The Effect of Physical Limitations on Depressive Symptoms over the Life Course: Is Optimism a Protective Buffer?

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ABSTRACT

Objectives. We examined the extent to which optimism buffers the effects of physical limitations on depressive symptoms, across four mid- and later-life age groups (ages 40-49, 50-64, 65-74, 75+ at baseline). Analyses are motivated by stress theories, which hold that the protective effects of coping resources are evidenced only at high levels of stress. We further explore whether these purportedly protective effects diminish with age, as health-related stressor(s) intensify and become irreversible.

Methods. We use data from two waves (2004-06 and 2013-14) of the Health and Retirement Study (HRS, n = 4,515) and Midlife in the United States (MIDUS, n = 2,138). We estimate OLS regression models with three-way interaction terms to examine prospectively the benefits of optimism as a coping resource for persons with physical limitations across four age groups. Physical limitations are assessed with a composite measure encompassing mobility and activity of daily living (ADL) limitations.

Results. In HRS and MIDUS, persons with 3+ limitations reported significantly more depressive symptoms than persons with 0-2 limitations, yet these disparities diminished at higher levels of optimism. Buffering effects of optimism vary by age. For midlife and young-old persons with 3+ limitations, optimism is strongly and inversely related to depressive symptoms at follow-up. Comparable protective effects are not evident among oldest sample members.

Discussion. Stress and coping models should consider more fully factors that limit older adults' capacity to deploy purportedly protective personal resources. Investments in structural or institutional supports may be more effective than interventions to enhance positive thinking.

Key words: depressive symptoms, disability, functional limitation, optimism, life course, stress

Physical health problems increase with advancing age, undermining individuals' capacity to perform everyday tasks and navigate their physical and social environments (Ferrucci et al., 2016). Older adults who have difficulty with mobility and carrying out activities of daily living (ADLs) are vulnerable to compromised mental health due to factors including a diminished sense of self-efficacy, lower levels of social integration and activity, and stigmatization (Freedman et al., 2017; Namkung & Carr, 2020). Physical health problems and the limits they impose on daily functioning do not uniformly undermine mental health, however. Socioeconomic resources including education, income, and wealth (Freedman et al., 2019; Mandemakers & Monden, 2010) and social support from spouse and family (Carr et al., 2019) buffer these associations. Yet protective economic resources may be out of reach for the one-third of U.S. older adults classified as financially insecure (Kaiser Family Foundation, 2018), and family support may be unavailable to the rising proportions of older adults who have no close kin or are socially isolated (NASEM, 2020). Thus, it is critical that researchers identify potentially modifiable factors that protect against the adverse psychological consequences of physical limitations.

Psychological resources buffer against depressive symptoms in stressful contexts, with studies documenting the protective effects of mastery, or perceptions of personal control over one's environment (Jang et al., 2002). However, less is known about the extent to which optimism moderates the effects of stress on depressive symptoms, and whether this protection is more pronounced at particular ages. Dispositional optimism, or the general belief that good things will happen in the future, is an internal resource that protects against mental health symptoms including depressed affect (Giltay et al., 2006). Although extensive research documents strong inverse associations between optimism and depressive symptoms (Purol & Chopik, 2021), it is unclear whether these protective effects are evidenced only among persons facing serious adversities, such as a greater number of physical limitations, and whether these stress-buffering effects vary with age. Optimism may be less protective and even counterproductive at advanced ages, as older adults struggle with activity-limiting health conditions that cannot be reversed or easily accommodated,

even with positive thoughts and proactive coping approaches (Chipperfield et al., 2019; Wrosch et al., 2016; Zaslavsky et al., 2015).

Drawing on stress buffering perspectives (Cohen & Willis, 1985), we evaluate prospectively: (1) the effects of physical limitations (i.e., mobility and ADL limitations) on depressive symptoms; and (2) the extent to which these patterns are buffered by dispositional optimism across four mid- and later-life age groups. We use a life course research design (Yang et al., 2020) and data from the Health and Retirement Study (HRS) and Midlife in the United States (MIDUS), two large longitudinal studies spanning the period from midlife (ages 40 to 49) to old age (ages 75+). Understanding whether, how, and at what ages optimism moderates the effects of physical limitations on midlife and older adults' mental health is an important goal; it may inform appropriate sites of intervention for the 16 percent of U.S. older adults with physical activity limitations (CDC, 2009).

BACKGROUND

Psychological Consequences of Physical Limitations

Older adults with activity-limiting health conditions may have difficulty carrying out everyday tasks, such as dressing and bathing, and navigating their physical environment, such as walking up a flight of stairs without difficulty (Covinsky et al., 2009). They also may feel their independence and autonomy are threatened, abandon activities that were once a source of enjoyment, and struggle to live independently and maintain social relationships (Freedman et al., 2017). Consequently, difficulties with physical mobility and ADLs are associated with heightened depressive symptoms, with studies documenting the direction of effects going both from physical to mental health (Freedman et al., 2017; Kelley-Moore & Ferraro, 2005; Namkung & Carr, 2019; Schieman & Plickert, 2007), and vice-versa (Friedrich, 2017).

