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Hirsch, J.K., Sirois, F.M. and Lyness, J.M. (2011) Functional impairment and depressive symptoms in older adults: Mitigating effects of hope. *British Journal of Health Psychology*, 16 (4). 744 - 760. ISSN 1359-107X

<https://doi.org/10.1111/j.2044-8287.2010.02012.x>

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Functional Impairment and Depressive Symptoms in Older Adults: Mitigating Effects of Hope

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Keywords: Functional Impairment, Trait Hope, Depressive Symptoms, Older Adults, Primary Care

ABSTRACT

Objective: We examined trait hopefulness and its component subscales of agency and pathways as potential moderators of the association between functional impairment and depressive symptoms, hypothesizing that hopefulness would buffer this association.

Design: Cross-sectional, interview-based.

Methods: Older adult, primary care patients (N=105; 62% female) completed measures of cognitive functioning, functional impairment, medical illness burden, trait hope, and depressive symptoms.

Results: Functional impairment was significantly positively associated with depressive symptoms and dispositional hope total score moderated this relationship. Independently, the pathways subscale was a significant moderator and agency neared significance, yet their interaction was not significant.

Conclusions: Older adults with functional impairment appear to benefit from agency and pathways; either subcomponent alone or their additive effect can activate hopefulness.

Facilitation of infrastructure (pathways), primarily, and self-efficacy (agency), secondarily, may be important strategies for reducing depressive symptoms in elderly patients with functional impairment.

Functional Impairment and Depressive Symptoms in Older Adults: Mitigating Effects of Hope

Introduction:

Depression is a significant public health problem for adults ages 65 years and over, affecting up to thirteen percent of older adults (Mojtabai & Olfson, 2004; Alexopoulos, 2005), with depression rates doubling between the ages of 70 and 85 years old. The symptom pattern of older adults with depression is associated with increased morbidity and greater health care utilization and costs (Katon, Lin, Russo, & Unutzer, 2003; Beekman, Deeg, Braam, Smit, & Van Tilburg, 1997), and rates of depression are higher in medical settings than in the community (Alexopoulos, 2005). Depressed older adults most often present to primary care providers rather than mental health clinicians (Gallo & Coyne, 2000); it is estimated that 25% of older primary care patients have clinically significant depressive symptoms (Schwenk, 2002).

With increased age, risk factors for depression are generally well-established. Medical illness, functional impairment and psychosocial factors contribute significantly to reduction of well-being, including increased depressive symptoms (Zeiss, Lewinsohn, Rohde, & Seeley, 1996; Lyness, Caine, Conwell, King, & Cox, 1993; Oquendo et al., 2001; Zeiss et al., 1996; Sinclair, Lyness, King, Cox, & Caine, 2001) which, in turn, exerts its own influence, contributing to excess mortality and functional disability (Bruce, 1999; Gurland, Wilder, & Berkman, 1988). There is a high prevalence of functional impairment in the elderly; of individuals over the age of 65 in the United States, approximately 20% are chronically disabled (He, Sengupta, Velkoff, & DeBarros, 2005).

Not all individuals with chronic medical problems or functional decline, however, experience depressive symptoms. Study of factors that buffer against the deleterious effects of disease burden and impairment may identify targets for depression prevention or treatment. One

important potential set of such buffers are positive cognitive and emotional characteristics, such as positive affect, happiness, optimism and hope (Hirsch, Duberstein, & Unützer, 2009; Pressman & Cohen, 2005). In the context of medical illness and disability, adaptive cognitive-emotional characteristics are associated with better perceived health and longevity, improved coping and psychological adjustment to disease, decreased pain, and reduced depression and suicidal behavior (Achat, Kawachi, Spiro, DeMolles, & Sparrow, 2000; Ridder, Schreurs, & Bensing, 2000; Brummett et al., 2005; Helgeson, Snyder, & Seltman, 2004; Safren, Radomsky, Otto, & Salomon, 2002; Hirsch et al., 2007).

