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Disparities in mental health, social support and coping among individuals with mobility impairment

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ABSTRACT

Background: CDC estimated that 19.4 million (7.8%) US adults are living with mobility impairment, who are unable to walk a quarter mile. Individuals with physical disability reported greater depression and, in some cases, insufficient social support.

Objectives: This study explores the extent of disparities in psychological health, social support, and coping mechanisms among those with mobility impairment as compared to those without such impairment, and the longitudinal effect of onset of mobility impairment on subsequent psychosocial health and coping.

Methods: Individuals with mobility impairment were matched to controls from a nationally representative sample, using the propensity score method. The final sample included 345 matched pairs. Regression models with robust standard errors were used to assess disparities in outcomes by mobility status. Autoregressive models were used to assess the longitudinal effect of the onset of mobility limitation on these outcomes.

Results: Those with impaired mobility fared significantly higher on negative affect ($p < .05$) and pessimism ($p < .05$), and significantly lower on life satisfaction ($p < .05$) and positive affect ($p = .001$). In terms of coping, they showed disparities in health locus of control (self) ($p < .05$), planning ($p < .05$), active coping ($p < .05$), and problem-focused coping ($p < .05$), as compared to those without mobility limitation. The onset of mobility impairment had significant effects in similar psychological and coping domains.

Conclusion: Our work revealed a piece of reality of individuals living with mobility impairment and will inform designing effective interventions to mitigate psychosocial health disparities in this population.

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The Centers for Disease Control and Prevention estimated that 19.4 million (7.8%) US adults are unable (or very difficult) to walk a quarter mile, and 40.7 million (16.3%) US adults have difficulty ("very difficult" or "cannot do") in any physical functioning.¹ Mobility impairment, especially in older adults, is often a sign of the onset of disablement process,^{2,3} which leads to subsequent loss of more basic ADL skills, such as bathing and dressing, and eating and toileting. Recent research has revealed that functional impairment in basic ADLs predicts mortality, hospitalization, use of long-term care, and lack of receipt of recommended care among older adults.^{4–7}

The dire psychological consequences of physical disability have been extensively documented, although few studies have focused

on mobility impairments and the types of mental health outcomes studied were usually limited to depression and anxiety. Among older adults, higher levels of depressive symptoms were often reported among those with functional impairment, and the negative effect of impaired function was mediated by perceived decreasing psychological resources (self-esteem and sense of control) and social support.⁸ A meta-analysis of physical disability and depression in the community setting found an association between depression and limitation in ADLs and IADLs, controlling for other risk factors.⁹ Depressed affect, somatic symptoms, anxiety, stress, and global measures of mental health consistently increased for older adults at higher stages of ADL disability.¹⁰

The International Classification of Functioning, Disability, and Health (ICF) developed by the World Health Organization, provides a framework for the description of health and health-related states including changes in body function and structure as well functional capacity living with a health condition.¹¹ It synthesizes the medical

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and social model of disability, and views disability and functioning as an interaction between health conditions and contextual factors that may be external such as social support or internal such as coping styles.¹²

Social support has been shown as a promising factor to potentially mitigate the ill-effect of disability on mental health. Its health benefits originated from its buffering effect on the negative stressors on mental health. In a systematic review, social support, including family functioning, negative social interactions, and relationship quality, showed generally consistent associations with indicators of mental health and wellbeing in individuals with physical or mobility impairments.¹³ Quality of social support from family, friends, and spouses protected functional decline among middle-aged and older adults.¹⁴ Low mobility was associated with low social engagement,¹⁵ which could be a reason for inadequate social support. A study found no difference in received social support among those with different types of physical disability (multiple sclerosis, spinal cord injury, muscular dystrophy), but decreased depressive symptoms co-occur with increased social support in the global domain and sub-domains (significant other, family, friends).¹⁶ Social support and related mental health outcomes among individuals with disability are in need of more research, and it requires distinction of types of social support to generate more accurate estimations.¹³ HealthyPeople 2020 aims to increase the proportion of adults with disabilities who report sufficient social and emotional support.¹⁷ Thus, quantifying the discrepancy of received social and emotional support between the disabled and nondisabled individuals is a critical step to bridge the gap.

Coping styles have been described as being task oriented, avoidant and emotional.^{18,19} The task-oriented style implies an adoption of a problem-solving approach by an individual to stressful situations. Emotional coping refers to engagement in behaviors such as rumination and acceptance in response to stress, whereas avoidant coping is when an individual adopts behaviors aimed at circumventing the stressful situation such as denial, rationalization and self-distraction. Coping style has been shown to be an effective predictor of individuals' health behavior and health outcomes.^{20,21} In terms of coping strategies among individuals with mobility impairment or physical disability, previously published work often sampled on a specific disease group (e.g., multiple sclerosis), or a small sample of individuals with certain social roles. Emotion-focused coping (although studies may define emotion-focused coping differently) was generally associated with greater physical symptoms of illness and depressive symptoms, and problem-focused coping strategies with reduced depressive symptoms.^{22,23} For instance, among people with multiple sclerosis, ineffective coping (submissive and hopeless coping) partially mediated the relationship between disability and psychosocial loss.²⁴ Problem-focused coping was reported associated with lower levels of distress among participants with locomotor disability.²⁵ However, the coping behaviors associated with mobility limitation at the population level have not been well studied.

In our current study, we aimed to explore the differences in a wide range of psychological outcomes, types of social support, and adoption of various coping strategies among individuals with mobility limitation as compared to their counterparts without such limitation. We further inquired if these discrepancies occurred at the beginning period of the disablement process.

Methods

Data source

The study used the data from the national longitudinal survey of Midlife in the United States (MIDUS), which aims to understand

health and well-being as an integrated bio-psycho-social process.²⁶ The first wave of the survey was initiated in 1995/1996 with a Random Digit Dial (RDD) national sample of non-institutionalized, English-speaking American adults aged 24–74 years. The second and third waves were conducted in 2002–2006 and 2011–2016, respectively.²⁷ The MIDUS collected numerous measures of psychological well-being, affect, coping behaviors, and social relations and social support, thus providing a rich repertoire to unearth the psychosocial world of the mobility-disabled individuals in the general population.