Stress and coping theories provide a framework for understanding these patterns (Pearlin et al., 2005). Chronic or persistent strains, such as struggling to move around independently, can

undermine mental health due to their protracted duration and capacity to spill over into multiple life domains, including work, leisure, and family. Persistent stressors also strain one's immune, digestive, and cardiovascular systems, which heighten one's vulnerability to depression (Pearlin et al., 2005). Stress buffering perspectives further propose that external coping resources, such as social and emotional support, and internal resources, such as mastery and self-esteem, can reduce the harmful impacts of stress (Cohen & Wills, 1985). Buffering effects are theorized to be most pronounced at higher levels of stress. As stressors intensify or accumulate, individuals are more highly motivated to draw on internal or external resources to manage both the stressful context and their emotional reactions to that context (Lazarus & Folkman, 1984). Empirical assessments of the effects of mobility and activity limitations on psychological distress generally confirm that buffering effects are limited to persons with more rather than fewer limitations (Carr et al., 2019; Chan et al., 2011; Mancini & Bonanno, 2006). However, most studies focus on external coping resources, such as emotional and instrumental support from family and friends. It is less clear whether internal coping resources such as optimism operate similarly.

Optimism as a Coping Resource

Dispositional optimism is a well-documented correlate of mental health. Optimists tend to expect positive future outcomes, and thus may exert greater effort when confronted with a stressor or obstacle. Optimism also engenders problem-focused coping, or the strategies one uses to alter a stressful situation, and reduces the use of ineffective emotion-focused coping approaches such as denial (Nes & Segerstrom, 2006). However, theoretical writings and limited empirical work suggest that the protective effects of optimism may wane over the life course. With advancing age, older adults become increasingly susceptible to chronic and irreversible stressors such as health and mobility problems (Baltes & Smith, 2003). Although physical declines occur at different paces based on a range of sociodemographic and health characteristics, studies generally concur that decline "accelerates over the seventh decade of life, starting sometime between the ages of 60–70 years"

(Ferrucci et al., 2016, p. 1185). Under such conditions, optimism may not mitigate the psychological consequences of physical limitations because opportunities for problem-focused coping or emotional reframing may diminish. Rather than being protective, optimism may be unrealistic and may engender unproductive coping approaches and disappointment (Purol & Chopik, 2021).

We know of just one empirical assessment of the purportedly decreasing stress-buffering effects of optimism over the life course. Wrosch and colleagues (2016) tracked a small sample of older Canadian adults (ages 64 to 90) over a six-year period, and found that dispositional optimism protected younger participants from heightened depressive symptoms in the face of general self-reported stress. However, it is unclear whether comparable results would emerge for the specific stressor of mobility and ADL limitations, and whether the diminishing protective effects of optimism start even earlier, in midlife. Given rising rates of mobility and functional limitation even among adults in their 40s and 50s, it is important to explore whether and when the protective effects of optimism begin to decline, starting prior to one's retirement years (Brown et al., 2017). Thus, we evaluate prospectively the extent to which baseline dispositional optimism buffers against depressive symptoms at follow-up among person with significant (3+) versus more modest (0 to 2) limitations, encompassing both ADL and mobility limitations, and the extent to which these patterns differ across four age groups (ages 40 to 49, 50 to 64, 65 to 74, and 75+ at baseline). We expect that the buffering effects of optimism will decline in magnitude at older ages.

METHODS

Data

We use data from two national longitudinal studies of health and aging in the U.S.: the Midlife in the United States (MIDUS) and the Health and Retirement Study (HRS). The use of parallel measures from two data sets enables us to include a broader age range across the two samples, following the life course design approach used by Yang and colleagues (Yang et al., 2020). The initial

HRS cohort (b. 1931-41) collected baseline data when respondents were ages 51 to 61 in 1992; subsequent replenishment cohorts were ages 51 to 56 when they entered the sample. The MIDUS includes younger persons; the baseline sample collected in 1995 included persons as young as ages 25 to 34 (b. 1960-1970). The HRS includes a higher proportion of persons ages 75 and older, relative to the MIDUS. The use of two samples allows us compare findings across samples, enabling stronger conclusions regarding the extent to which the stress-buffering effects of optimism change with age (Yang et al., 2020).

MIDUS was initiated in 1995 to understand psychosocial influences on health among adults then ages 25 to 74 (See https://www.icpsr.umich.edu/icpsrweb/ICPSR/series/203). We used the second (MIDUS 2, 2004-2006) and third waves (MIDUS 3, 2013-2014) to prospectively examine associations between physical limitations, optimism, and age at MIDUS 2 (baseline) and depressive symptoms at MIDUS 3 (follow-up). We restricted our analytic sample to respondents ages 40-74 in MIDUS 2 (ages 48 to 82 in MIDUS 3) who completed the telephone interview and self-administered questionnaire (SAQ) in both waves (n = 2,399). We excluded respondents whose responses in our variables of interest were missing, resulting in an analytic sample of 2,138 persons. Item-specific missing data were less than 1% across all variables, except household income (3%) and wealth (17%) for which we imputed missing values and included missing data flags in the multivariable analyses.

The HRS has surveyed U.S. adults over age 50 biennially since 1992 (Sonnega et al., 2014). Our analyses are limited to those who completed the Leave Behind Questionnaire (LBQ), which assessed our focal moderator variable of optimism and other psychosocial factors. The LBQ was piloted in 2004 and fully implemented in 2006 (Sonnega et al., 2014). Of the 8,954 who were administered the LBQ in 2006, a randomly selected 50% subsample (n = 3,958) did not receive the optimism questions, as topical modules were administered in alternating years to different halves of the sample. Those persons without the baseline optimism assessments are excluded from our

analytic sample. We also excluded 481 persons who did not complete the depressive symptoms module at follow-up in 2014. Persons who did not complete the depressive symptoms module in 2014 differ significantly from those who did; they have lower optimism scores, more physical limitations, poorer self-rated health, and are younger, although they do not differ significantly with respect to chronic conditions. Our final analytic sample included 4,515 HRS respondents who were ages 50 and older in 2006 (58 and older in 2014). We use data from the 2006 and 2014 HRS waves to ensure historical comparability with the MIDUS and avoid the possibility of different period effects across the two samples. Historical factors like implementation of the Affordable Care Act (ACA), changing modalities for treating mental health, national crises like 9-11, and other historical events may bear on depressive symptoms levels (Ettman et al., 2020).