Further, previous research suggests that the presence of positive psychological characteristics, rather than the absence of negative psychological characteristics (e.g., negative affect), is a more robust predictor of decreased depressive symptoms and suicidal behaviors (Watson & Pennebaker, 1989; Mor & Winquist, 2002; Hirsch, Duberstein, Chapman, & Lyness, 2007). Although traditional interventions focused on reduction of negative affectivity have successfully reduced depression and suicide in older adults (Munoz et al., 1995; Szanto et al., 2001; Bruce et al., 2004; Unützer et al., 2002), clinical efforts to reduce depressive symptoms may not simultaneously address the need to promote and bolster adaptive characteristics. One might question whether the relationship of hope with less severe depressive symptoms is merely a tautology. Although some studies suggest that the association between constructs such as hopefulness and hopelessness, optimism and pessimism, and positive and negative affect are bipolar in nature, most research, including our own work on affect and personality, reveal a more orthogonal relationship (Hirsch et al., 2007; Hirsch & Conner, 2006). Importantly, most individuals with chronic medical problems or impairment are able to identify at least one or more positive characteristics about themselves or their illness experience which may, in turn,

contribute to improved physical and mental health (Benyamini, Idler, Leventhal, & Leventhal, 2000; Meraviglia, 2004; Sarna et al., 2005).

We examined one such characteristic, trait hopefulness, and its possible moderating role in the link between functional impairment and depressive symptoms. Defined as a dispositional cognitive-emotional characteristic, trait hope is posited to consist of two components, perceived self-efficacy to achieve goals (agency) and the ability to successfully acquire or implement resources necessary for goal attainment (pathways) (Snyder et al., 1991). The subcomponent of agency involves a sense of will and efficacy, including the ability to identify appropriate goals and perceived confidence in goal accomplishment. The pathways component of hope involves the ability to interact with the environment in an applied and functional manner, including identification of necessary steps for goal attainment and the ability to garner resources and solve problems in order to accomplish goals (Snyder, 1994). Hope theory suggests that it is necessary to have both perceived efficacy (will) and translational abilities and resources (ways) to benefit from hopefulness; as individual components, agency and pathways are necessary but not sufficient for the development of hope (Snyder et al., 1991). Findings regarding the necessity of both subcomponents of hope are mixed, with some research suggesting that agency and pathways are distinct (Magaletta & Oliver, 1999) and other research indicating that although they are somewhat overlapping constructs, agency may be a more robust contributor than the pathways subcomponent to both adaptive and maladaptive outcomes, including psychological adjustment and maladjustment and suicide ideation (Arnau, Rosen, Finch, Rhudy, & Fortunato, 2007; Bailey, Eng, Frisch, & Snyder, 2007; Range & Penton, 1994; Cramer & Dyrkacz, 1998; Chang, 2003).

Despite some controversy regarding its composition, hopefulness is generally associated with positive mental and physical health outcomes. Hopefulness may mitigate the effects of negative life events and is associated with reduced depressive symptoms in young adults, and improved coping, quality of life and mood in heart transplant, cancer and AIDS patients (Evangelista, Doering, Dracup, Vassilakis, & Kobashigawa, 2003; Chang & DeSimone, 2001; Gum & Snyder, 2002; Irving, Snyder, & Crowson, 1998; Kylma, Vehvilainen-Julkunen, & Lahdevirta, 2001; Reff, Kwon, & Campbell, 2005). As an ameliorative factor, trait hope may function via its effects on engaged coping (Snyder et al., 1991), adaptive problem solving (Gum & Snyder, 2002; Scheier & Carver, 1992), and goal persistence (Brissette, Scheier, & Carver, 2002); therefore, functionally-impaired older adults who are also hopeful may approach their current and future life situation more energetically and directly, perhaps facilitating recuperation and improved functioning (Gum & Snyder, 2002). Conversely, reduced levels of hopefulness, particularly decreased agentic thinking, has been associated with clinically significant scores on subscales of the MMPI-2, increased anxiety and depressive symptoms, and increased thoughts of suicide (Cramer & Dyrkacz, 1998; Range & Penton, 1994; Arnau et al., 2007).

