# Changes in Mental Well-Being in the Transition to Late Life: Findings From MIDUS I and II

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The number of adults aged 65 years and older is increasing rapidly, creating public health challenges. We used data from the 1995 and 2005 national surveys of Midlife in the United States (MIDUS) to compare changes in mental well-being of participants (n=1007) of 3 age cohorts (ages 45–54 years, 55–64 years, and 65–74 years in 1995). Older adults experienced a slight decline in mental well-being not seen among younger participants and not explained by demographic variables, physical ailments, mental illnesses, or chronic conditions. (*Am J Public Health.* 2010;100:2385–2388. doi:10.2105/AJPH.2010.193391)

Mental health research among older adults most often focuses on disease entities and symptoms such as major depression and anxiety that are known to be associated with poor outcomes in other health domains such as increased mortality and health care costs, especially in those with co-occurring chronic conditions (e.g., cardiovascular disease).[1–4] Mental well-being and positive mental health are less studied among older adults. Measures of mental well-being load on a separate, but correlated, factor structure from measures of mental disorders.[5–10] These findings support the dual continuum model of mental health, meaning that the absence of mental disorders does not imply the presence of high levels of mental well-being. Existing research on age and well-being has examined a wide spectrum of issues, encompassing general concepts such as life satisfaction[11] or more narrow domains such as positive affect.[12,13] Often such investigations have relied on cross-sectional data, and the findings vary depending on how well-being is operationalized. We have expanded on critical research focusing on mental well-being, or "good" mental health, because we have included the established dimensions of psychological well-being[14] and social well-being[15] as well as emotional well-being as incorporated in a single instrument, the Mental Health Continuum–Long Form (MHC-LF).[16] This structure of mental well-being proposed by Keyes has been confirmed in several subsequent studies.[17,18]

We sought to address a research gap in understanding whether and why levels of mental well-being and its constituent components change over time. Specifically, is there a change in mental well-being in late life? Second, do physical ailments, chronic conditions, and mental disorders account for changes, if any, in mental well-being in late life?

## METHODS

We drew data from the Midlife in the United States (MIDUS) national surveys of 1995 and 2005. Of the participants aged 45 years and older from 1995 (n=1671), 1007 (60%) completed follow-up measures in 2005 and were the sample for our study. The sample was divided into 3 age cohorts—youngest, middle, and oldest—based on the respondents' ages in 1995 of 45 to 54 years, 55 to 64 years, and 65 to 74 years, respectively.

### Measures

The MIDUS surveys used the Composite International Diagnostic Interview–Short Form (CIDI-SF) scale to measure major depression, panic disorder, and generalized anxiety disorder.[19] Respondents' sociodemographic characteristics and the prevalence in the past 12 months of chronic conditions and physical ailments were obtained (Table 1). Mental well-being was measured with the MHC-LF in which mental well-being is operationalized as the sum of the scores of emotional, psychological, and social well-being.

### Statistical Methods

We used the $\chi^2$ statistic to assess sociodemographic differences over time between 1995 and 2005. We generated univariate frequencies to evaluate change over time in physical ailments, chronic conditions, and mental disorder. A series of multiple regression analyses generated unstandardized and standardized coefficients for changes between 1995 and 2005 surveys in mental well-being and its subcomponents of emotional, psychological, and social well-being. The initial model controlled for race/ethnicity, age, gender, education level, marital status, and employment status. Subsequent models included number of chronic conditions and physical ailments and changes in chronic conditions, physical ailments, and mental disorder (present in 1995, 2005, or both; no mental disorder in 1995 or 2005 was the reference category).

## RESULTS

Comparisons over the 10-year survey period revealed that the mental well-being score decreased by 2.9% (from 66.6 to 64.7) among the oldest age cohort. However, the younger 2 cohorts experienced a 1.5% increase (the score for the group aged 45–54 years increased from 66.9 to 67.9; the score for the group aged 55–64 years increased from 67.8 to 68.8; $P<.001$; Table 1).