Design

Since mobility impairment is associated with other socio-demographic and clinical characteristics, characteristics of those with mobility impairment often differ systematically from those without such impairment. Propensity score matching accounts for systematic differences in confounding characteristics between the two groups. Individuals with mobility impairment were matched with their counterparts without mobility disability using propensity score matching method to assess the relationship between mobility impairment and each psychosocial and coping dimension.^{28,29} To compare disparities cross-sectionally between two groups, we used MIDUS wave 2 data (2002–2006) for propensity score matching. Individuals with mobility impairment were matched to those without such impairment on important covariates, and the two groups were then compared on different psychosocial outcomes and coping mechanisms. To understand the disparities in these outcomes for those individuals at mobility impairment onset and those without mobility, a subset of matched sample consisting of those with impairment in wave 2 but not in wave 1 (mobility impairment onset) and those without such impairment in both waves was analyzed for the same array of outcomes. In addition, to explore the longitudinal effect of onset of mobility limitation on three domains of outcomes, we propensity-score matched individuals with no mobility impairment at waves 1 and 2 to those with no impairment at wave 1 but with impairment at wave 2, and compared different outcomes between two groups at wave 2, while adjusting for covariates including baseline outcome score at wave 1.

Exposure

Similar to the measurement of mobility impairment used in multiple clinical studies,^{30–34} we defined mobility impairment as self-reported difficulty walking several blocks. In MIDUS, respondents rated 1 (a lot) to 4 (not at all) to the extent that their health limited their ability to walk several blocks. In this current study, mobility impairment was operationalized as having “a lot” of difficulty walking several blocks.

Outcomes

Psychological, social support, and coping outcomes were validated scales published in previous literature and included in the MIDUS data sets. All Likert-scale outcomes were treated as continuous variables. We used the default final scales for each outcome provided in the MIDUS data, which had been recoded when appropriate so that higher scores reflect higher levels of positive/negative affect.

Psychological outcomes

Depressed affect consisted of seven items with binary responses (yes vs. no), such as “lose interest in most things?” and “feel more tired out or low on energy than is usual?” Anxiety disorder was a

continuous variable based on ten items, such as “In the past 12 months, how often were restless because of your worry” and “were keyed up, on edge, or had a lot of nervous energy.” Responses were on 4-point Likert scales: 1 most days, 2 about half the days, 3 less than half the days, 4 never. Anxiety disorder was constructed by taking the total number of “most days” responses to the items. The sum was computed for cases that had valid values for at least one item on the scale.³⁵ Panic disorder was measured by the sum of six items with binary responses (yes vs no) when there was at least one valid response. Examples were “When you have attacks, your heart pounds” and “When you have attacks, you have tightness, pain, or discomfort in your chest or stomach.” Life satisfaction was derived from the overall mean of 6 items, each coded from 0 (the worst possible) to 10 (the best possible). Respondents were asked to rate their satisfaction with life overall, health, work, relationship with partner/spouse, and relationship with children.

Negative affect took the sum of six items, such as “During the past 30 days, how much of the time did you feel so sad nothing could cheer you up?” Positive affect was derived from six items, such as “During the past 30 days, how much of the time did you feel cheerful? Responses were 5-point Likert scales: 1 all of the time; 2 most of the time; 3 some of the time; 4 a little of the time; 5 none of the time.

Optimism was derived on three items, such as “In uncertain times, I usually expect the best,” and “I’m always optimistic about my future.” Pessimism consisted of three items, such as “I hardly ever expect things to go my way,” and “I rarely count on good things happening to me.” Responses were a 5-point Likert Scale: 1 a lot agree, 2 a little agree, 3 neither agree or disagree, 4 a little disagree, 5 a lot disagree. Sums were taken across items in each domain to represent the final optimism and pessimism scales.

Social support

Family support was derived from four items, such as “Not including your spouse or partner, how much do members of your family really care about you?” And “How much do they understand the way you feel about things?” Family strain consisted of four items, such as “Not including your spouse or partner, how often do members of your family make too many demands on you?” And “How often do they criticize you?” Friends support was measured by the mean of four items, such as “How much do your friends really care about you?” and “How much do they understand the way you feel about things?” Similarly, friend strain was measured by four items, such as “How often do your friends make too many demands on you?” and “How often do they criticize you?” The response for each support/strain scale was a Likert scale: 1 often, 2 sometimes, 3 rarely, 4 never. Each final scale took the mean score of items in each domain respectively.

Coping mechanisms

Health locus of control-self (HLC-self) was derived from four items, such as “keeping healthy depends on things that I can do,” and “there are certain things I can do for myself to reduce the risk of a heart attack.” Health locus of control-others (HLC-others) was derived from two items, including “When I am sick, getting better is in the doctor’s hand,” and “It is difficult for me to get good medical care.” Responses were in a 7-point Likert Scale, 1 strongly agree, 2 somewhat agree, 3 a little Agree, 4 neither agree or disagree, 5 a little disagree, 6 somewhat disagree, 7 strongly disagree. Final scales took the mean across the items for each trait.

Each of the following coping scales was constructed by the sum of multiple items with established reliability. All response scales were 4-point Likert scales: 1 a lot; 2 a medium amount; 3 only a little; 4 not at all. For an item with a missing value, the mean value of completed items was imputed in MIDUS.

Live-for-today was measured by four items, such as “I live one day at a time” and “I have too many things to think about today to think about tomorrow.” Insight into the past was measured by two items, including “Making sense of my past helps me figure out what to do in the present,” and “after something bad happens, I think about how I could have prevented it.” Foresight and anticipation was based on five items, such as “I am good at figuring out how things will turn out,” and “I can sense when an opportunity is coming my way.” Positive reinterpretation and growth was measured by four items, such as “I try to grow as a person as a result of the experience,” and “I try to see it in a different light, to make it seem more positive.” Self-sufficiency took the mean of 2 items, including “I don’t like to ask others for help unless I have to,” and “asking others for help comes naturally for me.”

Planning was measured by four items, including “I make a plan of action”, “I try to come up with a strategy about what to do.” Active Coping was derived on four items, including “I concentrate my efforts on doing something about it,” and “I take additional action to try to get rid of the problem.”

Venting of Emotion was measure by four items, such as “I get upset and let my emotions out.” And “I get upset and am really aware of it.” Denial was measured by four items, such as “I say to myself “this isn’t real”.” Behavioral Disengagement was measured by four items, such as “I admit to myself that I can’t deal with it and quit trying.” And “I give up the attempt to get what I want.”

Problem Focused Coping was measured by the sum of 12 items, combining “Positive Reinterpretation and Growth,” “Active Coping,” and “Planning.” Emotion Focused Coping was measured by the sum of 12 items combining “Focus on and venting of emotion,” “Denial,” and “Behavioral disengagement.” The two final scales were computed in MIDUS for cases that had valid values for at least half of the items on the particular scale.