The association between trait hope, functional impairment and depressive symptoms has not been previously examined in older adults, so perhaps an analogy is appropriate. Disability encompasses both psychological and functional components; for instance, lowered self-efficacy and hopelessness may be representative of the former and decreased mobility and activity of the latter (Shnek et al., 1997; He et al., 2005). In parallel, hopefulness is comprised of psychological characteristics, such as perceived ability to achieve a goal, and functional characteristics, such as ability to garner resources for goal attainment (Snyder, 1994). The theoretical underpinning of hope suggests that perceived efficacy (agency) and instrumental functioning (pathways) may be

necessary but not sufficient factors for the development and maintenance of hope – both components are needed. Although sometimes not possible, overcoming functional impairment is challenging, involving emotional motivation, physical well-being and assistive resources (MacKenzie et al., 1998; de Leon, Gold, Glass, Kaplan, & George, 2001; Albrecht & Devlieger, 1999); each of these components may be necessary for potential recovery from illness or disability, but insufficient in isolation. Surprisingly, there has been very little investigation of differential effects of agency and pathways in general (Arnau et al., 2007), and none in older adults or individuals with functional impairment.

We hypothesized that functional impairment would be associated with greater depressive symptoms, and that trait hope would moderate this relationship, such that patients with greater levels of hope will report fewer depressive symptoms as a result of functional impairment. In addition to examining the total hope score as a moderator, we also conducted exploratory analyses investigating each of the subcomponents of hopefulness, agency and pathways, as potential moderators, as well as the combined moderating effects of the two subcomponents. We focused on primary care settings as important recruitment sites for identification and treatment of depression; most older adults with clinically significant depressive symptoms visit their primary care physician, but do not seek treatment with mental health providers (Unützer et al., 2001; Fischer, Wei, Solberg, Rush, & Heinrich, 2003; Harman, Crystal, Walkup, & Olfson, 2003).

Methods:

Participants. Participants included 105 older adult, primary care patients (68 females; 62%), with a mean age of 74.24 years ($SD = 5.56$). Marital status of patients included: 54% separated, divorced, widowed or married but not living with spouse, 42% married and living

with a spouse, and 4% single. Respondents were retired (88%), or were employed part-time (10%) or full-time (2%). Participants were recruited from private internal medicine practices and hospital-affiliated internal medicine and geriatric clinics in Rochester, New York. Subject selection and screening have been described previously (Hirsch et al., 2007); briefly, this IRB-approved study, which utilized trained raters, attempted to recruit all patients aged 65 years and older presenting for care at participating clinic sites and giving formal written informed consent.

Measures. We assessed functional impairment using the Karnofsky Performance Status Scale (KPSS) (Karnofsky & Burchenal, 1949), which describes limitations in abilities to perform normal daily activities due to physical illness. The KPSS is physician-rated on a scale from 0 (death) to 100 (normal; no evidence of disease); however, in the current study we reverse-scored this measure to match the scaling of other measures, such that higher scores indicate greater impairment. The KPSS has established reliability and validity in older adults (Schag, Heinrich, & Ganz, 1984).

Depressive symptoms were assessed using the Hamilton Rating Scale for Depression (Williams, 1988; Hamilton, 1960), a 24-item, interviewer-administered measure of the presence and severity of current depressive symptoms. In our study, the HRSD mean score (SD) was 7.75 (5.16). The HRSD has adequate psychometric properties (Williams, 2001), and adequate reliability, validity and sensitivity when used with older adults and patients with functional impairment (Aben, Verhey, Lousberg, Lodder, & Honig, 2002; Onega & Abraham, 1997); coefficient alpha in the present sample was .76.

Medical illness burden was assessed utilizing the Cumulative Illness Rating Scale (CIRS) (Linn, Linn, & Gurel, 1968) which provides a rating of illness burden based on the sum of severities in each of 12 organ systems; an additional psychiatric scale was unused and not

included in scoring. The CIRS is valid and reliable when used with older adults (Conwell, Forbes, Cox, & Caine, 1993). A physician investigator (JML) assigned CIRS scores for each organ system based on physical examinations, laboratory evaluations, and medical history ascertained from health records and interviews.