As seen in Table 2, being in the oldest age cohort remained a significant predictor of a decline in mental well-being after we controlled for demographic variables, physical ailments, chronic conditions, or changes in CIDI-SF diagnoses. The strongest predictor of a decrease in mental well-being was having a CIDI-SF diagnosis in both surveys. Having an increase in physical ailments was associated with a decline in mental well-being whereas an increase in chronic conditions was not associated with a change in mental well-being. The single variable associated with improved mental well-being scores was having a CIDI-SF diagnosis in 1995 but no longer having the diagnosis in 2005. In examination of the components of mental well-being, being in the oldest age cohort remained an independent predictor of worsening emotional and psychological well-being. Age cohort did not predict change in social well-being.

## DISCUSSION

Mental well-being scores were similar across the 3 age cohorts in 1995, but by 2005 the oldest-age cohort experienced a slight decline

**TABLE 1—Select Characteristics of the Study Population Aged 45 Years and Older (n = 1007), by Age Category: Midlife in the United States (MIDUS) I, 1995, and MIDUS II, 2005**

| | MIDUS I | | | MIDUS II | | |
|---|---|---|---|---|---|---|
| | Youngest (Age 45–54 Years) | Middle (Aged 55–64 Years) | Oldest (Aged 65–74 Years) | Youngest (Aged 55–64 Years) | Middle (Aged 65–74 Years) | Oldest (Aged 75–84 Years) |
| Physical ailments, no. (%) | | $\chi^2 = 8.67$ (df = 6); $P = .192$ | | | $\chi^2 = 15.76$ (df = 6); $P = .015$ | |
| None | 136 (29.1) | 102 (27.3) | 44 (21.9) | 154 (35.1) | 123 (32.9) | 42 (19.6) |
| 1 | 123 (26.2) | 83 (21.3) | 49 (22.5) | 118 (24.5) | 95 (26.6) | 54 (26.8) |
| 2 | 77 (17.5) | 73 (20.9) | 47 (25.4) | 81 (16.7) | 64 (18.3) | 38 (21.4) |
| ≥3 | 116 (27.2) | 107 (30.4) | 50 (30.2) | 100 (23.7) | 83 (22.2) | 56 (32.1) |
| Chronic conditions, no. (%) | | $\chi^2 = 49.90$ (df = 6); $P < .001$ | | | $\chi^2 = 34.01$ (df = 6); $P < .001$ | |
| None | 224 (47.7) | 140 (38.2) | 54 (27.4) | 144 (30.3) | 64 (17.9) | 27 (13.0) |
| 1 | 110 (23.5) | 91 (25.2) | 38 (20.2) | 104 (21.6) | 81 (20.6) | 36 (19.5) |
| 2 | 72 (16.9) | 71 (19.3) | 34 (17.3) | 79 (17.7) | 73 (20.6) | 38 (17.8) |
| ≥3 | 46 (11.9) | 63 (17.3) | 64 (35.1) | 126 (30.3) | 147 (40.9) | 89 (49.7) |
| CIDI-SF diagnoses,[a] no. (%) | | $\chi^2 = 11.98$ (df = 2); $P = .003$ | | | $\chi^2 = 4.72$ (df = 2); $P = .094$ | |
| None | 361 (80.8) | 320 (87.7) | 177 (91.1) | 390 (85.2) | 323 (88.1) | 180 (91.7) |
| ≥1 of 3 mental disorders | 91 (19.2) | 45 (12.3) | 13 (8.9) | 62 (14.8) | 42 (11.9) | 10 (8.3) |
| Mental well-being, no. (mean score) | | $F_{2830} = 1.06$; $P = .346$ | | | $F_{2830} = 10.96$; $P < .001$ | |
| | 452 (66.9) | 365 (67.8) | 190 (66.6) | 452 (67.9) | 365 (68.8) | 190 (64.7) |
| Emotional well-being, no. (mean score) | | $F_{2830} = 10.19$; $P < .001$ | | | $F_{2830} = 6.14$; $P = .002$ | |
| | 452 (11.0) | 365 (11.5) | 190 (11.8) | 452 (11.0) | 365 (11.5) | 190 (10.9) |
| Psychological well-being, no. (mean score) | | $F_{2830} = 0.45$; $P = .620$ | | | $F_{2830} = 10.32$; $P < .001$ | |
| | 452 (33.1) | 365 (33.4) | 190 (33.2) | 452 (33.6) | 365 (33.8) | 190 (31.8) |
| Social well-being, no. (mean score) | | $F_{2830} = 4.54$; $P = .011$ | | | $F_{2830} = 6.53$; $P = .002$ | |
| | 452 (22.8) | 365 (22.9) | 190 (21.6) | 452 (23.3) | 365 (23.5) | 190 (22.1) |