Covariates or matching variables

The covariates were considered associated with the outcomes in addition to mobility impairment. The covariates included age, gender (male vs. female), race/ethnicity (Non-Hispanic White, Non-Hispanic Black, Hispanic, Native American, and Other), education (below high school, high school graduate, some college/trade school, university), total household income, marital status (yes vs. no), and number of health conditions. The health conditions included: cancer, diabetes, heart disease, lung conditions, digestive conditions, bone conditions, bladder problems, gall bladder problems, HIV/AIDS, autoimmune diseases, hypertension, neurological problems, stroke, disease of the mouth, gum and teeth, thyroid conditions, hay fever, migraines, ulcers, hernia, and sleep problems.

Statistical analysis

Drawn from wave 2 data, individuals with mobility impairment were matched to those without the impairment using propensity scores on covariates including age, gender, race, marital status, education, income, and number of chronic conditions. The calipers of width equaled 0.2 of the standard deviation of the logit of the propensity scores.³⁶ A standardized difference below 0.1 was considered successful matching. Unmatched cases were not included in the analysis. Regression models with robust standard errors were used to estimate the difference between individuals with mobility impairment and those without it in multiple psychosocial domains, while adjusting for correlations between matched pairs. A subset of participants whose mobility status changed from no impairment to impairment between wave 1 and 2 were compared to their unchanged matches to assess the effect of mobility impairment onset on various psychosocial and coping

outcomes.

To explore the longitudinal effect of mobility impairment onset, individuals without impairment at both waves were matched to those without impairment at wave 1 but with impairment at wave 2. First-order autoregressive model (shown below) was used.³⁷

$$Y_{it} = \beta_0 + \sum_{j=1}^J \beta_{1j} X_{ijt-1} + \beta_2 Y_{it-1}$$

Y_{it} are observed outcomes for subject i at time t , β_0 is the intercept, X_{ijt-1} is the independent variable j for subject i at time $t - 1$, β_{1j} is the regression coefficient for independent variable j , J is the number of independent variables, Y_{it-1} is the observation for subject i at time $t - 1$, and β_2 is its coefficient. In this study, there are two time points, wave 1 and 2. Thus the outcome at wave 2 is expressed as a linear combination of independent variables including onset of mobility limitation between wave 1 and 2, covariates at wave 1, and the baseline outcome score at wave 1. Due to the matching procedure, the regression model also accounted for correlation between matched pairs with robust standard errors.

Because multiple outcomes were assessed, the p values were adjusted by controlling for the false discovery rate (FDR).³⁸ The conservative Bonferroni method adjusts for the family-wise error rates but substantially increases the type-II error rate, which may lead to many missed true effects. The FDR controls for the type-II error thus increasing the power of the tests, while still maintaining low false positive rate. FDR was controlled at 0.05, which means that less than 5% of the declared significant tests can be expected to be false positives. All analyses were conducted in SAS 9.4 (SAS Institute, Cary NC).

Results

Participants with and without mobility impairment at wave 2 were matched on propensity scores,^{28,29} which were adjusted for age, gender, race/ethnicity, education, income, marital status, and number of chronic conditions. The matched sample had 345 pairs. Matching results are shown in Table 1. All covariates were matched successfully because the standardized differences were all below 0.1.

The cross-sectional differences between the matched samples on various psychological, support, and coping dimensions are shown in Table 2. In general, participants with mobility impairment fared poorly on psychological well-beings. Compared to those with no classified mobility disability, they scored (β coefficients and standard error) significantly higher on negative affect ($\beta = 0.14$, $SE = 0.05$, $p = .031$) and pessimism ($\beta = 0.71$, $SE = 0.23$, $p = .018$), and significantly lower on positive affect ($\beta = -0.22$, $SE = 0.05$, $p = .001$) and life satisfaction ($\beta = -0.61$, $SE = 0.09$, $p < .0001$). They reported lower social support from friends ($\beta = -0.12$, $SE = 0.05$, $p = .083$) with marginally statistical significance ($p < .1$) but not from family ($\beta = -0.02$, $SE = 0.05$, $p = .763$). However, disabled individuals did not report more strains from family or from friends compared to their nondisabled counterparts. In terms of coping, they reported lower health locus of control – self ($\beta = -0.19$, $SE = 0.07$, $p = .031$), used less active coping ($\beta = -0.50$, $SE = 0.17$, $p = .019$), less planning ($\beta = -0.49$, $SE = 0.19$, $p = .033$), and less problem-focused coping ($\beta = -1.39$, $SE = 0.48$, $p = .019$), compared to those without mobility disability.

The subsample of 490 individuals included those who had mobility impairment at wave 2 but not at wave 1 (disability onset) and their matched pairs who had no disability in waves 1 and 2. Between-group differences (β coefficients, standard errors, and p values) in psychological well-being, social support, and coping

mechanisms are listed in Table 3. This set of results show that individuals with mobility restriction onset reported significantly lower life satisfaction ($\beta = -0.56$, $SE = 0.11$, $p < .0001$) and positive affect ($\beta = -0.21$, $SE = 0.06$, $p = .010$) They also scored significantly higher on negative affect ($\beta = 0.16$, $SE = 0.06$, $p = .037$). No self-reported differences in social support between two groups. In terms of coping, they reported less active coping ($\beta = -0.70$, $SE = 0.20$, $p = .008$), less problem-focused coping ($\beta = -1.76$, $SE = 0.58$, $p = .017$), and nearly significant lower health locus of control ($\beta = -0.23$, $SE = 0.09$, $p = .051$). This set of results was mostly consistent with the total matched sample results in terms of the magnitude of the effects.

The longitudinal effect of mobility limitation onset on later psychosocial and coping outcomes were explored with first-order autoregressive models, in which outcomes at wave 2 were predicted by a linear combination of covariates and outcome at wave 1. Propensity score matching at baseline (wave 1) was successful with all standardized differences < 0.1 , as shown in Table 4. Model results are shown in Table 5. This series of models ($n = 574$) showed that disability onset was prospectively associated with increased greater negative affect ($\beta = 0.25$, $SE = 0.05$, $p < .0001$), decreased life satisfaction ($\beta = -0.66$, $SE = 0.09$, $p < .0001$) and positive affect ($\beta = -0.20$, $SE = 0.05$, $p = .001$), lower health locus of control – self ($\beta = -0.20$, $SE = 0.07$, $p = .018$), more live-for-today coping strategy ($\beta = 0.14$, $SE = 0.05$, $p = .013$), but the disability onset did not affect future social support. Due to fewer psychosocial and coping outcomes were measured at wave 1 than wave 2, we were not able to explore the complete set of outcomes included in wave 2.