Measures

Dependent Variable

Depressive symptoms at follow-up were assessed with the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI) Short Form (Kessler et al., 1999) in the MIDUS and the eight-item version of the Center for Epidemiologic Studies Depression (CES-D) Scale (Radloff, 1977) in the HRS. MIDUS participants indicated whether they "felt sad, blue, or depressed" or "lost interest in most things" for two weeks or more within the past 12 months. Those who endorsed either item were asked about the presence (yes/no) of seven symptoms: (a) lost interest in most things; (b) feel more tired out or low on energy than is usual; (c) lost your appetite; (d) have more trouble falling asleep than usual; (e) have a lot more trouble concentrating than usual; (f) feel down on yourself, no good, or worthless; and (g) think a lot about death. Consistent with previous MIDUS studies (e.g., Namkung & Carr, 2020); we constructed a depressive symptoms score ranging from 0 (no two-week period of depressed affect or anhedonia in the past 12 months) to 7 (presence of all seven symptoms).

HRS respondents were asked whether they experienced each of eight CES-D symptoms during the past week: (a) felt depressed, (b) felt everything was an effort, (c) sleep was restless, (d) felt lonely, (e) felt sad, (f) could not get going, (g) enjoyed life (reverse-coded), and (h) felt happy (reverse-coded) (Radloff, 1977). Total scores ranged from 0 to 8, indicating the total number of depressive symptoms reported.

Independent Variables

Our focal predictor is baseline *physical limitations,* referring to difficulties with mobility and ADLs. This measure captures the impacts of physical health on one's capacity to navigate their environment and carry out activities necessary for independence. This composite measure also is appropriate for studying a broad age range; an analysis focused on ADLs only may not have enough younger persons to carry out adequately powered analyses. National data show that 2 percent of adults ages 45 to 64 report ADL limitations, whereas 11 percent report mobility limitations (CDC, 2009).

MIDUS participants were asked, "How much does your health limit you" in doing each of nine activities encompassing both mobility and ADLs: bathing or dressing yourself; lifting or carrying groceries; climbing several flights of stairs; bending, kneeling, or stooping; walking more than a mile; walking several blocks; walking one block; vigorous activity (e.g., running, lifting heavy objects); and moderate activity (e.g., bowling, vacuuming)? Response categories were "not at all," "a little," "some," and "a lot." (Ware & Sherbourne, 1992). We indicated the presence of a limitation if a respondent indicated at least "some" difficulty with an activity, consistent with previous MIDUS analyses (Namkung & Carr, 2019). HRS participants were asked whether they had any difficulty performing each of 11 similar activities because of health problems: dressing; eating; bathing; walking several blocks; walking one block; walking across a room; climbing several flights of stairs without resting; getting up from a chair after sitting for long periods; stooping, kneeling, or crouching; pushing or pulling large objects like a living room chair; and getting in and out of bed.

Response categories were “yes” or “no.” Despite the slight difference in measurement in HRS and MIDUS, the correlates of physical limitations are similar across the two samples (Cornman et al., 2021).

We recoded continuous summed scores (range: MIDUS 0 to 9; HRS 0 to 11) into a dichotomous measure indicating three or more versus 0 to 2 (reference group) limitations (Covinsky et al., 2009; Duchowny & Noppert, 2021). In preliminary analyses, we evaluated a continuous summed score, three-category (0, 1-2, 3+), and two-category (0-2, 3+) measures as predictors of depressive symptoms and tested three-way interactions between age group, physical limitations, and optimism. Multiple regression analyses showed that models with the two-category measure accounted for the greatest proportion of variance in the dependent variable, indicated by the adjusted R^2 levels (models available from authors). Our results are consistent with prior studies showing non-linear effects, with significant buffering effects found only at the highest levels of impairment (Carr et al., 2017; Chan et al., 2011).

Because our composite measure of physical limitation encompasses both mobility and ADL limitations, we carried out supplementary analyses in which we re-estimated all multivariable analyses using a measure of ADLs only (e.g., bathing or dressing), and mobility limitations only (e.g., walking one block) to assess whether each dimension had distinctive effects. Results for all multivariable models are presented in the online appendix (see Online Appendix Tables 1 and 2, and Appendix Figures 1 and 2). Patterns were comparable across the three specifications, although with slight differences in the magnitude and significance of effects. We present results here for the combined measure, as models using the combined measure best fit the data, as indicated by adjusted R^2 values.

Optimism and *age* are our focal moderators. In both the MIDUS and HRS, dispositional optimism is measured with a three-item version of the Life Orientation Test-Revised (LOT-R), which has excellent reliability and validity (Scheier et al., 1994). Respondents indicated their level of

agreement or disagreement with three items: (a) “In uncertain times, I usually expect the best;” (b) “I'm always optimistic about my future;” and (c) “I expect more good things to happen to me than bad.” Higher scores indicate greater levels of optimism (MIDUS: α = 0.72, HRS: α = 0.81). We standardized scores to account for differences in response categories (i.e., 5-point Likert scale in MIDUS and 6-point Likert scale in HRS). Standardized responses were summed so values range from 0 to 3 for both samples. Age is coded as four groups, based on one’s age at baseline: early midlife (40-49 years; MIDUS only), late midlife (50-64 years), younger late-life (65-74 years), and older late-life (75 years and older; HRS only).