*Note.* CIDI-SF = Composite International Diagnostic Interview–Short Form. Numbers are unweighted; percentages are weighted.
[a]Major depression, panic disorder, or generalized anxiety disorder.

in score, whereas the scores of the youngest- and middle-age cohorts improved slightly. The declines observed in emotional and psychological well-being may be responsible for the decrease in overall mental well-being during the late life transition. By contrast, change in social well-being was not associated with mental well-being among the oldest age cohort.

The decline in mental well-being among the oldest cohort remained statistically significant after we controlled for demographic variables, physical ailments, chronic conditions, and mental disorders. Thus, physical ailments and mental disorders were associated with a decline in well-being among the oldest cohort but are not the total explanation for that decline. Whether this is an age-associated finding or a cohort effect specific to this individual group of aging adults is uncertain. It is unclear how meaningful this small difference over a 10-year follow-up period is with regard to potential poor health outcomes or care costs. Although this change is small, its implications need to be investigated. Research in "minor" depression has already demonstrated that seemingly minor problems can have significant public health impacts for older adults.[20]

Neither the prevalence of chronic conditions nor increases in chronic conditions over the 10-year period predicted change in mental well-being. Relatively low rates of chronic conditions and healthy survivor effects may explain our lack of association of mental well-being and chronic conditions. Even though the participants in the oldest cohort were more likely to report at least 1 chronic condition, they had fewer chronic conditions (an average of 1.48) than are seen in many clinically based samples derived from primary care settings or aging network service providers, in which the average number of chronic conditions ranges from 4 to 6.[21] Alternatively, chronic conditions may not affect mental well-being as much as they affect mental illnesses, particularly disorders such as depression. Increases in physical ailments, however, were associated with worsening mental well-being, opening the possibility that such generally reversible and more time-limited conditions may have had a more significant impact on mental well-being among our relatively healthy sample.

In addition to the age cohort findings, the regression analyses in our study revealed that mental disorders, assessed with CIDI-SF diagnoses of depression, generalized anxiety, or panic disorder were associated with changes in mental well-being. With a regression coefficient comparable to that seen for being in the oldest age cohort, a 2005 onset of a mental disorder was associated with worsening mental well-being. Conversely, recovery or remission from a 1995 mental disorder was strongly predictive of improved mental well-being over

**TABLE 2—Multivariate Ordinary Least Squares Regressions of Mental Well-Being and Its Components of Emotional, Psychological, and Social Well-Being Onto Predictors and Covariates (Unweighted n = 1007): Participants in Midlife in the United States (MIDUS) I, 1995, and MIDUS II, 2005**