Discussion

The findings show that mobility impairment has negative ramifications in multiple dimensions of psychosocial life. Our study results reinforce previous research findings that people with mobility impairment have poorer mental health outcomes.^{39–42} Specifically, we found that people with mobility restriction reported lower life satisfaction and positive affect, but greater negative affect and pessimism when compared to those without mobility disability in the cross-sectional analysis. Depressed affect and friend support also differed nearly significantly between two groups. In addition, those with mobility restriction onset reported lower life satisfaction and positive effect, but higher negative effect than those without restriction. The longitudinal effect of onset of mobility has similar impact on future outcomes. In terms of coping, cross-sectionally reporting shows that those with mobility disability had lower health locus of control and were less likely to use active coping, planning, and problem-focused coping. Those at the disablement onset also adopted living-for-today strategy to cope with their life with mobility disability over time.

Depression and negative affect have been consistently linked to functional and physical disabilities as documented in this study.^{42–44} One possible explanation of this association is that disability functions as the stressful condition. In this view, new-onset impairment requires patients to adjust and could exert chronic strain when it prevents their daily activities that may increase the risk of depression. The inverse relation may also exist in multiple situations, where mobility impairment could be the symptoms of depression.^{45,46} Depression may present as loss of interest in previous activities and listlessness that may reduce an individual's desire for being engaged in activities, and with time can lead to decrease in activities of daily living and other functional restrictions.

Over the last few years, significant research examining optimism and pessimism as a psychological phenomenon, have explained it as a “disposition”, that influences the way in which

Table 1
Sample characteristics and standardized difference for each covariate before and after matching, wave 2.

| Variables | Class and measurement | Before Matching | | | After Matching | | |
|-----------------------------|-----------------------|----------------------------------|---------------------------|-------------------------------------|----------------------------------|-------------------------------------|-------------------------------------|
| | | Mean of Impairment Cases n = 398 | Mean of Controls n = 3570 | Standardized Difference of the Mean | Mean of Impairment Cases n = 345 | Mean of PS Matched Controls n = 345 | Standardized Difference of the Mean |
| Age | Mean | 63.372 | 55.244 | 0.679 | 62.939 | 63.029 | 0.008 |
| Sex % | Male | 35.2% | 45.8% | 0.217 | 35.9% | 36.5% | 0.012 |
| Race/ethnicity % | Non-Hispanic white | 88.1% | 90.8% | 0.085 | 88.4% | 88.4% | 0.000 |
| | Non-Hispanic Black | 7.3% | 3.2% | 0.186 | 6.4% | 6.1% | 0.012 |
| | Hispanics | 2.3% | 2.9% | 0.040 | 1.2% | 0.6% | 0.062 |
| | Native American | 1% | 1.4% | 0.032 | 1.4% | 1.4% | 0.000 |
| | Other | 1.3% | 1.8% | 0.041 | 2.6% | 3.5% | 0.051 |
| Education | Below High School | 14.9% | 5.0% | 0.336 | 13.3% | 10.7% | 0.080 |
| | High School | 36.5% | 25.8% | 0.232 | 36.5% | 38.8% | 0.048 |
| | Some College | 30.7% | 28.4% | 0.052 | 30.7% | 29.6% | 0.025 |
| | University and above | 17.9% | 40.8% | 0.521 | 19.4% | 20.9% | 0.036 |
| Currently Married | No | 41.7% | 27.4% | 0.305 | 40.9% | 38.6% | 0.047 |
| Number of health conditions | Mean | 4.324 | 1.858 | 1.087 | 3.974 | 3.820 | 0.071 |
| Income (in \$1000) | Mean | 42.422 | 74.739 | 0.608 | 43.868 | 43.348 | 0.012 |

Note. Health conditions included: cancer, diabetes, heart disease, lung conditions, digestive conditions, bone conditions, bladder problems, gall bladder problems, HIV/AIDS, autoimmune diseases, hypertension, neurological problems, stroke, disease of the mouth, gum and teeth, thyroid conditions, hay fever, migraines, ulcers, hernia, and sleep problems.

individuals come to terms with present, past and future events in life; or as an “attributional style”, characterized by the tendency to believe that negative events are inconstant, due to external factors, and specific to an event or time-period; and finally as an “cognitive bias”, characterized by a conviction that positive events are more likely to occur to oneself while negative events usually affect

others.^{47,48} People living with mobility limitation have to contend not only with the health changes associated with aging but also with conditions associated with chronic physical disability. These developing challenges are associated with increased pessimism, which presents as a stronger predictor of poorer physical health than optimism.⁴⁹

Table 2
Difference in psychological health, social support, and coping mechanisms between individuals with mobility impairment and those without, wave 2 (n = 690).

| | Outcomes | β | SE | FDR adjusted P value | |
|----------------------|---------------------------|----------------|-------|----------------------|-------|
| Psychological Health | Depressed affect | .32 | 0.15 | 0.083 | |
| | Anxiety | 0.03 | 0.10 | 0.817 | |
| | Panic disorder | 0.06 | 0.08 | 0.643 | |
| | Life satisfaction* | -0.61 | 0.09 | <.0001 | |
| | Negative affect* | 0.14 | 0.05 | 0.031 | |
| | Positive affect* | -0.22 | 0.05 | 0.001 | |
| | Optimism | -0.41 | 0.19 | 0.083 | |
| | Pessimism* | 0.71 | 0.23 | 0.018 | |
| | Social Support | Family support | -0.02 | 0.05 | 0.763 |
| | | Family strain | -0.01 | 0.04 | 0.815 |
| Friends support | | -0.12 | 0.05 | 0.083 | |
| Friends strains | | -0.03 | 0.04 | 0.532 | |
| Coping | | HLC Self* | -0.19 | 0.07 | 0.031 |
| | HLC other | 0.01 | 0.10 | 0.897 | |
| | Live for today | 0.09 | 0.05 | 0.128 | |
| | Insight into past | -0.05 | 0.05 | 0.550 | |
| | Anticipation | -0.14 | 0.07 | 0.109 | |
| | Self-sufficiency | -0.02 | 0.05 | 0.764 | |
| | Positive reinterpretation | -0.39 | 0.19 | 0.083 | |
| | Active coping* | -0.50 | 0.17 | 0.019 | |
| | Planning* | -0.49 | 0.19 | 0.033 | |
| | Venting | 0.11 | 0.20 | 0.748 | |
| | Denial | 0.28 | 0.18 | 0.203 | |
| | Behavioral disengagement | 0.08 | 0.18 | 0.763 | |
| | Problem focused coping* | -1.39 | 0.48 | 0.019 | |
| | Emotion focused coping | 0.47 | 0.42 | 0.430 | |

Note. Estimates were derived from regression models accounting for matched.

