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Quality of Life Outcomes for Depressed and Non-Depressed Older Adults in Community Long Term Care

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Structured Abstract

Objective—To compare outcomes of mortality, institutionalization, physical and mental quality of life, overall life satisfaction, and satisfaction with living arrangements, for depressed and non-depressed clients after one-year of community long-term care (CLTC) services.

Design—Prospective cohort study with repeated assessments at 6 and 12 months.

Setting—A publicly-funded CLTC agency that coordinates in-home care such as meal delivery, personal care and nursing care to functionally disabled and low income adults throughout a Midwestern State.

Participants—Adults 60 years and older, starting CLTC services with minimal or no cognitive impairment (n=551).

Measurements—Outcomes included the Medical Outcome Study's Short-Form (SF-8) for physical and mental quality of life and single-items for life satisfaction and satisfaction with living arrangements. Diagnostic Interview Schedule and the Center for Epidemiological Studies Depression Scale determined clients' depression status.

Results—Depressed clients (n = 266) had significantly worse scores for all outcomes than non-depressed clients (n = 285), but mortality and institutionalization were not significantly related to depression. Depression was significantly associated with more positive change in mental health (mean change: depressed group = 4.60, S.D. = 14.0; non-depressed group = -1.50, S.D. = 11.2) and overall life satisfaction (mean change: depressed group = 0.10, S.D. = 1.1; non-depressed group = -0.10, S.D. = 0.8).

Conclusion—After one year of CLTC services, depressed clients experienced more improvement in quality of life and life satisfaction, yet their outcomes remained significantly lower than non-

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depressed clients. Depression was consistently and negatively associated with quality of life and satisfaction outcomes.

Keywords

depression; community long-term care; quality of life; life satisfaction; outcomes

Every state provides publicly-funded community long-term care (CLTC) through a range of case management, in-home and community-based services for low-income, functionally disabled older adults. CLTC services can include but are not limited to personal care, home-delivered meals, homemaker/chore services, adult day services, and respite. Almost one in four older adults within this rapidly growing service sector experience depression (major depression: 7%, subthreshold depression: 18%) (1), and CLTC workers report that depression complicates the delivery of services (2). Evidence that the continuum of depressive disorders (subthreshold depression, dysthymia, major depressive disorder) diminish quality of life, is a leading worldwide cause of disability, and is associated with higher mortality (3,4,5,6,7,8) suggests that depression might negatively impact CLTC service outcomes. Depression is a documented burden in relation to specific health conditions (9), to medical non-adherence (10), and to general health care utilization (11,12). Yet, we do not know how depression impacts CLTC clients' perceptions of quality of life and satisfaction which are particularly important constructs in understanding disease burden (13,14,15,16).

Objectives

Using a prospective cohort study from a sample of depressed and non-depressed older CLTC clients, this study tests the burden of depression on one-year outcomes of mortality, institutionalization, physical and mental quality of life, life satisfaction, and satisfaction with living arrangements. The first objective is to characterize the level and change over 12 months for quality of life and satisfaction outcomes of CLTC clients with and without depression. We hypothesize that depressed CLTC clients will have worse quality of life and life satisfaction outcomes than non-depressed CLTC clients at baseline, 6-months and 12-months of CLTC services. Within this objective, we also hypothesize that depressed CLTC clients will have worse outcomes for mortality and institutionalization by 12-months of CLTC services than non-depressed CLTC clients.

As a second objective, we examine the effect of depression on changes in quality of life and satisfaction outcomes for CLTC clients by 12-months of service, while controlling for sociodemographics, medical, cognitive and physical functioning, and mental health service use. We hypothesize that CLTC clients with depression will experience no change or a decline in their quality of life and satisfaction outcomes when compared to non-depressed CLTC clients. As a third objective, we further investigate if depression moderates the impact of medical, cognitive, and physical functioning on quality of life and satisfaction outcomes, and we determine if mental health service use moderates the impact of depression on these outcomes. Since the co-occurrence of physical, functional, and cognitive comorbidities is common for older adults (17), it is necessary to consider potential interactions among depression and comorbidities when investigating the burden of depression. Utilization of mental health services may also influence service outcome, given that a wide range of effective treatments exist for late life depression (18,19) and for low income, minority older adults with comorbid illness in particular (20).