| | Mental Well-Being | | | Emotional Well-Being | | | Psychological Well-Being | | | Social Well-Being | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Predictors | B | b | *P* | B | b | *P* | B | b | *P* | B | b | *P* |
| Youngest cohort (aged 45–54 y in 1995; Ref) | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | | |
| Middle cohort (aged 55–64 y in 1995) | 0.341 | 0.021 | .585 | −0.003 | 0.000 | .985 | 0.108 | 0.012 | .764 | 0.236 | 0.027 | .495 |
| Oldest cohort (aged 65–74 y in 1995) | −2.159 | −0.116 | .005 | −0.831 | −0.155 | <.001 | −1.457 | −0.137 | .001 | 0.129 | 0.013 | .763 |
| Number of physical ailments, 1995 | 0.065 | 0.017 | .731 | 0.039 | 0.037 | .465 | 0.016 | 0.008 | .884 | 0.010 | 0.005 | .924 |
| Increase in number of physical ailments | −0.435 | −0.102 | .006 | −0.188 | −0.154 | <.001 | −0.089 | −0.037 | .332 | −0.158 | −0.069 | .073 |
| Decrease in number of physical ailments | −0.516 | −0.086 | .063 | −0.050 | −0.029 | .526 | −0.281 | −0.082 | .08 | −0.186 | −0.058 | .227 |
| Number of chronic conditions, 1995 | −0.205 | −0.031 | .44 | 0.010 | 0.005 | .893 | −0.235 | −0.062 | .126 | 0.020 | 0.006 | .893 |
| Increase in number of chronic conditions | 0.341 | 0.044 | .24 | 0.093 | 0.042 | .256 | 0.073 | 0.017 | .662 | 0.174 | 0.042 | .279 |
| No CIDI-SF diagnoses[a] in 1995 or 2005 (Ref) | 1.00 | | | 1.00 | | | 1.00 | | | 1.00 | | |
| CIDI-SF diagnoses[a] in 1995 and 2005 | 2.272 | 0.070 | .05 | 0.636 | 0.068 | .053 | −0.196 | −0.011 | .769 | 1.832 | 0.105 | .004 |
| CIDI-SF diagnoses[a] in 2005, not in 1995 | −2.246 | −0.076 | .026 | −0.700 | -0.082 | .015 | −0.969 | −0.058 | .097 | −0.577 | −0.036 | .303 |
| CIDI-SF diagnoses[a] in 1995, not in 2005 | 3.725 | 0.145 | <.001 | 1.077 | 0.145 | <.001 | 1.189 | 0.081 | .021 | 1.460 | 0.105 | .003 |

*Notes.* CIDI-SF = Composite International Diagnostic Interview–Short Form. Samples sizes are weighted. Each regression was controlled for gender, race/ethnicity, education level, marital status in 2005, and employment status in 2005.
[a]Major depression, panic disorder, or generalized anxiety disorder.

the 10-year follow up. Although mental well-being is distinct from mental disorders, our finding suggests that improving mental illness outcomes to the point of recovery or remission has the potential to improve mental well-being. Such degrees of improvement are not often achieved with "usual care" diagnosis and pharmacological management; an increasing number of evidence-based interventions using the depression care management model, however, are resulting in substantially better outcomes.[22] Thus, public health efforts must continue to encourage evidence-based practices to reduce mental illness. Well-being therapies have been developed and targeted to anxiety and affective illnesses and may hold promise for improvement of well-being independent of those illness outcomes.[23,24]

Limitations of this study include that there was only 1 follow-up measure over a 10-year interval. Only counts of chronic conditions and physical ailments were available, which does not allow for control of correlations among chronic conditions. Similarly, functional status as measured in basic or instrumental activities of daily living associated with well-being in some studies was not available. Causality for change in mental well-being cannot be determined from the available data, and nonrespondents differed from participants included in the survey. Despite these limitations, the study suggests a small decline in mental well-being among the oldest cohort. Because of increases in the numbers of older adults in current demographic trends,[25] further research is needed to assess the significance of this small decline to determine whether illness-based interventions for depression now recommended more broadly in public health interventions[21–24] can improve mental well-being outcomes, or whether more specialized interventions, such as well-being interventions specifically targeted to well-being outcomes, are needed. ■