Cognitive functioning was assessed using the Mini Mental State Exam (MMSE) (Folstein, Folstein, & McHugh, 1975), a measure of general cognitive functioning. Scores can range from 0 – 30 and were scored continuously. The MMSE has good validity and reliability in use with older adults (Tombaugh & McIntyre, 1992).

Trait hopefulness was measured using the Goals Scale (Snyder et al., 1991), which has 12 items scored on a 4-point Likert scale, yielding a total score and two subscales, pathways (e.g., “there are lots of ways around any problem”) and agency (e.g., “I meet the goals I set for myself”). Dispositional hope is associated with reduced depressive symptoms, and has adequate internal consistency (Snyder et al., 1991), including in use with older adults and patients with medical illness and functional impairment (Wroblewski & Snyder, 2005; Parenteau, Gallant, Sarosiek, & McCallum, 2006). In the current study, coefficient alpha for all items = .85; for subscales, $\alpha = .76$ (agency) and .83 (pathways).

Statistical analyses. Bivariate correlations were used to assess the degree of association between predictor variables; no relationship reached accepted cutoffs for multicollinearity (Tabachnick & Fidell, 2001) (See Table 1). A paired-samples t-test was used to compare variable means between respondents in our sample and those in the larger study from which this sample was derived. We used hierarchical linear regressions to test the hypothesized associations between trait hopefulness and depressive symptoms, and to assess the moderator status of trait hope and its subscales in the relationship between functional impairment and

depressive symptoms. Covariates were age, gender, medical illness burden (CIRS), and cognitive functioning (MMSE). Predictors and potential moderators were centered and, along with covariates, were entered on the first step of the regression. Multiplicative interaction terms were entered on the second step of the model (Baron & Kenny, 1986). To illustrate the interaction term, patients were categorized into high and low hope groups based on being ± 1 SD from the Trait Hope total mean score. Scores on the Karnofsky were reverse-scored for ease of interpretation, such that higher scores indicate greater impairment.

Results:

Bivariate correlation analyses revealed significant positive correlations between functional impairment and illness burden ($r = .60, p < .01$), age ($r = .30, p < .01$) and depressive symptoms ($r = .56, p < .01$). Significant negative correlations existed between depressive symptoms and the trait hope agency subscale ($r = -.23, p < .05$) and trait hope total score ($r = -.20, p < .05$) (See Table 1).

Controlling for covariates (age, gender, cognitive status and illness burden), we utilized regression analyses to examine the trait hope total score as a potential moderator of the relationship between functional impairment and depressive symptoms. Functional impairment was significantly positively associated with depressive symptoms, $t = 3.21, p < .01, \text{Un } \beta = .65$ [SE=.20], and dispositional hope total score moderated this relationship, $t = -2.45, p < .05, \text{Un } \beta = -.02$ [SE=.01], in support of our hypothesis (See Table 2). Specifically, the association between functional impairment and depressive symptoms was weakest in patients with higher levels of hopefulness (See Figure 1). Hope and illness burden were also significant independent contributors to the model.

We also assessed the independent effects of agency and pathways as potential moderators. In a model covarying the pathways main effect, agency neared significance as a moderator of the association between functional impairment and depressive symptoms, $t = -1.93$, $p = .06$, $Un \beta = -.02$ [$SE=.01$], suggesting that individuals able to identify and set personal goals may report fewer depressive symptoms. In a model covarying the main effect of agency, pathways was a significant moderator of this relationship, $t = -2.60$, $p < .05$, $Un \beta = -.03$ [$SE=.01$], such that individuals with greater ability to generate solutions toward goal attainment experience fewer depressive symptoms as a result of functional impairment (See Table 2).

