly, based on an arbitrary but typically-used $P = 0.05$ to determine statistical significance, racial status and current anxiety and depression did not distinguish residents who screened positive for cognitive impairment from those who did not. Although not statistically significant ($P = 0.071$), a lifetime history of substance misuse was more common in residents without cognitive impairment (46.0%) than those with cognitive impairment (31.4%), which is unexpected given that alcohol abuse is associated with cognitive disorders (10). The reasons for these findings are not entirely clear. An important consideration is that both the public housing setting and its tenants are unique. With regard to the public housing residents, nearly half had a history of substance misuse. Prior research of Baltimore and Connecticut public housing residents and our study sample have shown that anxiety (3, 12) and depressive (3, 11, 12) disorders are also elevated. It is possible that these high baseline levels of mental illness may obscure the associations between mental illness and cognitive impairment that were established in other populations. These high baseline levels of mental illness suggest that future interventions targeting cognitive impairment should also consider addressing anxiety, depression, and substance misuse. An additional consideration is that neighborhood social cohesion may alleviate mental illness (38), and perhaps the public housing setting plays a role in reducing the risk of anxiety and depression among residents with cognitive impairment.

Another factor that may contribute to the high prevalence of cognitive impairment is that the public housing residences, although not certified as assisted living facilities, offer a structured and supportive environment for its residents that helps those with cognitive impairment to maintain independent living which may not be possible for them in other community settings. The public housing residents we interviewed had ready access to maintenance workers, security, visiting nurses, home health aides, and social workers, as well as highly subsidized rent and utilities. Also, due to the high concentration of socioeconomically disadvantaged older adults, many community programs were readily accessible to these residents (e.g., food programs, transportation assistance).

Further highlighting the services provided in the public housing setting is that in 1992, the U.S. Congress permitted the Department of Housing and Urban Development (HUD) to initiate the Service Coordinator Program in public housing to help residents age in place and live independently. Six-hundred forty-five HUD-assisted housing projects received funding for service coordinators (i.e., onsite social workers), who were perceived to have prevented early institutionalization for some residents (18). Cognitive impairment is known to place older adults at greater risk for institutionalization (39) and, because of these supportive services, it is possible that people with cognitive impairment who may struggle living independently in free-standing homes in the community can thrive in the public housing setting and age in place. Indeed, public housing residents with cognitive impairment had less

reliance on adaptive coping skills, potentially suggesting an impaired ability to function independently. Nonetheless, they also had less apartment turnover than residents without cognitive impairment (likely partly attributable to the older age of those with cognitive impairment). The public housing environment may have also alleviated some of the need for other service providers because, contrary to our expectations and with the exception of a modest increase in the number of health services used, cognitive impairment status was not associated increased services utilization. In our experience, the service coordinators appeared to be familiar with many of the residents who had severe cognitive impairment, but were less likely to identify residents with milder forms of cognitive impairment. If the service coordinators were to systematically screen the residents for cognitive impairment, it is possible that the coordinators would identify residents with mild cognitive impairment who could potentially benefit from additional health and social services (e.g., making regular appointments with the primary care provider).

Our study has several limitations to consider. First, defining cognitive impairment is an active area of research (40), and different definitions of cognitive impairment can lead to widely disparate prevalence estimates (41). Our study relied on the Mini-Cog to determine the presence of cognitive impairment, which may impact its comparability to other studies. The Mini-Cog, however, includes the Clock Drawing Test, which performs well in groups with limited educations and diverse backgrounds (20). The sensitivity and specificity for detecting probable dementia in the validation study of the Mini-Cog were high (99% and 93%, respectively) (19). The Mini-Cog does not perform as well in detecting less severe forms of cognitive impairment and has a sensitivity of 55% for identifying individuals with mild cognitive impairment (MCI); specificity was not reported (42). These data suggest that our study likely did not identify many residents with MCI, but without information on the specificity of the Mini-Cog for detecting MCI, we are unable to comprehensively assess how this impacts our prevalence estimate.