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***Note.*** *The findings and conclusions in this article are those of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention.*

## Contributions

M. Snowden participated in planning the project, in directing the data analysis and interpretation, and in writing the article. S. S. Dhingra helped conceptualize the article, provided input into data analysis, and assisted with writing the article. L. A. Anderson provided direction on conceptualizing the article, provided input into data analysis, and assisted with writing the article. C. L. M. Keyes helped conceptualize the article, performed all analyses, and collaborated on writing the article. All authors helped conceptualize ideas and interpret findings, reviewed drafts of the article, and approved the final version.

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## Human Participant Protection

The MIDUS survey complied with institutional review board standards of the University of Wisconsin and of the Harvard Medical School, and the study protocol was approved by the human study committees of both schools. All participants provided informed consent for participation; interviewers read to the interviewees a standard informed consent protocol at the beginning of the telephone interview, which preceded the self-administered questionnaires (see http://midmac.med.harvard.edu/tech.html for more details).

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# Potential Health Impact of Switching From Car to Public Transportation When Commuting to Work

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We assessed humidity-corrected particulate matter ($PM_{2.5}$) exposure and physical activity (using global positioning system monitors and diaries) among 18 people who commuted by car to Queens College, New York, New York, for 5 days, and then switched to commuting for the next 5 days via public transportation. The $PM_{2.5}$ differed little between car and public transportation commutes (1.41 $\mu g/M^3 \cdot min$; $P=.226$). Commuting by public transportation rather than by car increased energy expenditure (+124 kcal/day; $P<.001$) equivalent to the loss of 1 pound of body fat per 6 weeks. (*Am J Public Health*. 2010;100:2388–2391. doi:10.2105/AJPH.2009.190132)

In 2007, the US population took an estimated 10.3 billion public transportation trips, a 32% increase compared with trips taken in 1995.[1] If sustained, this behavioral change may impact health favorably, by increasing physical activity.

Increased use of public transportation can potentially generate health benefits from the persistent aerobic physical activity that results from walking and climbing stairs when one is riding buses and trains, and from moving to, from, and within stations.[2–6] To determine the magnitude of such effects if car commuters switch to public transportation, we compared personal exposure to $PM_{2.5}$ and levels of physical activity between car and public transportation commutes to work.

## METHODS

Between October 27, 2008, and May 29, 2009, 18 of 21 recruited participants continued commuting by car for 5 days and then switched to public transportation for another 5 days, all while carrying the Forerunner 305 (Garmin, Kansas City, KS) Global Positioning System (GPS) receiver and an AM510 SidePak (TSI, Shoreview, MN) aerosol monitor during the 10-day commute.

Eligibility criteria, equipment, measurements, and analysis had previously been described in detail.[6] The only major change was the addition of an air drier jacket to the AM510 SidePak to prevent the artificial increase in particle detection resulting from the high humidity levels of New York City air.

To match the particulate matter of a diameter of 2.5 microns or smaller ($PM_{2.5}$), and GPS data, each volunteer was required to maintain a time–activity diary with preprinted, minute-by-minute time and activity columns.[6] During car commutes, participants used a hands-free digital voice recorder (Model ICDP520, Sony, Los Angeles, CA), worn with a neck strap, to dictate diary information as they drove. All digital voice recordings (for the car days) or print copies (for the public transportation days) were completed.

We assessed commute-specific energy expenditures based on GPS tracking and diary entries.[6] The GPS device failed to record waypoints for 7.3% of the segments, mostly at the beginning of the commute, while the GPS receiver was searching for a satellite connection. These missing waypoints were easily imputed on the basis of commutes with complete recordings. We used conventional metabolic equivalents (METs; 1 MET=1 kcal/kg of body weight/hour) for various modes of activity.[7] Travel by subway was assigned a MET of 2.0.[6]