To assess the shared effects of both agency and pathways as potential moderators, we conducted a regression with both agency and pathways subscale scores entered into the model simultaneously, with their interactions. In addition, we conducted analyses to investigate potential 3-way interactions between functional impairment, agency and pathways. None of the 2-way or 3-way interactions involving agency and pathways were significant, suggesting that it is the additive effect of the independently-beneficial components of agency and pathways, as captured in the total hope score, that is responsible for the ameliorative effect of hopefulness, rather than the multiplicative influence that these variables might have on one another.

Discussion:

We confirmed our hypothesis, finding that that functional impairment was associated with increased depressive symptoms in our sample of older adult, primary care patients, and that trait hope moderated this relationship, over and above the effects of age, gender, cognitive status and illness burden. Despite the presence of hopefulness, as impairment becomes more severe, its association with depressive symptoms is strengthened; however, older adults with greater levels

of trait hope may experience fewer depressive symptoms in the context of functional decline. In additional analyses independently examining the sub-components of trait hope, we found that the ability to generate goals (agency) neared significance and the ability to garner resources to accomplish goals (pathways) was a significant moderator of the association between functional impairment and depressive symptoms. In and of themselves, these abilities may contribute to better health functioning. Finally, we examined agency and pathways and their interactions in a full model, finding that none of the 2-way or 3-way interactions between agency and pathways, and functional impairment, were significant. Our findings suggest that, when considered together, it is the additive effect of agency and pathways that is of the most benefit, rather than the effect that agency and pathways have on one another in the context of functional impairment, supporting of a primary tenet of hope theory (Arnau et al., 2007; Snyder et al., 1991).

Our results support previous research indicating a trend toward better outcomes for individuals with a hopeful or future-oriented set of cognitions and mood (Segerstrom, 2000; Hirsch et al., 2007), which may buffer against depressive symptoms in the context of illness, impairment and negative life events (Hirsch et al., 2007; Heisel & Flett, 2004). Older adults with functional limitations may be vulnerable to changes in affect and motivation that reduce goal striving, perhaps resulting in greater impairment (Sinyor et al., 1986). Older individuals with impairments, however, who are also able to maintain adequate levels of positive emotion and hopefulness may gain social, psychological and physical benefits, including more effective coping ability, reduced depression and improved health (Hirsch et al., 2007; Pressman & Cohen, 2005).

Trait hope, as proposed by Snyder, was not originally conceptualized as a developmentally-based characteristic, and is not expected to change over time; however, there is

some precedent for the role of goal-oriented motivational constructs in successful aging (Carstensen & Turk-Charles, 1994; Freund & Baltes, 1998). The natural aging process may expose older adults to more frequent biological and interpersonal losses, potentially thwarting agentic and pathways processes toward goal attainment (Wroblewski & Snyder, 2005). As such, helping older adults emotionally and psychologically cope with illness and impairment, in themselves and others, may necessitate reevaluation of personal goals; however, research suggests that older adults may be well-suited to make this transition, and it is not surprising that older adults with higher levels of hope reap some measure of psychological benefit (Snyder et al., 1991).

Older adults may have an improved ability to attend to and regulate internal cognitive and emotional states, and tend to manifest an age-related shift in psychological defense style from self-focused negative affect to a more positive affective and behavioral style, leading to improved coping and intra and inter-personal functioning (Labouvie-Vief, Devoe, & Bulka, 1989; Labouvie-Vief, Hakim-Larson, & Hobart, 1987). Declines in rigid and stereotypical thinking, increased tolerance of conflict within the self and with others, and greater cognitive flexibility, including changes in social, informational and behavioral goal identification and attainment strategies may also be a product of the aging process (Carstensen, Fung, & Charles, 2003; Freund & Baltes, 1998). This late-blooming capacity for capitalizing on positive emotional functioning and concomitant decreases in negative affectivity (Isaacowitz & Seligman, 2002), may be at least, in part, attributed to changing degrees of future orientation and goal oriented behavior (Hirsch et al., 2007; Carstensen, Isaacowitz, & Charles, 1999).

Capitalizing on these cognitive and emotional changes may be an important adjunctive treatment strategy for older adults experiencing functional impairment and its consequences.