Methods

Participants

This study is an extension of a prospective cohort study of depressed and non-depressed clients from a public CLTC system administered by a Midwestern's State Unit on Aging (1). State Units on Aging are the cornerstone of CLTC and incorporate other state or federal programs, such as Medicaid's Home and Community Based Waivers, Older American Act Programs, Adult Protective Services/Elder Abuse Programs, and Long-Term Care Ombudsman Programs (21). Recruitment occurred from October 2000 to May 2003 in urban and rural regions of a Midwestern state. New English-speaking CLTC clients age 60 and above who were their own legal guardians were eligible. Figure 1 depicts the steps and outcomes of recruitment.

CLTC intake workers approached all new clients for recruitment. Several factors prevented universal recruitment. The 126 CLTC workers reported demanding work situations and a reluctance to approach clients with severe illness or very stressful circumstances; and state laws forbade the use of incentives encouraging worker participation in the recruitment protocols. Based on state records indicating 7,392 new clients were potentially eligible for the study during the recruitment period, we estimate only 37.01% of new clients potentially eligible were approached. State data indicated that the clients referred to the study were younger and were more likely to be African American than all clients eligible for the study during this timeframe (1).

Of the 2,736 eligible clients approached by CLTC workers for study recruitment, 1,788 assented to study contact (65.35%). Because some clients could not be reached (174 or 12%) and those with cognitive impairment were eliminated (169 or 11%), 1,170 new clients completed the study screener (84.34% consent rate) upon entry to CLTC. Whereas all clients meeting criteria for depression were solicited into the depressed group (n=300), only a random sample of non-depressed clients were solicited into a comparison group (n=315). Depressed clients had a diagnosis of major depressive disorder or dysthymia per the Diagnostic Interview Schedule's (DIS) screener (22) or subthreshold depression per a score of 9 or higher on the modified Center for Epidemiological Studies Depression Scale (CES-D) (23). Due to previous research indicating older adults with subthreshold depression symptoms may not meet full diagnostic criteria (such as the DIS) but still be detrimentally affected by depression (6,7,8), we used the CES-D measure to study a more inclusive group of older adults with depression. Furthermore, as this study occurred within a service sector that typically does not contain mental health expertise or staff with diagnostic training, we wanted to be sensitive and inclusive to identifying older clients with a broad range of depressive conditions. In an effort to retain a comparison group, only non-depressed clients with modified CES-D scores less than 5 and no life-time history of depression were selected to be conservative in having a comparison group that had minimal within group variation on depression severity.

Depressed and non-depressed clients participated in structured interviews upon entry into the CLTC system, at 6-, and at 12-months to obtain depression status, sociodemographics, comorbidities, service utilization, quality of life, and satisfaction outcomes. Computer-assisted telephone interviews lasted about 60 minutes, with approximately 10% of interviews conducted in-person due to communication limitations. By the 12-month interview, 44 clients (7.19%) were deceased, 19 clients were excluded due to entering a nursing home (3.10%), and 137 clients did not have complete data due to other reasons (i.e., lost-to-follow-up, refused, ineligible, missing data). Multiple imputation using the Markov Chain Monte Carlo method, as described in the subsequent analysis section, was used for these 137 cases because imputation can provide more accurate estimates than omitting observations because of missing data in statistical analyses (24), and this resulted in data for 551 clients (depressed: 266; non-depressed: 285) at 12-months.

Washington University Committee on Human Subjects (#E99-201) approved this study. Trained research interviewers obtained informed consent, and study clients were paid \$20 per interview.

Measures

Aside from the sociodemographic variables (age, sex, race, education, marital status, and living alone) and the DIS, all instruments were repeated at each study observation period. Urban versus rural residence was determined according to the client's zip code. Income was not included as a variable, given that the sample consists solely of Medicaid-eligible clients of a public CLTC service system.