Pairs and adjusted for covariates. β: coefficient; SE: standard error.

*: coefficients that show significant difference p < .05.

HLC: health locus of control; FDR refers to false discovery rate.

Table 3

Difference in psychological well-being, social support, and coping among those at onset of mobility impairment at wave 2 compared to those without impairment in waves 1&2 (n = 490).

| | Outcomes | β | SE | FDR adjusted P value | |
|----------------------|---------------------------|----------------|-------|----------------------|-------|
| Psychological Health | Depressed affect | 0.19 | 0.16 | 0.388 | |
| | Anxiety | 0.05 | 0.10 | 0.696 | |
| | Panic disorder | 0.08 | 0.09 | 0.523 | |
| | Life satisfaction* | -0.56 | 0.11 | <.0001 | |
| | Negative affect* | 0.16 | 0.06 | 0.037 | |
| | Positive affect* | -0.21 | 0.06 | 0.010 | |
| | Optimism | -0.34 | 0.23 | 0.278 | |
| | Pessimism | 0.62 | 0.26 | 0.063 | |
| | Social Support | Family support | -0.01 | 0.05 | 0.846 |
| | | Family strain | 0.03 | 0.05 | 0.620 |
| Friends support | | -0.08 | 0.06 | 0.332 | |
| Friends strains | | -0.02 | 0.04 | 0.696 | |
| Coping | HLC self | -0.23 | 0.09 | 0.051 | |
| | HLC other | -0.08 | 0.12 | 0.620 | |
| | Live for today | 0.13 | 0.06 | 0.063 | |
| | Insight into past | -0.02 | 0.06 | 0.723 | |
| | Anticipation | -0.11 | 0.07 | 0.278 | |
| | Self-sufficiency | 0.05 | 0.06 | 0.577 | |
| | Positive reinterpretation | -0.50 | 0.22 | 0.063 | |
| | Active coping* | -0.70 | 0.20 | 0.008 | |
| | Planning | -0.55 | 0.23 | 0.063 | |
| | Venting | 0.22 | 0.24 | 0.523 | |
| | Denial | 0.35 | 0.21 | 0.252 | |
| | Behavioral disengagement | 0.10 | 0.21 | 0.696 | |
| | Problem focused coping* | -1.76 | 0.58 | 0.017 | |
| | Emotion focused coping | 0.65 | 0.49 | 0.332 | |

Note. Estimates were derived from regression models accounting for matched pairs and adjusted for covariates. β : coefficient; SE: standard error; *: coefficients that show significant difference $p < .05$; HLC: health locus of control; FDR refers to false discovery rate.

Health locus of control (HLC) has been defined as the extent to which a person believes he or she can affect their health status.⁵⁰ Internal or self HLC refers to the belief that whatever happens to one's health is potentially under their control; in contrast external or chance HLC believe that the event in their life are beyond their

control. Usually, those with internal HLC contributes to being more actively engaged in one's health care and have better psychosocial outcomes than those with external HLC.⁵¹ In the present study those with mobility limitation scored lower for internal HLC than the non-disabled group, which is consistent with other research.⁵²

Table 4

Sample characteristics and standardized difference for each covariate before and after matching, wave 1.

| Variables | Class and measurement | Before Matching | | | After Matching | | |
|-----------------------------|-----------------------|--|---------------------------|-------------------------------------|--|-------------------------------------|-------------------------------------|
| | | Mean of Impairment onset Cases n = 304 | Mean of Controls n = 3408 | Standardized Difference of the Mean | Mean of Impairment Onset Cases n = 287 | Mean of PS Matched Controls n = 287 | Standardized Difference of the Mean |
| Age | Mean | 54.711 | 46.325 | 0.697 | 54.432 | 54.812 | 0.032 |
| Sex % | Male | 34.9% | 46.1% | 0.217 | 35.8% | 35.8% | 0 |
| Race/ethnicity % | Non-Hispanic white | 89.4% | 91.3% | 0.064 | 89.2% | 88.5% | 0.022 |
| | Non-Hispanic Black | 5.9% | 2.8% | 0.152 | 5.9% | 4.9% | 0.046 |
| | Hispanics | 2.3% | 2.7% | 0.028 | 2.4% | 2.4% | 0 |
| | Native American | 1% | 1.3% | 0.032 | 1.0% | 1.7% | 0.059 |
| | Other | 1.3% | 1.8% | 0.037 | 1.4% | 2.4% | 0.076 |
| | Below High School | 14.9% | 5.0% | 0.336 | 13.9% | 11.8% | 0.062 |
| Education | High School | 36.5% | 25.8% | 0.232 | 40.7% | 43.6% | 0.056 |
| | Some College | 30.7% | 28.4% | 0.052 | 27.1% | 27.5% | 0.008 |
| | University and above | 17.9% | 40.8% | 0.521 | 18.1% | 17.1% | 0.044 |
| | Currently Married | No | 34.2% | 27.4% | 0.305 | 33.1% | 35.2% |
| Number of health conditions | Mean | 4.201 | 2.236 | 0.712 | 4.101 | 3.882 | 0.075 |
| Income (in \$1000) | Mean | 55.174 | 79.897 | 0.608 | 55.761 | 52.674 | 0.012 |

Note. Health conditions included asthma/bronchitis/emphysema, cancer, heart problems, tuberculosis, other lung problems, joint/bone diseases, sciatica/lumbago/backache, skin trouble persistent, thyroid disease, hay fever, Stomach trouble, Urinary/bladder problem Constipated all/most, gall bladder trouble, Foot trouble persistent, varicose veins, AIDS/HIV, lupus/autoimmune disorder, gum/mouth trouble persistent, teeth trouble persistent, high blood pressure/hypertension, anxiety/depression, migraine headaches, chronic sleep problems, diabetes/high blood sugar, neurological disorder, stroke, ulcer, hernia, piles/hemorrhoids.