Indeed, interventions based on hope theory have successfully decreased depressive symptoms in older adults (Klausner et al., 1998), although this effect remains to be rigorously assessed in the context of illness and impairment. There is some evidence to suggest, however, that such interventions may be successful. As an example, some older adult, palliative care patients were able to maintain hopefulness by acknowledgement of their current strengths and weaknesses, searching for meaning and positive reappraisal of capabilities and goals (Duggleby & Wright, 2009). Older adults with greater levels of trait hope also tend to exhibit more adaptive coping strategies (Jackson, Taylor, Palmatier, Elliott, & Elliott, 1998), view themselves as healthier than their peers and are less likely to allow illness or impairment to interfere with successful aging (Wroblewski & Snyder, 2005).

Our findings extend previous research, implying that encouragement of feelings of self-efficacy may have an ameliorative effect on depression despite frustrations occurring as a result of reduced functionality (Marks & Allegrante, 2005). As suggested by the activity restriction model (Williamson & Schulz, 1992; Williamson & Shaffer, 2000), impairment may result in a reduction of meaningful activities that contributes to depression, but can also be conceptualized as a blockade of meaningful goal pursuits (Snyder et al., 1991; Snyder, Lehman, Kluck, & Monsson, 2006); however, encouraging agency, or the identification and attainment of alternative, yet meaningful, goals, may buffer this association. As an individual adopts and engages in pathways that lead to successful goal-attainment, a sense of accomplishment may occur that fosters future motivation to behave similarly (Snyder et al., 2002). From a caregiver or therapeutic perspective, provision of instrumental and social support that facilitates goal-attainment may “broaden and build” positive emotions and hopefulness, despite the decreased

motivation and confidence that may be experienced as a result of functional impairment (Taylor & Lynch, 2004; Alexopoulos, Raue, & Arean, 2003; Fredrickson & Joiner, 2002).

Our study is one of only a few to examine the independent contributions of the agency and pathways components of hopefulness (Arnau et al., 2007). Our results support Snyder's theory of trait hope, which suggests that agency and pathways commonly co-occur and that both additively contribute to the beneficial effects of trait hope (Snyder et al., 1991). We also found that the independent effects of agency and pathways were ameliorative; over and above the effects of one another, these subcomponents of hope contributed to fewer depressive symptoms in the context of functional impairment. Yet, importantly, these constructs appear to have little reciprocal effect on one another, as their interaction was not significant. This pattern of results suggests that it may be important to address both subcomponents in the context of therapy and rehabilitation – merely encouraging passive goal identification or, alternatively, providing resources without a meaningfully identified end-goal, may be less effective than providing both components (Gum, Snyder, & Duncan, 2006).

Of interest, across analytic models, the pathways component of hopefulness, which encompasses goal-oriented planning, problem-solving and behavior (Snyder et al., 1991), was the most robust buffer of the association between functional impairment and depressive symptoms. For individuals with functional impairment, the “will” (agency) to achieve a goal may not be sufficient to ameliorate depressive symptoms in the context of functional decline (Elliott, Witty, Herrick, & Hoffman, 1991); perhaps, it may be difficult to become motivated toward a desired goal when functional limitations appear to be an obstacle (Gum et al., 2006). Enhancement of the more concrete, and perhaps pragmatic, component of pathways, including

development of strategic “ways” to accomplish goals, may be a more efficacious intervention for depression in older adults with illness or impairment (Gum & Snyder, 2002).