Depression Status—The DIS is a well-established instrument for yielding Diagnostic and Statistical Manual-IV diagnoses (i.e., current and lifetime diagnoses of major depressive disorder or dysthymia) through lay interviewers (21). The modified CES-D was used to yield a continuous measure of symptom severity. The modified CES-D has 20 items of the original instrument, but response options are limited to yes or no. A modified CES-D score of 9 or greater was used to yield a categorization of subthreshold depression to allow for an inclusive diagnostic approach (22). The scores on these instruments were collapsed into the primary predictor variable of baseline depression status: depressed (i.e., major depression, dysthymia, and subthreshold) versus not depressed.

Mortality and Institutionalization—Disposition was ascertained at 6- and 12-month interviews through call logs obtained by interviews and coded as: 1) deceased or not and 2) moving into institutional long-term care or not. When researchers were unable to contact a client or their family members, disposition was obtained by calling the CLTC workers.

Quality of Life and Satisfaction Outcomes—Four variables were used—each in separate models—as the dependent variables. The Medical Outcome Study's Short-Form measure for quality of life (SF-8) provided two outcome variables: physical health component of quality of life (PCS-8) and the mental health component of quality of life (MCS-8) (25). The SF-8 is a common measure for distal clinical outcomes, and it is based on a longitudinal panel to describe individual perceptions of changes in health status over time (16). Previous research supports the test-retest reliability of the SF-8 survey and indicates that it is sensitive to change (25).

The SF-8 includes eight health dimensions (i.e., physical functioning, role limitations due to physical health, bodily pain, general health perceptions, vitality, social functioning, role limitations due to emotional health, and mental health) that are aggregated to determine physical health and mental health summary scores. These scores were computed using norm-based methods that standardize the scores to a mean of 50 and a standard deviation of 10 in comparison to the general United States population. For both the physical health and mental health scores, higher scores indicate better health (25). Quality of life change scores for both the physical health and mental health scores were calculated by subtracting baseline scores from the 12-month follow-up scores.

We included the Duke Depression Evaluation Schedule's (DDES) two items on satisfaction: overall life satisfaction and satisfaction with current living arrangements, each with a response set respectively of: 1) not satisfying, fairly satisfying, satisfying and very satisfying; and 2) very dissatisfied, dissatisfied, satisfied and very satisfied (26). Higher scores indicated higher levels of satisfaction. Again, baseline scores for life satisfaction and satisfaction with living arrangements were subtracted from the 12-month follow-up scores to determine the change scores while controlling for the initial level of these outcomes at baseline.

Comorbid Conditions—DDES items were used to ascertain functional and medical comorbidities. Seven activities of daily living (e.g., walking, toileting, bathing) and nine instrumental activities of daily living (e.g., housekeeping, shopping, and traveling) yielded severity of functional comorbidity. Clients rated each activity as having no difficulty, needing some assistance, or needing total assistance, and this resulted in a summative score ranging from 0 to 16, with higher scores indicating higher levels of functional impairments. A list of 14 chronic conditions was also reviewed, yielding a count of medical conditions to indicate medical comorbidity. The Short Portable Mental Status Questionnaire (SPMSQ) was used to determine cognitive status. Clients with scores of 5 or greater, indicating moderate to severe impairment, were excluded; whereas, scores of 3 or greater were considered to have mild cognitive impairment (27).

Mental Health Service Use—Interviewers asked if clients had used a list of services in the 6-months prior to each interview. The mental health service use variable was coded as positive if any of the following services were used: inpatient psychiatric care, emergency room services for an emotional condition, met with a physician or psychiatrist for help with an emotional condition, seen a mental health specialists, been to a day treatment center for emotional health, attended a self-help or support group, or talked to a religious leader about problems in your life. The psychotropic medication use variable was determined by a single item from the DDES which asked: “Do you take any medications that lift your spirit, calm you down, help you sleep, or make you think more clearly?” These two variables were categorized as: 0 = no use during the 12-months, 1= use only during the last 6-months, and 2=ongoing use for all 12-months of the observation period.