Covariates

We controlled for baseline demographic, socioeconomic, health, and psychosocial characteristics that are documented correlates of physical limitation and depressive symptoms. Persons from socially and economically disadvantaged groups, including women, ethnic minorities, unmarried persons, and persons of lower socioeconomic status, are especially vulnerable to physical disability (Brown et al., 2017; Krahn et al., 2015) and both a greater number of and more frequent depressive symptoms (e.g., Abrams & Mehta, 2019). Thus, we control for demographic characteristics included *race and ethnicity* (racial/ethnic minority; non-Hispanic White (reference)), *sex*, and *marital status* (married or partnered (reference); separated or divorced; widowed; never married). Socioeconomic characteristics include *educational attainment* (less than high school (reference); high school graduate; some college; college graduate or higher), *employment status* (currently working; not working (reference)), *total household income*, and *total household wealth.* To address the skewed distribution of household income and net worth of wealth with zero and negative values, we transformed values using an inverse hyperbolic sine (Pence, 2006).

We also adjust for self-rated health and chronic health conditions, as they are associated with the risk of physical limitation (Krahn et al., 2015) and heightened depressive symptoms (Parajuli et al., 2021). Health covariates included *self-rated health status* (poor/fair vs. good or better health

(reference)) and a dichotomous indicator of any *chronic medical condition,* where respondents reported if they ever experienced any of seven chronic medical conditions (e.g., high blood pressure, cancer, heart problems, and stroke).

Psychosocial characteristics include *perceived mastery* and *social support.* Perceived mastery is an established mechanism linking physical limitations and depressive symptoms (Jang et al., 2002); it also is correlated with although is conceptually and statistically distinct from optimism (Scheier et al., 1994). Mastery is measured using four items: (a) Whether or not I am able to get what I want is in my own hands; (b) I can do just about anything I really set my mind to; (c) When I really want to do something, I usually find a way to succeed at it; and (d) What happens to me in the future mostly depends on me (Pearlin & Schooler, 1978). Participants indicated their level of agreement or disagreement with each item on a 7-point scale in MIDUS or a 6-point scale in the HRS. Items were recoded so that higher scores indicate higher levels of perceived mastery (MIDUS: $\alpha = 0.70$, HRS: $\alpha = 0.87$). All values were standardized to range between 0 and 1 and were summed so that values range from 0 to 4 for both samples.

Perceived social support also is a well-established coping resource that protects against depressive symptoms among persons with physical limitations (Carr et al., 2019). We constructed a measure of perceived positive social support from friends and family, as specific assessments of spouse and child(ren) ties were assessed of currently married persons and parents only. The three items are: (a) "how much do they understand the way you feel about things;" (b) "how much can you rely on them if you have a serious problem;" and (c) "how much can you open up to them if you need to talk about your worries." Responses ranged from "a lot" to "not at all." Responses are averaged such that higher scores indicate more positive social support. The overall scale alphas are high ($\alpha = 0.85$ in HRS and $\alpha = 0.81$ in MIDUS).

Analytic Plan

We carried out ANOVA (continuous measures) and chi-squared tests (categorical measures) comparing descriptive statistics for all study measures, by baseline age group, in Tables 1 (MIDUS) and 2 (HRS). We then estimated a series of hierarchical OLS regression models, to evaluate: (1) the main effects of physical limitations, optimism, and age group on depressive symptoms; and (2) three-way interactions to assess whether the stress-buffering effects of optimism differ by age, shown in Table 3. For ease of interpretation, the adjusted three-way interaction terms are plotted in Figures 1 and 2. (All results for the alternative specifications of ADL only or mobility limitations only are presented in the Appendix Tables and Figures).

RESULTS

Bivariate Analysis

Tables 1 (MIDUS) and 2 (HRS) present descriptive statistics for all study variables by baseline age group: early midlife (ages 40-49, *n* = 570 from MIDUS), late midlife (ages 50-64, *n* = 1,091 in MIDUS; 2,097 in HRS), younger late life (ages 65-74, *n* = 477 in MIDUS; 1,692 in HRS), and older late life (ages 75 and older, *n* = 726 from HRS). The far-right column denotes statistically significant group differences. In MIDUS, each successive age group is significantly more likely to report three or more physical limitations (13 vs. 23 vs. 31%) and significantly less likely to report 0 to 2 limitations. Optimism levels also increase slightly and significantly across the age groups (*M* = 2.13 vs. 2.24 vs. 2.33). Similar patterns emerge in HRS; the proportion with three or more limitations increases across age groups (29 vs. 31 vs. 44%), although persons ages 50-64 and 65-74 do not differ significantly from one another. Unlike MIDUS, levels of optimism among HRS participants do not differ significantly on the basis of age group.

The two samples reveal similar age-based patterns regarding other covariates; physical health, including self-rated health and the presence of a chronic medical condition, worsens with

age. In both samples, household income levels and the proportion currently employed decrease, but wealth levels increase across the three age groups. Although the three age groups in the HRS do not differ with respect to perceived support from friends and family, the oldest age group in the MIDUS (65 to 74) reports significantly more support than younger persons in the study. Mean depressive symptoms at follow-up decline with age among MIDUS participants and then increase slightly among the oldest HRS respondents, consistent with a U-shaped pattern of depressive symptoms documented across midlife and old age (Tampubolon & Maharani, 2017).