Table 5
Longitudinal effect of mobility impairment onset on subsequent psychological health, social support, and coping (n = 574).

| | Outcomes | β | SE | FDR adjusted P value |
|----------------------|--------------------|---------|------|----------------------|
| Psychological Health | Depressed affect | .33 | 0.15 | 0.059 |
| | Anxiety | 0.07 | 0.06 | 0.499 |
| | Panic disorder | 0.08 | 0.09 | 0.527 |
| | Life satisfaction* | -0.67 | 0.09 | <0.0001 |
| | Negative affect* | 0.25 | 0.05 | <0.0001 |
| Social support | Positive affect* | -0.20 | 0.05 | 0.001 |
| | Family support | 0.03 | 0.04 | 0.534 |
| | Family strain | 0.06 | 0.04 | 0.390 |
| | Friends support | 0.01 | 0.05 | 0.896 |
| | Friends strains | 0.03 | 0.04 | 0.715 |
| Coping | HLC Self* | -0.20 | 0.07 | 0.018 |
| | HLC other | 0.12 | 0.12 | 0.499 |
| | Live for today * | 0.14 | 0.05 | 0.013 |
| | Insight into past | -0.01 | 0.05 | 0.896 |
| | Self-sufficiency | -0.01 | 0.06 | 0.896 |

Note. Estimates were derived from autoregressive models accounting for matched. Pairs and adjusted for covariates and baseline outcome at wave 1. β : effect coefficient.

SE: standard error; *: coefficients that show significant difference $p < .05$.

HLC: health locus of control; FDR refers to false discovery rate.

Living with mobility restrictions decreases an individual's internal health locus of control, the belief that they have control over their health. However, the differences between disabled and non-disabled samples was insignificant for external or chance HLC, which may be determined by the type and specification of the mobility disability.

Participants with mobility impairment reported less planning, active coping and problem-focused coping strategies cross-sectionally, but more of the live-for-today coping strategy longitudinally when compared to those without mobility disability. Coping refers to those mechanisms adopted by an individual as an adaptive response to deal stress.⁵³ Active coping mechanisms are strategies that minimize physical or psychological harm when exposed to the stressor such as mobility disability. Examples of these strategies include creating a sense of coherence in their lives that gives meaning, strength and purpose to their lives as they adjust to their stressors or health conditions; creating a realistic perception of their stressor, that can then assist in developing a plan to address challenges they will face when living with those stressors; and using problem-focused coping to solve each problem they are exposed to as they assess their health and the environment they live in.⁵⁴ These adaptive strategies were found to be lower in the people living with mobility disability; thus addressing active coping strategies is an essential part of their rehabilitation process to foster their sense of control on their life and environment.

Conversely, live-for-today coping strategy may be an adaptive or detrimental coping strategy based on the situation.⁵³ Live-for-today is a part of 'mindfulness', that has generally been referred to as present-moment awareness of any experience and has been recently getting attention as an intervention methodology for various chronic health conditions.⁵⁵⁻⁵⁷ Mindfulness enables the choice of a more adaptive strategies to deal with ones' health condition rather than catastrophic ruminations or automatic reactions. The pain and challenges in living with mobility impairment can be diminished by developing a more open and accepting attitude toward this challenging experience. It is important to note that whether a specific coping strategy is adaptive is dependent on the environment and type of stress. However, it may be a detrimental coping strategy if used as a denial or avoidance strategy.⁵³ Therefore, the concept of a particular coping strategy leading to healthy adaption must be a fluid concept.

There is strong evidence that interaction with one's social

environment exerts beneficial effects on health and wellbeing, and conversely, social isolation or lack of close social ties is associated with poorer health.^{13,58,59} However, for people with mobility disability, their physical restriction is a substantial challenge to developing and maintaining active social participation. Engagement with community activities and friendships are professed as strategies for maintaining social participation.⁶⁰ Even though support from family members is important, nonetheless our study revealed that disabled individuals may have inadequate friend support (nearly significant difference). Friend support may be a vital resource for decreasing the negative consequences of a wide variety of stressors faced by mobility disabled. Thus, such knowledge is important for understanding the kind of social support needed by mobility disabled that may lead to the development of appropriate interventions and connections to appropriate resources to increase social participation.

ICF has emphasized overall health classification and assessment versus focusing only on people's disabilities; and recognizes that all individuals experience decrements in health during different stages of life and thereby experience some disability. Multisectoral approaches to implementing interventions aimed at addressing psycho-social factors is required. For example, interventions aimed at building partnership of community resources with the health care system such patient navigators and community health workers aim to improve care coordination in the delivery of health services for people experiencing functional disability. Linking persons with disabilities and their social ties in support programs may also facilitate adaption and coping. Psychoeducational interventions such as stress management are designed to support families in dealing with their emotional responses or to teach skills and strategies for dealing and adjusting to disability. Disability support programs may borrow strengths from interventions targeting vulnerable older adults due to commonality of two populations, such as restricted mobility and multiple chronic conditions. In a previous intervention, community-dwelling frail and undernourished older adults benefited from home-based physical training, nutritional education, and social support provided by nonprofessional volunteer "buddies", with the support of health professionals.⁶¹ A support program integrating a buddy system may provide supportive relationships for improving coping efficacy and ability. The buddies may also deliver education and skill training on active and problem-focused coping that leads to positive behavioral change. Individuals lack mobility may also lack a sense of planning and goal directedness, as shown in our study. Planning is a part of purpose or meaning in life, which has been found to be predictive of reduced risk of developing mobility disability,⁶² positive psychological functioning,⁶³ and physical well-being.⁶⁴ Although some at the onset of mobility disability are likely to adopt a live-for-today strategy, we recommend that support programs contain a critical educational component that appropriately guides participants in developing plans for their daily life and gently cultivating a purpose in life. Our study highlights the need to understand and utilize the bio-psycho-social framework proposed by ICF to develop interventions, policies and advocacy efforts.

Few limitations may affect the generalizability of the present study's results. The first limitation is based on the observational study design, we cannot ascertain causation between psychosocial factors and mobility disability. Our propensity score model included the most pronounced confounders on the outcome variables to obtain a decent sample size of matched pairs; however; there can be other unmeasured or measured confounders. We examined self-report measures only, which may be biased by contextual factors, memory, and socially desirable responses. Social support is a multidimensional construct that is comprised of network size, type of support available, and satisfaction with

support. In our study, we only examined perceived support from social networks including friends and family members. A more complete view of the importance of social support may emerge by examining additional support domains. We employed only a sample of people with mobility disabilities, thus the results may not generalize to other disabled populations. Future studies should explore the underlying causal mechanisms between mobility disability and various psychosocial and coping outcomes. Effective and innovative interventions targeting improvement of coping and psychosocial outcomes in this population are urgently needed.