Statistical Analyses

Analyses were performed using SAS 9.1. All baseline variables had fewer than 15% missing values. Missing values were estimated using multiple correlates through the multiple imputation (MI) procedure in SAS, following the Markov Chain Monte Carlo method, thus producing less-biased estimates than other methods (24). We used Proc Mianalyze to determine all parameter estimates, which involved “rolling up” the parameter estimates from the 5 implicates of imputed data into a single estimate, along with confidence interval and p-value, which we present in the results section. Odds ratios for the logistic regression models were averaged across the five implicates for the outcomes of institutionalization and mortality at 12-months. These logistic regression models included covariates of sociodemographics (i.e., age, sex, race, education, marital status, and living alone), medical, cognitive and physical functioning, and mental health service use.

We used descriptive statistics to characterize the sample at baseline and the longitudinal profiles of depressed versus non-depressed clients for the baseline, 6- and 12-month outcome variables of 1) physical health, 2) mental health, 3) overall life satisfaction, and 4) satisfaction with living arrangements. Independent t-tests, using parametric or nonparametric methods depending on the homogeneity of variances per outcome, were calculated to test the differences between group means for depressed and non-depressed CLTC clients for all outcomes. All hypotheses were tested at a two-sided significance level of $\alpha = 0.05$.

To further test the impact of depression on these outcomes while accounting for time, we evaluated mixed effects models for each continuous outcome (i.e., Model A: physical health, Model B: mental health, Model C: life satisfaction, and Model D: satisfaction with living arrangements). Using SAS Proc Mixed, depression status and time (i.e., baseline, 6-months or 12-months) served as the primary predictors, and the interaction of depression and time was also examined. These models also included covariates to control for sociodemographics (i.e., age, sex, race, education, marital status, and living alone), medical, cognitive and physical

functioning, and mental health service use. Our second set of models attempted to identify the moderating effect of medical, cognitive, and physical functioning, mental health service use, and use of psychotropic medications on the relationship between depression and the outcomes. Each interaction term was entered into four separate models using the four outcome variables, along with the previously described covariates.

Results

Table 1 presents the baseline characteristics for the 266 depressed clients and 285 non-depressed clients. At entry to CLTC, depressed clients were significantly younger, had significantly more medical conditions, and had significantly greater functional impairment than non-depressed clients. During 12-months of CLTC service, depressed clients used significantly more mental health services and more psychotropic medications than non-depressed clients. For the dichotomous outcomes of mortality and institutionalization, the event rates were low for the entire sample with only 7.19% being deceased and 3.10% moving into institutional long-term care. When accounting for sociodemographics, medical, cognitive and physical functioning, and mental health service use, depression status was not significantly related to mortality (Wald $X^2 = 2.13$, $df = 1$, $p = 0.147$) nor institutionalization (Wald $X^2 = 1.76$, $df = 1$, $p = 0.185$). For risk of mortality, significant predictors included being male (OR: 0.41; 95% CI: 0.19-0.87, Wald $X^2 = 5.35$, $df = 1$, $p < 0.05$), living alone (OR: 0.44; 95% CI: 0.20-0.97, Wald $X^2 = 4.17$, $df = 1$, $p < 0.05$), having more functional impairments (OR: 1.11; 95% CI: 1.01-1.22, Wald $X^2 = 4.42$, $df = 1$, $p < 0.05$), and less consistent use of mental health services (OR: 0.23; 95% CI: 0.08-0.65, Wald $X^2 = 7.76$, $df = 1$, $p < 0.01$) and psychotropic medications (OR: 0.32; 95% CI: 0.15-0.66, Wald $X^2 = 9.37$, $df = 1$, $p < 0.01$). Caucasians (OR: 17.70; 95% CI: 2.09-150.04, Wald $X^2 = 6.94$, $df = 1$, $p < 0.01$), urban residents (OR: 3.98; 95% CI: 1.41-11.25, Wald $X^2 = 6.76$, $df = 1$, $p < 0.01$), those with mild cognitive impairment (OR: 2.32; 95% CI: 1.37-3.94, Wald $X^2 = 9.73$, $df = 1$, $p < 0.01$) had higher risks for entering a nursing home over the 12 month period; whereas, use of psychotropic medications (OR: 0.36; 95% CI: 0.12-0.92, Wald $X^2 = 4.60$, $df = 1$, $p < 0.05$) was significantly related to lower risk of entering a nursing home over the 12 month period.