[Tables 1 and 2 about here]

Multivariable Analysis

Physical Limitations and Depressive Symptoms

We first evaluate the effects of our focal measures – physical limitations, age, and optimism - on depressive symptoms, net of all covariates (Model 1, Table 3). In both samples, persons with three or more physical limitations at baseline report significantly more depressive symptoms at follow-up, relative to those with 0-2 limitations (b = 0.237 in MIDUS, and 0.374 in HRS, $p < .001$). Likewise, baseline optimism is significantly and inversely related to depressive symptoms eight years later in both samples (b = -0.140 in MIDUS and b = -0.128 in HRS, $p < .001$). Among MIDUS participants, persons ages 50 to 64 (ages 58 to 72 at follow-up) and ages 65 to 74 (73 to 82 at follow-up) report significantly fewer depressive symptoms at follow-up, relative to the youngest age group (b = -0.123, $p < .05$ and b = -0.318, $p < .001$, respectively). While the oldest age group (age 75+ at baseline; age 83+ at follow-up) in the HRS evidenced higher depressive symptoms relative to younger sample members in the bivariate analyses, this effect is not statistically significant after controlling for covariates (b = 0.052, $p = .246$). Supplemental analyses revealed that younger HRS participants were more likely than older participants to skip the CES-D module and thus were dropped from the analysis. Because missing data may be an indication of unacknowledged

depressive symptoms, the young-old adults' mental health advantage may be slightly understated in the HRS data (Bono et al., 2007).

The effects of the covariates are consistent with prior studies of risk factors for depressive symptoms, such that women and persons with poor self-rated health evidence more depressive symptoms in both samples. Divorced/separated people and unemployed people report significantly more symptoms in the MIDUS, and people with less than a high school degree and those with chronic medical conditions report more symptoms in the HRS.

[Table 3 about here]

Moderation Analyses

Our final analysis focuses on three-way interaction terms, to explore whether the stress-buffering effects of optimism differ on the basis of age. Coefficients are presented in Model 2 in Table 3 (left panel for MIDUS and right panel for HRS) and statistically significant three-way interaction terms are plotted in Figures 1A and B. In both samples, we find statistically significant three-way interaction terms, such that optimism is most protective against depressive symptoms among persons in the youngest age groups with 3+ (versus 0 to 2) physical limitations. Among sample members with three or more limitations, the inverse association between optimism and depressive symptoms is strongest for the youngest subgroup in each sample. Figure 1A (MIDUS sample) shows the steepest inverse association between baseline optimism and depressive symptoms at follow-up among persons ages 40 to 49 with 3+ limitations, followed by persons ages 50 to 64 with 3+ limitations. By contrast, for older adults (age 65 to 74) with 3+ limitations and persons of any age with 0-2 limitations (dotted lines), the association between optimism and depressive symptoms is flat. Similarly, Figure 1B (HRS sample) shows that optimism is most protective for the youngest HRS participants with 3+ limitations. As optimism increases, declines in depressive symptoms are steepest for persons with 3+ limitations ages 50-64 at baseline, followed

by those ages 65 to 74. However, the association between optimism and depressive symptoms is flat for sample members with 0 to 2 limitations, and the oldest age group (ages 75+ at baseline) regardless of number of limitations.

[Figures 1A and B about here]

Our supplementary analyses, which separately consider ADL and mobility limitations, show similar patterns, with one exception. Among the oldest age groups in both samples, optimism is linked with a slight *increase* in depressive symptoms among those with ADLs only (results presented in Supplemental tables and figures). In MIDUS, higher levels of optimism are linked with a substantial decrease in depressive symptoms scores among persons ages 40-49 with either ADL limitations or mobility limitations, and a slightly more muted decline among those ages 50-74 for both outcomes. Similar patterns emerge in the HRS, such that persons ages 50-64 with either ADL or mobility limitations have a marked decrease in depressive symptoms as optimism increases, with similar though a slightly flatter decrease among those ages 65 to 74 with either ADL or mobility limitations. However, we see somewhat different patterns for the oldest age group in both samples for ADL versus mobility limitations. Optimism provides no protection against depressive symptoms for the oldest group in either sample, among persons with mobility limitation -- as evidenced by the flat lines -- consistent with results for the composite physical limitation measure. For persons with ADLs only, optimism is associated with a slight increase in depressive symptoms among the oldest age group in MIDUS, and a slightly larger (though marginally significant) increase among the oldest age group in HRS.

DISCUSSION

Our study is the first we know of to explore whether dispositional optimism buffers against the common later-life stressor of physical limitations, and the extent to which these patterns differ across four age groups, ranging from midlife to old age. Informed by stress and coping models and using a life-course research design (Yang et al., 2020), our analyses challenge the assumption that

optimism is a protective coping resource for all persons; rather these protective effects are conditional on the stress level experienced and age.

Three-way interaction terms revealed that optimism is a protective resource for mitigating depressive symptoms among midlife and young-old persons with physical limitations, whether operationalized as an aggregate measure, ADL only, or mobility limitation only. However, among persons of any age group with no or modest physical limitations, the association between optimism and depressive symptoms is flat. These patterns are consistent with stress theories, which suggest that coping resources such as optimism buffer against depressive symptoms only at high levels of stress, operationalized here as a greater number of physical limitations (Cohen & Wills, 1985). Internal coping resources, like optimism, or external resources, like social support, are deployed when the stressful situation becomes overwhelming and requires such supports (Lazarus & Folkman, 1984).