Presentation

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References

- Centers for Disease Control and Prevention. Disability and functioning (noninstitutionalized adults aged 18 and over). <https://www.cdc.gov/nchs/fastats/disability.htm>; 2018. Accessed December 10, 2019.
- Shumway-Cook A, Ciol MA, Yorkston KM, Hoffman JM, Chan L. Mobility limitations in the Medicare population: prevalence and sociodemographic and clinical correlates. *J Am Geriatr Soc.* 2005;53(7):1217–1221.
- Patla AE, Shumway-Cook A. Dimensions of mobility: defining the complexity and difficulty associated with community mobility. *J Aging Phys Activ.* 1999;7(1):7.
- Na L, Pan Q, Xie D, et al. Activity limitation stages are associated with risk of hospitalization among medicare beneficiaries. *Pm r.* 2017;9(5):433–443.
- Kurichi JE, Streim JE, Xie D, et al. The association between activity limitation stages and admission to facilities providing long-term care among older medicare beneficiaries. *Am J Phys Med Rehabil.* 2017;96(7):464–472.
- Na L, Hennessy S, Bogner HR, et al. Disability stage and receipt of recommended care among elderly medicare beneficiaries. *Disabil Health J.* 2017;10(1):48–57.
- Hennessy S, Kurichi JE, Pan Q, et al. Disability stage is an independent risk factor for mortality in medicare beneficiaries aged 65 Years and older. *Pm r.* 2015;7(12):1215–1225.
- Yang Y. How does functional disability affect depressive symptoms in late life? The role of perceived social support and psychological resources. *J. Health Soc. Behav.* 2006;47(4):355–372.
- Lenze EJ, Rogers JC, Martire LM, et al. The association of late-life depression and anxiety with physical disability: a review of the literature and prospectus for future research. *Am J Geriatr Psychiatr.* 2001;9(2):113–135.
- Na L, Streim JE. Psychosocial well-being associated with activity of daily living stages among community-dwelling older adults. *Gerontol Geriatr Med.* 2017;3, 233721417700011.
- World Health Organization. *International Classification of Functioning, Disability, and Health: Children & Youth Version: ICF-CY.* Geneva, Switzerland: World Health Organization; 2007.
- Mitra S, Shakespeare T. Remodeling the ICF. *Disabil Health J.* 2019;12(3):337–339.
- Tough H, Siegrist J, Fekete C. Social relationships, mental health and wellbeing in physical disability: a systematic review. *BMC Publ Health.* 2017;17(1):414.
- Lachman ME, Agrigoroaei S. Promoting functional health in midlife and old age: long-term protective effects of control beliefs, social support, and physical exercise. *PLoS One.* 2010;5(10).
- Rosso AL, Taylor JA, Tabb LP, Michael YL. Mobility, disability, and social engagement in older adults. *J Aging Health.* 2013;25(4):617–637.
- de la Vega R, Molton IR, Miró J, Smith AE, Jensen MP. Changes in perceived social support predict changes in depressive symptoms in adults with physical disability. *Disability and health journal.* 2019;12(2):214–219.
- HealthyPeople.gov. *Social Determinants of Health*; 2019. <https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health/objectives>. Accessed December 10, 2019.
- Doron J, Trouillet R, Maneveau A, Ninot G, Neveu D. Coping profiles, perceived stress and health-related behaviors: a cluster analysis approach. *Health Promot Int.* 2015;30(1):88–100.
- Zou H, Tian Q, Chen Y, Cheng C, Fan X. Coping styles mediate the relationship between self-esteem, health locus of control, and health-promoting behavior in Chinese patients with coronary heart disease. *J Cardiovasc Nurs.* 2017;32(4):331–338.
- Pereira-Morales AJ, Adan A, Lopez-Leon S, Forero DA. Personality traits and health-related quality of life: the mediator role of coping strategies and psychological distress. *Ann Gen Psychiatr.* 2018;17:25.
- Park CL, Iacocca MO. A stress and coping perspective on health behaviors: theoretical and methodological considerations. *Hist Philos Logic.* 2014;27(2):123–137.
- Dimiceli EE, Steinhardt MA, Smith SE. Stressful experiences, coping strategies, and predictors of health-related outcomes among wives of deployed military servicemen. *Armed Forces Soc.* 2010;36(2):351–373.
- Mark G, Smith AP. Occupational stress, job characteristics, coping, and the mental health of nurses. *Br J Health Psychol.* 2012;17(3):505–521.
- Gedik Z, Sorias O, Idiman E. Do coping styles mediate the relationship between disability status and psychosocial loss in people with relapsing remitting multiple sclerosis? *J Health Psychol.* 2017;22(6):707–721.
- Pande N, Tewari S. Understanding coping with distress due to physical disability. *Psychol Develop Soc.* 2011;23(2):177–209.
- Radler BT. The midlife in the United States (MIDUS) series: a national longitudinal study of health and well-being. *Open Health Data.* 2014;2(1).
- Midlife In the United States. History & overview of MIDUS. <http://midus.wisc.edu/scopeofstudy.php#History>; 2011. Accessed December 29, 2019.
- Austin PC. A tutorial and case study in propensity score analysis: an application to estimating the effect of in-hospital smoking cessation counseling on mortality. *Multivariate Behav Res.* 2011;46(1):119–151.
- Mason C, Sabariego C, Thang DM, Weber J. Can propensity score matching be applied to cross-sectional data to evaluate Community-Based Rehabilitation? Results of a survey implementing the WHO's Community-Based Rehabilitation indicators in Vietnam. *BMJ Open.* 2019;9(1), e022544.
- Rosso AL, Metti AL, Faulkner K, et al. Associations of usual pace and complex task gait speeds with incident mobility disability. *J Am Geriatr Soc.* 2019;67(10):2072–2076.
- Simonsick EM, Newman AB, Nevitt MC, et al. Measuring higher level physical function in well-functioning older adults: expanding familiar approaches in the Health ABC study. *J Gerontol A Biol Sci Med Sci.* 2001;56(10):M644–M649.
- McDermott MM, Guralnik JM, Tian L, et al. Baseline functional performance predicts the rate of mobility loss in persons with peripheral arterial disease. *J Am Coll Cardiol.* 2007;50(10):974–982.
- Chen H, Rejeski WJ, Gill TM, et al. A comparison of self-report indices of major mobility disability to failure on the 400-m walk test: the LIFE study. *J Gerontol A Biol Sci Med Sci.* 2018;73(4):513–518.
- Hardy SE, Kang Y, Studenski SA, Degenholtz HB. Ability to walk 1/4 mile predicts subsequent disability, mortality, and health care costs. *J Gen Intern Med.* 2011;26(2):130–135.
- Wang PS, Berglund P, Kessler RC. Recent care of common mental disorders in the United States: prevalence and conformance with evidence-based recommendations. *J Gen Intern Med.* 2000;15(5):284–292.
- Harder VS, Stuart EA, Anthony JC. Propensity score techniques and the assessment of measured covariate balance to test causal associations in psychological research. *Psychol Methods.* 2010;15(3):234–249.
- Twisk JW. *Applied Longitudinal Data Analysis for Epidemiology: A Practical Guide.* Cambridge university press; 2013.
- Benjamini Y, Hochberg Y. Controlling the false discovery rate: a practical and powerful approach to multiple testing. *J Roy Stat Soc B.* 1995;57(1):289–300.
- Hudakova A, Hornakova A. Mobility and quality of life in elderly and geriatric patients. *Int J Nurs Midwifery.* 2011;3(7):81–85.
- Kostka T, Jachimowicz V. Relationship of quality of life to dispositional optimism, health locus of control and self-efficacy in older subjects living in different environments. *Qual Life Res.* 2010;19(3):351–361.
- Mollaoglu M, Tuncay FO, Fertelli TK. Mobility disability and life satisfaction in elderly people. *Arch Gerontol Geriatr.* 2010;51(3):e115–e119.
- Musich S, Wang SS, Ruiz J, Hawkins K, Wicker E. The impact of mobility limitations on health outcomes among older adults. *Geriatr Nurs.* 2018;39(2):162–169.
- Xiang X, An R, Kang S-w, Stagg BC, Ehrlich JR. Disability type, depression, and antidepressants use among older adults in the United States. *Aging Ment Health.* 2020;24(1):27–34.
- Weil J, Hutchinson SR, Traxler K. Exploring the relationships among performance-based functional ability, self-rated disability, perceived instrumental support, and depression: a structural equation model analysis. *Res Aging.* 2014;36(6):683–706.
- Bacon KL, Heeren T, Keysor JJ, Stuver SO, Cauley JA, Fredman L. Longitudinal and reciprocal relationships between depression and disability in older women caregivers and noncaregivers. *Gerontol.* 2016;56(4):723–732.
- Noh J-W, Kwon YD, Park J, Oh I-H, Kim J. Relationship between physical disability and depression by gender: a panel regression model. *PLoS One.* 2016;11(11).
- Chang EC, Sanna LJ. Optimism, pessimism, and positive and negative affectivity in middle-aged adults: a test of a cognitive-affective model of psychological adjustment. *Psychol Aging.* 2001;16(3):524.
- Conversano C, Rotondo A, Lensi E, Della Vista O, Arpone F, Reda MA. Optimism and its impact on mental and physical well-being. *Clinical practice and epidemiology in mental health. CP & EMH.* 2010;6:25.
- Martínez-Correa A, del Paso Reyes G, García-León A, González-Jareño M. Relationship between dispositional optimism/pessimism and stress coping strategies. *Psicothema.* 2006;18(1):66–72.
- Wallston KA, Wallston BS. *Who Is Responsible for Your Health. The Construct of Health Locus of Control in Social Psychology of Health and Illness City.* Hillsdale, NJ: Lawrence Erlbaum; 1982:65–95.
- Bonetti D, Johnston M, Rodriguez-Marin J, et al. Dimensions of perceived control: a factor analysis of three measures and an examination of their relation to activity level and mood in a student and cross-cultural patient sample. *Psychol Health.* 2001;16(6):655–674.
- Cross M, March L, Lapsley H, Byrne E, Brooks P. Patient self-efficacy and health locus of control: relationships with health status and arthritis-related