Longitudinal profiles of the quality of life and satisfaction outcome variables are presented in Table 2. Depressed clients had significantly lower means than non-depressed clients at baseline, 6- and 12-month follow-ups for all outcome variables. Only the mean change scores for the mental health and the overall life satisfaction were significantly different between groups. For the depressed group, the mean change in the mental health was 4.60 points (S.D. = 13.99), indicating improvements in the mental component of quality of life over the 12-month period; whereas, the non-depressed group had mean change in the mental health, indicating a slight decrease (Mean = -1.50; S.D. = 11.17). For the change in overall life satisfaction rating in the depressed and non-depressed groups, the means were respectively: 0.09 (S.D. = 1.05) and -0.10 (0.78).

Table 3 reflects the mixed effects models for the quality of life outcomes. In Model A, depression had no relationship with a change in the physical health; whereas, greater functional impairment at baseline was significantly related to improvements in the physical health over the 12-months of CLTC services. In fact, over the 12-months of CLTC services, time was a significant predictor for increased physical health. For Model B, depression was significantly related to lower mental health, but the interaction of depression and time was significantly associated with improvements in the mental health at 6- and 12-months of CLTC services. This result indicates that the relationship between depression and improvement in mental health occurred throughout the service year. Both mild cognitive impairments and higher functional impairments were significantly related with lower mental health. Interestingly, new or ongoing

use of mental health services and new and ongoing use of psychotropic medications were also significantly related with lower mental health.

Satisfaction outcomes per the mixed effects regression models are presented in Table 4. In Model C, being depressed was significantly related to lower overall satisfaction, yet the interaction of depression status and time indicated a significant relationship to improvements in overall life satisfaction after 6-months of CLTC services. This relationship was not significant at the 12-month observation, indicating that this change more closely followed service initiation. Again, new or ongoing mental health service utilization was associated with lower overall satisfaction when compared to no use of mental health services. For satisfaction with living arrangements, as depicted in Model D, depression and new or ongoing mental health service use were also significantly related to lower satisfaction with living arrangements.

Models A through D were rerun to test interaction effects between depression and co-occurring conditions, such as medical conditions, functional impairments, and cognitive status. As none of the interaction terms were significant, depression does not appear to moderate the relationship of co-occurring conditions and the quality of life and satisfaction outcomes. Likewise, no significant interaction terms were found in the models of mental health service use or psychotropic medication use by depression status for these outcomes.

Conclusions

This study tested whether depressed and non-depressed CLTC clients fare differently on the outcomes targeted by the CLTC system, specifically mortality, institutionalization, physical and mental quality of life, life satisfaction, and satisfaction with living arrangements. Results supported hypothesis one, in that depressed clients consistently had lower quality of life and life satisfaction than non-depressed clients—at baseline and after 6- and 12-months of CLTC services. These findings are consistent with previous medical research linking depression to lower quality of life (28,29). To augment our findings on quality of life outcomes, we included single-items measures of overall life satisfaction and satisfaction with living arrangements. While literature is sparse for these outcomes, they are congruent with CLTC's mission to help older adults “to live independent, meaningful, productive, dignified lives and maintain close family and community ties” (21). Results again showed that depressed clients fared more poorly on these measures at all points in time.

Contrary to our expectation, depressed clients did not deteriorate over time relative to non-depressed clients, nor did depression interact with other comorbidities as suggested by previous research in medical settings (9,10,11,12). Rather depressed clients demonstrated small, but positive changes in mental health and their overall life satisfaction after one-year of CLTC services. In short, CLTC clients with depression did slightly better after one year of in-home services. Non-depressed clients did not experience these positive gains in outcomes while in CLTC services. These small but significant improvements in depressed clients' outcomes were similar to those reported for disease management (30) and medication assistance programs (31); both studies used the SF-8 in samples of chronically ill older adults and reported mean improvements of approximately 3 to 4 points on the SF-8. Similarly, with a sample of depressed older adults drawn from acute psychiatric care, improvements in mental health were detected using the SF-12, but physical health had documented deteriorations at 6-months (32). Among depressed older adults drawn from acute psychiatric care, improvements in the depression outcome were significantly related to the quality of psychosocial care received, such as the provision of home-delivered meals, companionship, transportation services (33). Of note, a recent pilot study of problem-solving therapy for older home healthcare patients resulted in significant increases in mental health and emotional role functioning on the SF-36 that averaged

about 7 points after six weeks of treatment (34). Thus, use of an empirically supported depression treatment in these settings may lead to even greater gains.