Second, our assessment of cognitive impairment is unable to account for whether the cognitive impairment represents a static (e.g., prior traumatic brain injury) or progressive (e.g., precursor to Alzheimer's dementia) illness. Identification of these two groups could have important implications for provision of onsite services (e.g., transportation) and in-home assistance (e.g., visiting nursing services) in the public housing setting.

Third, this was a cross-sectional study and was unable to evaluate whether variables placed residents at risk for, simply correlated with, or may be a consequence of cognitive impairment.

Fourth, this study occurred in Rochester, NY and had a non-response rate of almost 40%. Among public housing residents nationally, only 19% of residents are Hispanic while 47% are non-Hispanic black (1), which is relevant because study participation was relatively strong among non-Hispanic and African American residents. Based on the limited information available on the non-responders, our study thereby had a higher response from non-Hispanic and younger residents, which could limit its generalizability and possibly lead to an underestimate of the prevalence of cognitive impairment. Further assessing the potential impact of non-response bias is difficult, however, due to the wide range of reasons why residents did not participate. Another concern is that the onsite services provided to public housing residents in Rochester, NY may vary from services offered elsewhere. Such factors may impact the ability of residents with cognitive impairment to live independently.

In summary, our study suggests that cognitive impairment may be highly elevated in older adults living in public housing. Our hypothesis that previously-identified risk factors would distinguish between those with and without cognitive impairment was partially supported by

our findings. Of interest is that anxiety, depression, and history of substance misuse were not associated with cognitive impairment in this population. It is possible that these null findings are either population-specific (e.g., high baseline history of substance misuse obscures association) or environment-specific (e.g., public housing facility characteristics help reduce risk for anxiety and depression in residents with cognitive impairment). Further investigating which residents with cognitive impairment do and which do not function well in public housing, in addition to examining the individual- and facility-level characteristics that distinguish these two groups, could be of considerable public health relevance with respect to quality of life for those desiring to age in place with cognitive impairment.

The high prevalence of cognitive impairment is also noteworthy because, as a group, public housing residents are socioeconomically disadvantaged and may have few personal resources for managing cognitive impairment. The public housing setting likely offsets some of the resource limitations through the provision of onsite services and inexpensive housing. Since there are increasing numbers of people living with cognitive impairment, better understanding the factors that facilitate the ability of these residents to age in place is needed. For example, while the supportive services in the housing facilities may be a factor in helping residents with cognitive impairment age in place, perhaps being equally important is the structure provided in these facilities (i.e., predictable environments with rules to follow, safety, and a sense of someone looking after you) even without specific services being mobilized. Also unclear is how many public housing residents with cognitive impairment have or ultimately will develop dementia. As many older adults live in public housing, knowledge of the progression to dementia in residents and of factors that assist their aging in place would have important policy implications.

Acknowledgments

The authors thank the staff of the Rochester Housing Authority and Eldersource for making this research possible as well as the reviewers of this article for their time and expertise. The authors also would like to acknowledge the support of Susan G. Fisher, Ph.D., and Thomas M. Richardson, Ph.D., for their contributions in developing the original study. Adam Simning is a student in the Medical Scientist Training Program at University of Rochester, which is funded by the National Institutes of Health (NIH) T32 GM007356 grant. Grants from the Agency for Healthcare Research and Quality (AHRQ) (R36 HS018246), National Institute for Mental Health (NIMH) (R24 MH071604), and the National Center for Research Resources (NCRR) (TL1 RR024135), a component of the NIH, and NIH Roadmap for Medical Research, provided additional support for this research. The content is solely the responsibility of the authors and does not necessarily reflect the official views of the AHRQ, NIMH, NCRR, or NIH.