- expenditure. *Rheumatology*. 2006;45(1):92–96.
53. Wood SK, Bhatnagar S. Resilience to the effects of social stress: evidence from clinical and preclinical studies on the role of coping strategies. *Neurobiology of stress*. 2015;1:164–173.
 54. Matsushita M, Ishikawa T, Koyama A, et al. Is sense of coherence helpful in coping with caregiver burden for dementia? *Psychogeriatrics*. 2014;14(2): 87–92.
 55. Dahm KA, Meyer EC, Neff KD, Kimbrel NA, Gulliver SB, Morissette SB. Mindfulness, self-compassion, posttraumatic stress disorder symptoms, and functional disability in US Iraq and Afghanistan war veterans. *J Trauma Stress*. 2015;28(5):460–464.
 56. Idusohan-Moizer H, Sawicka A, Dendle J, Albany M. Mindfulness-based cognitive therapy for adults with intellectual disabilities: an evaluation of the effectiveness of mindfulness in reducing symptoms of depression and anxiety. *J Intellect Disabil Res*. 2015;59(2):93–104.
 57. Nathan HJ, Poulin P, Wozny D, et al. Randomized trial of the effect of mindfulness-based stress reduction on pain-related disability, pain intensity, health-related quality of life, and A1C in patients with painful diabetic peripheral neuropathy. *Clin Diabetes*. 2017;35(5):294–304.
 58. Jensen MP, Smith AE, Bombardier CH, Yorkston KM, Miró J, Molton IR. Social support, depression, and physical disability: age and diagnostic group effects. *Disability and health journal*. 2014;7(2):164–172.
 59. Litwin H, Levinson M. The association of mobility limitation and social networks in relation to late-life activity. *Ageing Soc*. 2018;38(9):1771–1790.
 60. Mikula P, Nagyova I, Krokavcova M, et al. Social participation and health-related quality of life in people with multiple sclerosis. *Disability and health journal*. 2015;8(1):29–34.
 61. Luger E, Dorner TE, Haider S, Kapan A, Lackinger C, Schindler K. Effects of a home-based and volunteer-administered physical training, nutritional, and social support program on malnutrition and frailty in older persons: a randomized controlled trial. *J Am Med Dir Assoc*. 2016;17(7), 671. e679-671. e616.
 62. Boyle PA, Buchman AS, Bennett DA. Purpose in life is associated with a reduced risk of incident disability among community-dwelling older persons. *Am J Geriatr Psychiatry*. 2010;18(12):1093–1102.
 63. Zika S, Chamberlain K. On the relation between meaning in life and psychological well-being. *Br J Psychol*. 1992;83(1):133–145.
 64. Krause N. Stressors arising in highly valued roles, meaning in life, and the physical health status of older adults. *J Gerontol B Psychol Sci Soc Sci*. 2004;59(5):S287–S297.