Two points are noteworthy. First, depressed clients served by CLTC had significantly lower quality of life, relative to non-depressed clients, throughout the study's one year observation period. Second, during one year of CLTC services, depressed clients experienced significantly greater improvement in quality of life and life satisfaction than did non-depressed clients, although these differences were small. These improvements were not sufficient for them to reach the quality of life levels experienced by non-depressed clients nor did they reach the population norms for older adults without depression or with adequately treated depression (35,29). This study cannot test if depression treatment led to clients' improvements in quality of life and life satisfaction over time. Yet, our analysis shows use of mental health services or use of psychotropic medications was negatively associated with these outcomes. An explanation for this relationship could be that mental health service use is a proxy for more severe depression or psychiatric comorbidity; thus, worse outcomes might be expected. As Gum and colleagues' report in their article for this issue, clients in this service system who use psychotropic medications often still meet criteria for depressive and anxiety disorders, thus questioning the quality of depression care received (36).

Study limitations existed. First, all eligible CLTC clients were not systematically recruited. Although state data confirmed similarities between clients referred to not referred, questions of generalizability and selection bias remain. Second, this study did not contain a control group of older adults with comorbidities and depression who did not receive CLTC services, thus no causal relationships can be ascertained. This constrain is tempered by the ethical obligations to respond to clients' needs first, as society may not ethically allow a control group of older adults with depression, low-income and functional disabilities who are at risk of nursing home placement to go without in-home assistance once professionals are aware. Third, by comparing change in outcomes between depressed and non-depressed clients, we caution that regression to the mean may provide an alternative interpretation for these results. Fourth, the 12-month time-frame for evaluating the mortality and institutionalization outcomes is rather short, as demonstrated by these events occurring rarely within our study sample. Fifth, we were unable to consider other psychiatric comorbidities in the analyses because other DIS sections were omitted during data collection. Of course, a fuller assessment of mental health may highlight other conditions that may burden CLTC outcomes or may equally respond to the provision of CLTC services. Lastly, we included clients with no depression history and very low CES-D scores in the comparison group to achieve the study aims of examining the differences between depressed and non-depressed clients. However, this may accentuate the differences between the groups on other variables, such as comorbid conditions, service use, and 12-month outcomes.

Given the strengths of this study, in that it included diagnostic measures for depression, a common measure with available normative data for the primary outcome of quality of life, and it speaks to the specific needs of the CLTCS service system, some important implications are presented. As other literature has described (18), community-based depression care options may be beneficial but not sufficient treatment for depression in older adults (i.e., specialty mental health services may be required). Our findings highlight that specifically, CLTC services may be advantageous to clients with depression who have medical, functional, and cognitive comorbidities. With routine contact provided through CLTC services, such as personal care services and home-delivered meals, the meeting of these basic needs and provision of social contact for homebound functionally impaired older adults may be key components in enhancing these older adult's perceptions about their quality of life and satisfaction. Such findings may lead us to question if specialty mental health services are also

not sufficient when treating depression in clients with long-term care needs, and that accessing CLTC services may be required for additive gains on quality of life and satisfaction outcomes.

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Figure 1. Flow-chart of recruitment results and community-long term care (CLTC) client participation in baseline, 6-month, and 12-month interviews

*Completed 6-month and 12-month interviews includes imputed interviews (i.e., lost-to follow-up, refused, ineligible, missing data)