References

1. Burke, P. A picture of subsidized households in 1998: United States summaries. U.S. Department of Housing & Urban Development; Washington, DC: 1998.
2. Simning A, Conwell Y, Fisher SG, Richardson TM, van Wijngaarden E. The characteristics of anxiety and depression symptom severity in older adults living in public housing. *Int Psychogeriatr*. 2012; 24:614–623. [PubMed: 22018393]
3. Robison J, Schensul JJ, Coman E, Diefenbach GJ, Radda KE, Gaztambide S, et al. Mental health in senior housing: racial/ethnic patterns and correlates of major depressive disorder. *Aging Ment Health*. 2009; 13:659–673. [PubMed: 19882404]
4. Black BS, Rabins PV, German PS. Predictors of nursing home placement among elderly public housing residents. *Gerontologist*. 1999; 39:559–568. [PubMed: 10568080]
5. Luck T, Lupp M, Briel S, Riedel-Heller SG. Incidence of mild cognitive impairment: a systematic review. *Dement Geriatr Cogn Disord*. 2010; 29:164–175. [PubMed: 20150735]
6. Wu MS, Lan TH, Chen CM, Chiu HC, Lan TY. Socio-demographic and health-related factors associated with cognitive impairment in the elderly in Taiwan. *BMC Public Health*. 2011; 11:22. [PubMed: 21223555]

7. Yeh SC, Liu YY. Influence of social support on cognitive function in the elderly. *BMC Health Serv Res.* 2003; 3:9. [PubMed: 12775218]
8. Lopez OL, Jagust WJ, Dulberg C, Becker JT, DeKosky ST, Fitzpatrick A, et al. Risk factors for mild cognitive impairment in the Cardiovascular Health Study Cognition Study: part 2. *Arch Neurol.* 2003; 60:1394–1399. [PubMed: 14568809]
9. Vink D, Aartsen MJ, Schoevers RA. Risk factors for anxiety and depression in the elderly: a review. *J Affect Disord.* 2008; 106:29–44. [PubMed: 17707515]
10. Thomas VS, Rockwood KJ. Alcohol abuse, cognitive impairment, and mortality among older people. *J Am Geriatr Soc.* 2001; 49:415–420. [PubMed: 11347785]
11. Rabins PV, Black B, German P, Roca R, McGuire M, Brant L, et al. The prevalence of psychiatric disorders in elderly residents of public housing. *J Gerontol A Biol Sci Med Sci.* 1996; 51:M319–M324. [PubMed: 8914505]
12. Simning A, van Wijngaarden E, Fisher SG, Richardson TM, Conwell Y. Mental healthcare need and service utilization in older adults living in public housing. *Am J Geriatr Psychiatry.* 2012; 20:441–451. [PubMed: 22522961]
13. Gnjdic D, Stanaway FF, Cumming R, Waite L, Blyth F, Naganathan V, et al. Mild cognitive impairment predicts institutionalization among older men: a population-based cohort study. *PLoS One.* 2012; 7:e46061. [PubMed: 23029389]
14. Fisher KM, Copenhaver V. Assessing the mental health of rural older adults in public housing facilities: a comparison of screening tools. *J Gerontol Nurs.* 2006; 32:26–33. [PubMed: 16972606]
15. Black BS, Rabins PV, German P, McGuire M, Roca R. Need and unmet need for mental health care among elderly public housing residents. *Gerontologist.* 1997; 37:717–728. [PubMed: 9432988]
16. de Souza-Talarico JN, Chaves EC, Nitrini R, Caramelli P. Stress and coping in older people with Alzheimer's disease. *J Clin Nurs.* 2009; 18:457–465. [PubMed: 19077019]
17. Ganguli M, Seaberg E, Belle S, Fischer L, Kuller LH. Cognitive impairment and the use of health services in an elderly rural population: the MoVIES Project. *J Am Geriatr Soc.* 1993; 41:1065–1170. [PubMed: 8409151]
18. KRA Corporation. Evaluation of the service coordinator program. US Department of Housing and Urban Development; Washington, DC: 1996.
19. Borson S, Scanlan J, Brush M, Vitaliano P, Dokmak A. The Mini-Cog: a cognitive 'vital signs' measure for dementia screening in multi-lingual elderly. *Int J Geriatr Psychiatry.* 2000; 15:1021–1027. [PubMed: 11113982]
20. Borson S, Brush M, Gil E, Scanlan J, Vitaliano P, Chen J, et al. The Clock Drawing Test: utility for dementia detection in multiethnic elders. *J Gerontol A Biol Sci Med Sci.* 1999; 54:M534–M540. [PubMed: 10619314]
21. Kroenke K, Spitzer RL, Williams JB, Monahan PO, Lowe B. Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. *Ann Intern Med.* 2007; 146:317–325. [PubMed: 17339617]
22. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med.* 2001; 16:606–613. [PubMed: 11556941]
23. Katz S, Ford AB, Moskowitz RW, Jackson BA, Jaffe MW. Studies of illness in the aged. The Index of ADL: a standardized measure of biological and psychosocial function. *JAMA.* 1963; 185:914–919. [PubMed: 14044222]
24. Lawton MP, Brody EM. Assessment of older people: self-maintaining and instrumental activities of daily living. *Gerontologist.* 1969; 9:179–186. [PubMed: 5349366]
25. Carver CS. You want to measure coping but your protocol's too long: consider the Brief COPE. *Int J Behav Med.* 1997; 4:92–100. [PubMed: 16250744]
26. Carver CS, Scheier MF, Weintraub JK. Assessing coping strategies: a theoretically based approach. *J Pers Soc Psychol.* 1989; 56:267–283. [PubMed: 2926629]
27. Lunsford SL, Simpson KS, Chavin KD, Hildebrand LG, Miles LG, Shilling LM, et al. Racial differences in coping with the need for kidney transplantation and willingness to ask for live organ donation. *Am J Kidney Dis.* 2006; 47:324–331. [PubMed: 16431262]