However, comparable long-term benefits of optimism are not detected among the oldest age groups in the MIDUS and HRS, for whom the association between optimism and depressive symptoms is flat, regardless of whether one has physical limitations (composite measure) or mobility limitations only. For the specific measure of ADL limitation, we found a very slight yet statistically significant *increase* in depressive symptoms among MIDUS participants, and a slightly larger (though marginally significant) increase among HRS participants in the oldest age groups. These results likely reflect the severity and intensity of health-related stressors experienced by older adults. For older adults with serious limitations, optimism may not be a realistic or effective coping resource in the long term. These beliefs may be counterproductive when physical limitations impede one's capacity to live independently and carry out necessary daily tasks like dressing or bathing.

Optimism typically motivates people to engage in problem-focused coping, yet for persons of advanced ages with serious or intensifying physical limitations, altering the stress-inducing context may not be feasible (Wrosch et al., 2016). Other benefits of optimism, such as the "power of

positive thinking" and a tendency to see the bright side of a situation also may be unrealistic, leading to feelings of disappointment (Purol & Chopik, 2021). Highly optimistic people also may fail to understand their health risks and may not take proper precautions or make necessary adjustments to accommodate their physical limitations, believing that things will get better (Weinstein, 1989). With our data, we cannot specify the mechanism accounting for the diminishing protective capacities of optimism at older ages; future studies should evaluate potential behavioral mechanisms, such as a refusal to use assistive devices or mobilize family caregivers, or to ignore the advice and information conveyed by one's health care provider.

Limitations

Our research has several limitations that bear on the generalizability of the results and motivate future investigations. First, while we strived for comparability across the two samples by constraining observations to similar time periods and selecting parallel measures, the HRS and MIDUS differ with respect to composition. The MIDUS sample is less racially and ethnically diverse, and has higher levels of educational attainment relative to the HRS. The two studies differ slightly with respect to their measures of physical limitation and depressive symptoms; for instance, MIDUS depressive symptoms refer to the past year whereas HRS assesses the past week. Despite these differences, the study findings were remarkably consistent across samples (see also Cornman et al., 2021). Second, we cannot definitively ascertain whether the documented age differences in the stress-buffering effects of optimism reflect chronological age or birth cohort. Given extensive literature on age differences in both the accumulation of and emotional responses to stressors such as health concerns and difficulties with ADLs (e.g., Baltes & Smith, 2003; Charles & Carstensen, 2010; Namkung & Carr, 2020), we find age-based arguments more persuasive, although these contrasts could be further fleshed out in future analyses using multicohort multiwave data.

Third, we could not ascertain the specific diagnosis or health condition that limited physical functioning. As such, we do not know if optimism is differentially protective in the face of chronic or

irreversible activity-limiting conditions versus short-term or less serious conditions that one may recover from. Future studies could further explore whether optimism undermines older adults' psychological adaptation to irreversible conditions under which "positive thinking" may be unrealistic and maladaptive (Chipperfield et al., 2019). Fourth, we focused specifically on optimism; future studies could explore whether the purportedly protective effects of other well-established coping resources like perceived mastery, self-esteem, and sense of humor operate differently across the life course (Ben-Zur, 2002). Fifth, given the relatively long (eight-year) duration between baseline and follow-up, other unmeasured health or age-related changes could bear on depressive symptoms. Fifth, both MIDUS and HRS, like any longitudinal study of aging, are subject to attrition and retention biases (Hofer & Sliwinski, 2006). We carried out supplemental analyses with both samples, and found that persons who dropped out of the sample or died between baseline and follow-up were significantly older, had lower levels of optimism, and higher levels of physical limitation at baseline relative to those who remained in the sample (results available from authors). Thus, our results are biased towards older adults in superior physical and mental health.

Finally, our study focused on the United States only. Future studies should explore whether similar patterns are found beyond the U.S., and especially in non-western and low-income contexts. While cross-national studies find only modest differences in mean levels of dispositional optimism (e.g., Fischer & Chalmers, 2008), recent evidence suggests that the protective effects of optimism for mental health are more muted in lower-income nations, in which there are fewer opportunities to use positive thinking to improve one's situation (e.g., Baranski et al., 2021). The extent to which optimism buffers the harmful psychological impact of physical disability on well-being, and how these associations unfold over the life course, may differ dramatically across social, cultural, and economic contexts.

Conclusion

Despite these limitations, our study is the first we know of to explore whether the stress-buffering effects of optimism in the face of one common later-life stressor, physical limitation – encompassing mobility and ADL limitation - differ over the life course. Our results reveal that optimism is a coping resource that can protect against depressive symptoms in some contexts, yet under certain conditions does not mitigate (and may even intensify) the harmful effects of stress on depressive symptoms. Optimism buffered against depressive symptoms among younger and midlife adults with substantial physical limitation yet offered little protection for younger adults who did not face the stressor of limitation. For older adults in their 70s and beyond, optimism provided little psychological benefit for those with physical limitation; such beliefs may be unrealistic and lead to disappointment and depression. Coping models historically have privileged individual-level resources, such as personality attributes, coping styles, and social support. Our research contributes to a growing literature that calls for a more expansive view of coping resources, one that incorporates structural and institutional supports (see Schneiderman et al., 2005 for review), such as increased public funding for long-term supports and services, including home health aides, home repairs and modifications, and subsidies for the purchase of assistive devices. These structural and environmental supports may be more effective than interventions intended to promote positive thinking among older adults with declining health and accompanying constraints to their mobility and independence.