Table 1
Characteristics of the study sample at baseline

Variables	Depressed (N = 266)	Non-depressed (N = 285)	p [*]
Age (in yr.), mean ± SD	70.8 ± 7.9	73.9 ± 7.6	<i>a</i>
Gender, n (%)			
Female	211 (79.3)	214 (75.1)	
Male	55 (20.7)	71 (24.9)	
Race, n (%)			
Caucasian	191 (71.8)	204 (71.6)	
African American or Other	75 (28.2)	81 (28.4)	
Education, n (%)			
Less than high school	199 (74.8)	178 (62.5)	<i>b</i>
High school or above	67 (25.2)	107 (37.5)	
Marital status, n (%)			
Not Married	212 (79.7)	214 (75.1)	
Married	54 (20.3)	71 (24.9)	
Household size, n (%)			
Living with others	115 (43.2)	130 (45.6)	
Living alone	151 (56.8)	155 (54.4)	
Locale, n (%)			
Rural	152 (57.1)	165 (57.9)	
Urban	114 (42.9)	120 (42.1)	
Co-occurring conditions			
Count of medical conditions, mean ± SD	4.8 ± 2.1	3.8 ± 1.7	<i>a</i>
Functional impairment [†] , mean ± SD	9.3 ± 3.6	7.2 ± 4.0	<i>a</i>
Cognitive impairment, n (%)			
Mild	19 (7.1)	13 (4.6)	
None	247 (92.9)	272 (95.4)	
Mental health service use, n (%)			
No use at 1-year follow-up	118 (44.4)	226 (79.3)	<i>a</i>
New use by 1-year follow-up	92 (34.6)	55 (19.3)	
Ongoing use for full year	56 (21.0)	4 (1.4)	
Used psychotropic medications, n (%)			
No use at 1-year follow-up	91 (34.2)	191 (67.0)	<i>a</i>
New use by 1-year follow-up	83 (31.2)	70 (24.6)	
Ongoing use for full year	92 (34.6)	24 (8.4)	

^{*} Two-tailed p-value based on χ^2 ($df = 2$) tests for categorical variables and *t*-test ($df = 549$) for continuous variables.

[†] Higher score indicates higher level of functional impairment.

^a $p < 0.001$

^b $p < 0.01$

Table 2
Longitudinal profiles of disposition outcomes by depression status among older community long-term care clients

Variable	Depressed Mean $\pm$ SD	Non-depressed Mean $\pm$ SD	t-value (df =549)
<i>Outcome A: Physical Health (PCS-8)*</i>			
Baseline	30.7 $\pm$ 9.9	35.6 $\pm$ 11.7	5.19 ^a
6 mo follow-up	34.2 $\pm$ 10.5	38.8 $\pm$ 11.5	4.88 ^a
12 mo follow-up	34.3 $\pm$ 9.5	38.3 $\pm$ 11.3	4.46 ^a
Change Score [†]	3.6 $\pm$ 10.5	2.7 $\pm$ 12.6	-0.86
<i>Outcome B: Mental Health (MCS-8)*</i>			
Baseline	37.8 $\pm$ 11.0	53.5 $\pm$ 8.2	18.87 ^a
6 mo follow-up	40.9 $\pm$ 11.0	52.9 $\pm$ 8.0	14.51 ^a
12 mo follow-up	42.4 $\pm$ 11.2	52.0 $\pm$ 8.8	11.09 ^a
Change Score [†]	4.6 $\pm$ 14.0	-1.5 $\pm$ 11.2	-5.64 ^a
<i>Outcome C: Overall Life Satisfaction Rating[‡]</i>			
Baseline	2.6 $\pm$ 1.1	3.1 $\pm$ 0.7	7.41 ^a
6 mo follow-up	2.5 $\pm$ 1.0	3.2 $\pm$ 0.7	10.41 ^a
12 mo follow-up	2.5 $\pm$ 1.0	3.1 $\pm$ 0.8	7.70 ^a
Change Score [†]	0.1 $\pm$ 1.1	-0.1 $\pm$ 0.8	-2.47 ^b
<i>Outcome D: Satisfaction with Living Arrangements Rating[‡]</i>			
Baseline	3.0 $\pm$ 0.9	3.5 $\pm$ 0.6	8.48 ^a
6 mo follow-up	3.1 $\pm$ 0.9	3.5 $\pm$ 0.6	6.84 ^a
12 mo follow-up	3.1 $\pm$ 0.8	3.4 $\pm$ 0.7	5.60 ^a
Change Score [†]	-0.1 $\pm$ 1.2	-0.1 $\pm$ 0.9	0.16

* Composite score computed using norm-based methods that standardize the scores to a mean of 50 and a standard deviation of 10 in the general US population; higher score indicates higher health-related quality of life.