28. Lubben J, Blozik E, Gillmann G, Iliffe S, von Renteln Kruse W, Beck JC, et al. Performance of an abbreviated version of the Lubben Social Network Scale among three European community-dwelling older adult populations. *Gerontologist*. 2006; 46:503–513. [PubMed: 16921004]
29. Zimet GD, Dahlem NW, Zimet SG, Farley GK. The Multidimensional Scale of Perceived Social Support. *J Pers Assess*. 1988; 52:30–41.
30. Sirey JA, Meyers BS, Teresi JA, Bruce ML, Ramirez M, Raue PJ, et al. The Cornell Service Index as a measure of health service use. *Psychiatr Serv*. 2005; 56:1564–1569. [PubMed: 16339619]
31. Toseland RW, McCallion P, Gerber T, Dawson C, Gieryic S, Guilamo-Ramos V. Use of health and human services by community-residing people with dementia. *Soc Work*. 1999; 44:535–548. [PubMed: 10568026]
32. Rait G, Fletcher A, Smeeth L, Brayne C, Stirling S, Nunes M, et al. Prevalence of cognitive impairment: results from the MRC trial of assessment and management of older people in the community. *Age Ageing*. 2005; 34:242–248. [PubMed: 15863409]
33. van Wijngaarden E, Winters PC, Cory-Slechta DA. Blood lead levels in relation to cognitive function in older U.S. adults. *Neurotoxicology*. 2011; 32:110–115. [PubMed: 21093481]
34. Das SK, Bose P, Biswas A, Dutt A, Banerjee TK, Hazra AM, et al. An epidemiologic study of mild cognitive impairment in Kolkata, India. *Neurology*. 2007; 68:2019–2026. [PubMed: 17548552]
35. Simning A, van Wijngaarden E, Conwell Y. Anxiety, mood, and substance use disorders in United States African-American public housing residents. *Soc Psychiatry Psychiatr Epidemiol*. 2011; 46:983–992. [PubMed: 20617430]
36. Froehlich TE, Bogardus ST Jr, Inouye SK. Dementia and race: are there differences between African Americans and Caucasians? *J Am Geriatr Soc*. 2001; 49:477–484. [PubMed: 11347796]
37. Gamaldo AA, Allaire JC, Sims RC, Whitfield KE. Assessing mild cognitive impairment among older African Americans. *Int J Geriatr Psychiatry*. 2010; 25:748–755. [PubMed: 20069588]
38. Johns LE, Aiello AE, Cheng C, Galea S, Koenen KC, Uddin M. Neighborhood social cohesion and posttraumatic stress disorder in a community-based sample: findings from the Detroit Neighborhood Health Study. *Soc Psychiatry Psychiatr Epidemiol*. 2012; 47:1899–1906. [PubMed: 22526824]
39. Lupp M, Riedel-Heller SG, Luck T, Wiese B, van den Bussche H, Haller F, et al. Age-related predictors of institutionalization: results of the German study on ageing, cognition and dementia in primary care patients (AgeCoDe). *Soc Psychiatry Psychiatr Epidemiol*. 2012; 47:263–70. [PubMed: 21181110]
40. Sachdev PS, Ganguli M, Petersen RC. How can we best categorize cognitive impairment in nondemented older adults? *Am J Geriatr Psychiatry*. 2010; 18:657–661. [PubMed: 21491626]
41. Kochan NA, Slavin MJ, Brodaty H, Crawford JD, Trollor JN, Draper B, et al. Effect of different impairment criteria on prevalence of “objective” mild cognitive impairment in a community sample. *Am J Geriatr Psychiatry*. 2010; 18:711–722. [PubMed: 21491632]
42. Borson S, Scanlan JM, Watanabe J, Tu SP, Lessig M. Simplifying detection of cognitive impairment: comparison of the Mini-Cog and Mini-Mental State Examination in a multiethnic sample. *J Am Geriatr Soc*. 2005; 53:871–874. [PubMed: 15877567]