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Table 1. Descriptive Statistics for All Variables Used in Analysis, 2004-06 and 2013-14 Midlife in the United States (MIDUS). *N* = 2,138.

	Early midlife [a] (ages 40-49, *n* = 570)	Late midlife [b] (ages 50-64, *n* = 1,091)	Young-old late life [c] (ages 65-74, *n* = 477)	Significant subgroup differences
	Proportion or *M* (*SD*)	Proportion or *M* (*SD*)	Proportion or *M* (*SD*)	
Sex (1 = female)	.56	.54	.58	
Race/ethnicity (1 = racial/ethnic minority)	.08	.08	.08	
Marital status				
Married or partnered	.73	.74	.73	
Divorced or separated	.13	.16	.13	
Widowed	.01	.04	.11	ac, bc
Never married	.13	.06	.03	ab, ac
Educational attainment				
Less than high school	.04	.05	.07	
High school graduate	.21	.24	.31	ac, bc
Some college	.27	.29	.27	
College graduate or higher	.49	.43	.36	ac, bc
Employment status (1 = currently working)	.87	.76	.36	ab, ac, bc
Self-rated physical health				

Fair/poor health	.09	.11	.09	
Good or better health	.91	.89	.91	
Chronic medical conditions (1 = yes)	.35	.64	.82	ab, ac, bc
Household income ($)	90,040 (63,317)	80,821 (62,001)	54,503 (47,988)	ab, ac, bc
Household wealth ($)	257,793 (655,734)	417,130 (797,049)	580,904 (1,154,216)	ab, ac, bc
Social support from family and friend (1-4)	3.31 (0.56)	3.36 (0.55)	3.45 (0.49)	ac, bc
Physical limitations (PL, 0-9)				
PL 0-2	.87	.77	.69	ab, ac, bc
PL 3+	.13	.23	.31	ab, ac, bc
Optimism at baseline (0-3)	2.13 (0.63)	2.24 (0.63)	2.33 (0.54)	ab, ac, bc
Mastery at baseline (0-4)	2.58 (0.47)	2.61 (0.50)	2.58 (0.52)	
Depressive symptoms at follow-up (0-7)	0.71 (1.90)	0.56 (1.62)	0.32 (1.24)	ac, bc

Notes. All variables assessed at baseline, except depressive symptoms. Each within-age group comparison was carried out using ANOVA with post-hoc tests (continuous measures) or Chi-square tests (dichotomous measures). Statistically significant ($p < .05$) subgroup differences are denoted as *ab*: ages 40-49 vs. ages 50-64; *ac*: ages 40-49 vs. ages 65-74; *bc*: ages 50-64 vs. ages 65-74.

Table 2. Descriptive Statistics for All Variables Used in Analysis, 2006 and 2014 Health and Retirement Study (HRS). *N* = 4,515.

	Late midlife [a] (ages 50-64, *n* = 2,097)	Young-old late life [b] (ages 65-74, *n* = 1,692)	Old-old late life [c] (ages 75+, *n* = 726)	Significant subgroup differences
	Proportion or *M* (*SD*)	Proportion or *M* (*SD*)	Proportion or *M* (*SD*)	
Sex (1 = female)	.60	.56	.65	bc
Race/ethnicity (1 = racial/ethnic minority)	.25	.21	.11	ab, ac, bc
Marital status				
Married or partnered	.76	.72	.56	ab, ac, bc
Divorced or separated	.14	.10	.05	ab, ac, bc
Widowed	.06	.15	.38	ab, ac, bc
Never married	.04	.03	.01	ac
Educational attainment				
Less than high school	.11	.17	.18	ab, ac
High school graduate	.32	.40	.39	ab, ac
Some college	.28	.20	.22	ab, ac
College graduate or higher	.29	.23	.20	ab, ac
Employment status (1 = currently working)	.59	.14	.04	ab, ac, bc
Self-rated physical health				
Fair/poor health	.20	.20	.21	
Good or better health	.80	.80	.79	
Chronic medical conditions (1 = yes)	.73	.88	.90	ab, ac
Household income ($)	92,348 (312,704)	66,813 (187,860)	44,074 (60,978)	ab, ac
Household wealth ($)	496,388 (1,126,795)	565,734 (1,042,588)	566,701 (1,030,302)	
Social support from family and friend (1-4)	2.93 (0.67)	2.95 (0.67)	2.98 (0.63)	
Physical limitations (PL, 0-11)				
PL 0-2	.71	.69	.56	ac, bc
PL 3+	.29	.31	.44	ac, bc
Optimism at baseline (0-3)	2.13 (0.69)	2.15 (0.67)	2.17 (0.67)	
Mastery at baseline (0-4)	3.09 (0.86)	3.09 (0.84)	3.00 (0.88)	ac, bc
Depressive symptoms at follow-up (0-8)	1.28 (1.89)	1.30 (1.86)	1.54 (1.89)	ac, bc

Notes. All variables assessed at baseline, except depressive symptoms. Each within-age group comparison was carried out using ANOVA with post-hoc tests (continuous measures) or Chi-square tests (dichotomous measures). Statistically significant ($p < .05$) subgroup differences are denoted as *ab*: ages 50-64 vs. ages 65-74; *ac*: ages 50-64 vs. ages 75+; *bc*: ages 65-74 vs. ages 75+.