[†] Change score = 12 mo follow-up – baseline.

[‡] Likert rating ranging from 1 to 4; higher score indicates higher level of satisfaction.

^a p <0.001

^b p <0.01

Table 3
Temporal relationship between depression status and quality of life outcomes in older community long-term care clients per a mixed effects linear regression model

Variable	Model A [*] : Change in Physical Health			Model B [*] : Change in Mental Health		
	β	t-value (df=532)	95% CI	β	t-value (df=532)	95% CI
Depression	-1.33	-1.51	-3.10 to 0.44	-13.30	-15.22 ^a	-15.17 to -11.43
6 mo follow-up	3.24	3.91 ^b	1.61 to 4.87	-0.30	-0.78	-1.94 to 1.34
12 mo follow-up	2.49	3.37 ^a	0.81 to 4.16	-1.64	-1.90	-3.36 to 0.06
Depression $\times$ 6 mo	-0.29	0.25	-2.80 to 2.22	3.40	3.28 ^b	3.92 to 8.53
Depression $\times$ 12 mo	0.67	0.73	-1.65 to 2.99	6.22	5.36 ^a	0.97 to 5.83
Count of medical conditions	-0.30	-3.14	-0.64 to 0.04	-0.01	-0.70	-0.30 to 0.27
Functional impairment	-1.13	-16.65 ^a	-1.27 to -0.99	-0.19	-3.18 ^b	-0.32 to -0.05
Mild cognitive impairment	0.42	0.58	-0.04 to 0.89	-0.57	-2.77 ^b	-1.03 to -0.11
Mental health service use [†]	-0.33	-1.57	1.28 to 0.62	-2.10	-6.66 ^b	-3.35 to -0.85
Psychotropic use [†]	-0.64	-1.78	-1.37 to 0.09	-1.19	-2.16 ^c	-2.21 to -0.17

^{*} Compares depressed versus non-depressed and 6-month and 12-month follow-ups to baseline while adjusting for age, gender, race, education, marital status, living arrangement, and locale using mixed effects linear regression model.

[†] Variables coded as: 0=no use at 1-year; 1=new use at 1-year; 2=ongoing use for full year.

^a p <0.001

^b p <0.01

^c p<0.05

Table 4
Temporal relationship between depression status and satisfaction outcomes in older community long-term care clients per a mixed effects linear regression model

Variable	Model C [*] : Change in Life Satisfaction			Model D [*] : Change in Satisfaction with Living Arrangements		
	β	t-value (df=532)	95% CI	β	t-value (df=532)	95% CI
Depression	-0.37	-4.75 ^a	-0.52 to -0.21	-0.48	-7.11 ^a	-0.62 to -0.34
6 mo follow-up	0.10	1.18	-0.05 to 0.26	0.03	0.23	-0.10 to 0.16
12 mo follow-up	-0.03	-0.69	-0.18 to 0.12	-0.07	-1.60	-0.21 to 0.07
Depression $\times$ 6 mo	-0.22	-1.91 ^c	-0.43 to -0.01	0.10	1.24	-0.08 to 0.28
Depression $\times$ 12 mo	-0.01	-0.14	-0.22 to 0.20	0.17	2.21	-0.02 to 0.36
Mental health service use [†]	-0.16	-4.52 ^a	-0.23 to -0.08	-0.09	-3.88 ^b	-0.17 to -0.03
Psychotropic use [†]	-0.07	-1.38	-0.16 to 0.02	0.01	1.27	-0.06 to 0.08

^{*} Compares depressed versus non-depressed and 6-month and 12-month follow-ups to baseline while adjusting for age, gender, race, education, marital status, living arrangement, locale, count of medical conditions, severity of functional impairments, and mild cognitive impairment.

[†] Variables coded as: 0=no use at 1-year; 1=new use at 1-year; 2=ongoing use for full year.

^a p <0.001

^b p <0.01

^c p <0.05