Table 1

Cognitive impairment in older adults living in public housing

	n^a		95% Confidence Intervals ^b
<u>Clock Drawing Test</u>			
Correct	100	53.5	46.1-60.8
Incorrect	87	46.5	39.2-54.0
<u>Three-Item Recall</u>			
3 Correct	94	49.7	42.4-57.1
2 Correct	56	29.6	23.2-36.7
1 Correct	27	14.3	9.6-20.1
0 Correct	12	6.4	3.3-10.8
<u>Cognitive Impairment^c</u>			
Present	51	27.1	20.9-34.1
Absent	137	72.9	65.9-79.1

^aTotal *n* for the Clock Drawing Test, three-item recall, and cognitive impairment screen was 187, 189, and 188, respectively

^b95% confidence intervals for the summary point estimates determined using exact methods

^cA positive screen for cognitive impairment requires: 1) An incorrect clock and at least one incorrect item on recall or 2) three incorrect items on recall

Table 2

Sample characteristics categorized by cognitive impairment grouping

Characteristics	Total, <i>n</i> = 188 ^a % or Median (Interquartile Range)	Cognitive Impairment, <i>n</i> = 51 % or Median(Interquartile Range)	No Cognitive Impairment, <i>n</i> = 137 % or Median (Interquartile Range)	<i>P</i> ^b
<i>Sociodemographics</i>				
Age, years	66.2 (63.0, 72.4)	71.5 (64.9, 77.0)	65.6 (62.5, 69.7)	<0.001
Education				<0.001
< Grade 12	46.8	66.7	39.4	
Grade 12	53.2	33.3	60.6	
Gender				0.254
Female	58.0	64.7	55.5	
Male	42.0	35.3	44.5	
Ethnicity				0.464
Hispanic	5.3	7.8	4.4	
Non-Hispanic	94.7	92.2	95.6	
Race				0.177
Black	79.8	86.3	77.4	
Non-Black	20.2	13.7	22.6	
Marital Status				0.602
Married	18.1	15.7	19.0	
Unmarried	81.9	84.3	81.0	
Years in Apartment Complex	5.8 (3.0, 10.0)	7.0 (4.0, 15.0)	5.0 (3.0, 10.0)	0.036
Lives Alone				1.000
Yes	91.5	92.2	91.2	
No	8.5	7.8	8.8	
<i>Associated Mental Health</i>				
Anxiety Score	2.0 (0.0, 5.0)	1.0 (0.0, 3.0)	2.0 (0.0, 5.0)	0.313
Depression Score	4.0 (2.0, 8.0)	4.0 (1.0, 7.0)	4.0 (2.0, 8.0)	0.264
Substance Misuse History				0.071
Yes	42.0	31.4	46.0	
No	58.0	68.6	54.0	
<i>Physical Health and Disability</i>				
Number of ADLs Impairments ^c	0 (0, 1.0)	0 (0, 1.0)	0 (0, 1.0)	0.428
Number of IADLs Impairments ^d	0 (0, 2)	0 (0, 1.0)	0 (0, 2.0)	0.222
Self-Report Physical Health Status				0.001
Very Bad or Poor	13.8	27.5	8.8	
Fair, Good, or Excellent	86.2	72.5	91.2	
<i>Coping Mechanisms and Social Support</i>				
Adaptive Coping	31.0 (25.0, 36.0)	28.0 (20.0, 34.0)	32.0 (26.0, 36.0)	0.016