Table 3. Results for Multiple Regression Analyses Predicting Subsequent Depressive Symptoms, MIDUS 2004-06 and 2013-14, HRS 2006 and 2014

	MIDUS 2004-06 and 2013-14 (*N* = 2,138)		HRS 2006 and 2014 (*N* = 4,515)	
Variables	Model 1	Model 2	Model 1	Model 2
Main effects				
Physical limitations (PL) at baseline				
PL0-2 (reference)				
PL3+	.237***	1.907***	.374***	.955***
Optimism at baseline	-.140***	-.031	-.128***	-.074*
Age				
Age 40-49	reference	reference		
Age 50-64	-.123*	.099	reference	reference
Age 65-74	-.318***	-.264	.000	.049
Age 75+			.052	-.014
2-way interactions: Optimism × PL3+				
Optimism × PL3+		-.653***		-.272***
2-way interactions: Age × PL3+				
Age 40-49 × PL3+		reference		
Age 50-64 × PL3+		-1.072*		reference
Age 65-74 × PL3+		-1.866**		-.395*
Age 75+ × PL3+				-.633*
2-way interactions: Optimism × Age				
Optimism × Age 40-49		reference		
Optimism × Age 50-64		-.080		reference
Optimism × Age 65-74		.014		-.021

Optimism × Age 75+				.045
3-way interactions: Age × PL3+ × Optimism				
Age 40-49 × PL3+ × Optimism		reference		
Age 50-64 × PL3+ × Optimism		.360		reference
Age 65-74 × PL3+ × Optimism		.666**		.189*
Age 75+ × PL3+ × Optimism				.272*
Covariates				
Mastery at baseline	.078	.076	-.109***	-.108***
Race/ethnicity (1 = racial/ethnic minority)	.107	.115	.084*	.087*
Sex (1 = female)	.134**	.140***	.072*	.067*
Marital status				
Married or partnered (reference)				
Divorced or separated	.191***	.178**	.036	.038
Widowed	.055	.042	.043	.040
Never married	.128	.126	.032	.028
Educational attainment				
Less than high school (reference)				
High school graduate	-.186	-.157	-.170***	-.172***
Some college	-.056	-.032	-.159***	-.165***
College graduate or higher	-.118	-.095	-.234***	-.242***
Employment status (1 = currently working)	-.141**	-.138**	.011	.014
Self-rated physical health (1 = poor/fair health)	.212**	.172*	.429***	.421***
Chronic medical conditions (1 = yes)	.058	.050	.069*	.070*

Table 3 (cont'd)

	MIDUS		HRS	
	Model 1	Model 2	Model 1	Model 2

Social support from family and friend (1-4)	-.119**	-.107**	-.074***	-.075***
Household income	.005	.005	-.035	-.037
Income missing flag	.016	.016		
Household wealth	-.002	-.001	-.023***	-.023***
Wealth missing flag	.027	.029		
Intercept	.561	.203	.901***	.787***
Adjusted R^2	.072	.086	.192	.196

Note. All predictor variables are assessed at baseline; depressive symptoms are assessed at follow-up. Income and wealth are transformed using inverse hyperbolic sine. Unstandardized coefficients are presented. All models used z-scores of depressive symptoms.

Age reference group: Age 40-49 for the MIDUS; Age 50-64 for the HRS.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 1A

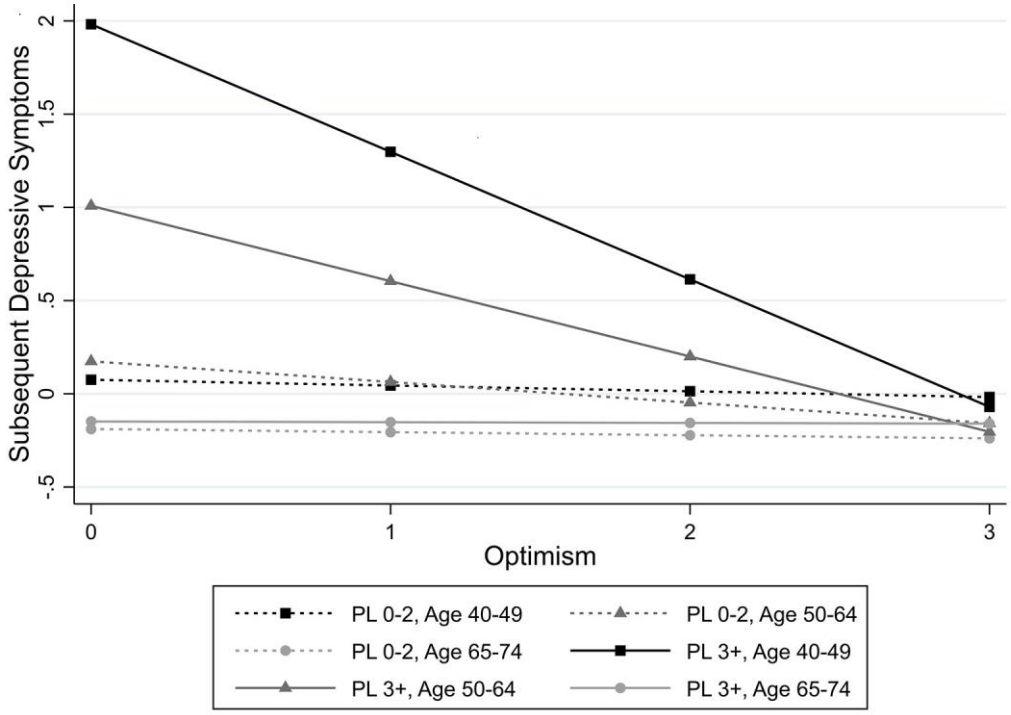

Figure 1B