Maladaptive Coping	9.0 (7.0, 12.0)	9.0 (7.0, 11.0)	9.0 (7.0, 12.0)	0.725
Social Network Size	15.0 (11.0, 20.0)	15.0 (12.0, 20.0)	15.0 (11.0, 20.0)	0.554

Characteristics	Total, <i>n</i> = 188 ^a % or Median (Interquartile Range)	Cognitive Impairment, <i>n</i> = 51 % or Median(Interquartile Range)	No Cognitive Impairment, <i>n</i> = 137 % or Median (Interquartile Range)	<i>P</i> ^b
Perceived Support	66.0 (58.0, 75.5)	65.0 (61.0, 76.0)	67.0 (57.0, 75.0)	0.434
<i>Service Utilization</i>				
Number of Health Services ^e	2.0 (2.0, 3.0)	2.0 (2.0, 3.0)	2.0 (2.0, 3.0)	0.042
Number of Human Services	2.0 (1.0, 2.0)	2.0 (1.0, 2.0)	2.0 (1.0, 2.0)	0.776
Regular Primary Care Physician				0.294
Yes	94.1	98.0	92.7	
No	5.9	2.0	7.3	
Onsite Social Worker Use (past 3-months)				0.513
Yes	43.1	39.2	44.5	
No	56.9	60.8	55.5	

^aTwo subjects were missing cognitive impairment screening information

^b*P* determined by chi-square tests (degrees of freedom = 1) or the Fisher's Exact Test for categorical variables and Mann-Whitney tests for characteristics with median values

^cMean number of ADL impairments by those with and without cognitive impairment was 0.5 and 0.6, respectively

^dMean number of IADL impairments by those with and without cognitive impairment was 1.0 and 1.3, respectively

^eMean number of health services used by those with and without cognitive impairment was 2.6 and 2.3, respectively

Table 3

Multivariable logistic regression analysis of correlates associated with cognitive impairment status

Domains	Odds Ratio	95% Confidence Intervals
<i>Sociodemographics</i>		
Age, years	1.07 *	1.00-1.15
Education (reference: Grade 12)	1.93	0.89-4.20
Years in Apartment Complex	1.02	0.96-1.09
<i>Associated Mental Health</i>		
Substance Misuse History (reference: No)	0.75	0.35-1.64
<i>Physical Health and Disability</i>		
Self-Reported Physical Health (reference = fair, good, or excellent)	4.56 **	1.74-11.96
<i>Coping Mechanisms and Social Support</i>		
Adaptive Coping	0.97	0.93-1.02
<i>Service Utilization</i>		
Number of Health Services	1.04	0.81-1.33

P determined using Wald chi-square tests with 1 degree of freedom:

^a Only variables with a *P* < 0.10 (based on bivariate analyses) were included in the multivariable logistic regression model; *n* = 188

* *P* < 0.05

** *P* < 0.01