Our results must be understood in the context of potential limitations. In our secondary data analysis, use of cross-sectional data limits assessment of causality, and bi-directionality is a consideration. For instance, depression in older adults is associated with functional impairment, poor physical and social functioning, reduced quality of life, and increased mortality (Callahan et al., 1998; Penninx et al., 1999; Penninx et al., 1998), and treatment of depression improves perceived general health and physical functioning (Callahan et al., 2005; Lin et al., 2003). Individuals with higher levels of hope may also simply have less depressive symptoms and less functional impairment, although evidence suggests that trait hope has robust effects despite level of physical or mental health functioning (Wroblewski & Snyder, 2005). Longitudinal studies, using a larger sample size, are necessary to fully understand these relationships. Although long considered the gold standard for screening and diagnosis of depression, some recent findings suggest that the Hamilton Rating Scale for Depression may not be well-suited for use in older adults with medical illness (Hammond, 1998); future research should consider alternative and objective measurements of depression, including modalities other than self-report. Depressed older adults may manifest symptoms and utilize services in a manner that complicates prevention efforts, although our findings suggest that the primary care setting may be an important site for detection and treatment (Unützer et al., 2002; Caine, Lyness, & Conwell, 1996). Despite this, the somewhat low level of depression found in our sample makes generalizability to other demographic and patient subgroups unknown. Finally, patients able to visit clinic sites may have had lower levels of impairment and depression than older adults who may be home-bound or in long-term care facilities and our results should be replicated in such settings.

In conclusion, our findings suggest that goal identification and self-efficacious beliefs regarding goal attainment contribute to less risk of depression in older adults with functional impairment. Further, our results suggest that, from a clinical perspective, it is important to not only encourage identification of alternative goals, but to also facilitate patient efforts toward goal attainment. Alone, and in combination, the agency and pathways components of trait hope may be particularly relevant for rehabilitative efforts, potentially resulting in greater health knowledge, more preventative health behaviors, and better treatment adherence (Snyder et al., 2006).

Acknowledgements

This study was supported by NIMH R01 MH61429 and K24 MH071509-05 (JML). We thank the patients, staff and providers of the following primary care practices: University of Rochester Medical Center Department of Medicine, Pulsifer Medical, East Ridge Family Medicine, Highland Family Medicine, Olsan Medical, Clinton Crossings Medical, Panorama Internal Medicine, Highland Geriatric Medicine, and Culver Medical. We thank the following for technical assistance: Karen Gibson, MSED, Constance Bowen, MA, James Evinger, MDiv, Cameron Gardner, MD, Michael New, Andra Niculescu, MD, Jean Sauvain, BS, Jill Scheltz, BA, LMT, Judy Woodhams, MFA, and Sherry Kaye, B.S.

Table 1: Mean score and bivariate correlations of study variables

Variable		Gender	Mental Status	Illness Burden	Functional Impairment	Trait Hope	Trait Hope [Agency]	Trait Hope [Pathways]	Depressive Symptoms
	Mean [SD] N (%)	r [p]	r [p]	r [p]	r [p]	r [p]	r [p]	r [p]	r [p]
Age (years)	74.24 [5.56]	.03 [.72]	-.19 [.05]	.21 [.03]	.30 [.00]	-.14 [.14]	-.05 [.61]	-.21 [.03]	.16 [.11]
Gender [Female]	68 (62%)	-	-.14 [.14]	.06 [.57]	-.05 [.64]	.16 [.11]	.18 [.06]	.10 [.30]	-.15 [.12]
Mental Status	28.57 [7.07]	-	-	.04 [.71]	.01 [.94]	.02 [.85]	-.11 [.24]	.13 [.17]	.09 [.30]
Illness Burden	10.16 [3.15]	-	-	-	.60 [.00]	-.10 [.32]	-.09 [.38]	-.10 [.29]	.48 [.00]
Functional Impairment	61.96 [12.94]	-	-	-	-	-.12 [.21]	-.13 [.19]	-.09 [.38]	.56 [.00]
Trait Hope	32.94 [5.14]	-	-	-	-	-	.87 [.00]	.89 [.00]	-.20 [.04]
Trait Hope [Agency]	17.02 [2.76]	-	-	-	-	-	-	.57 [.00]	-.23 [.02]
Trait Hope [Pathways]	15.91 [3.06]	-	-	-	-	-	-	-	-.12 [.20]

Note: MMSE = Mini Mental Status Exam total score; CIRS = Cumulative Illness Rating Scale total score; Functional impairment = Karnofsky Performance Status Scale total score; Trait hope = Goals Scale total score; Depressive symptoms = Hamilton Rating Scale of Depression total score (Mean = 7.75 [SD=5.16])

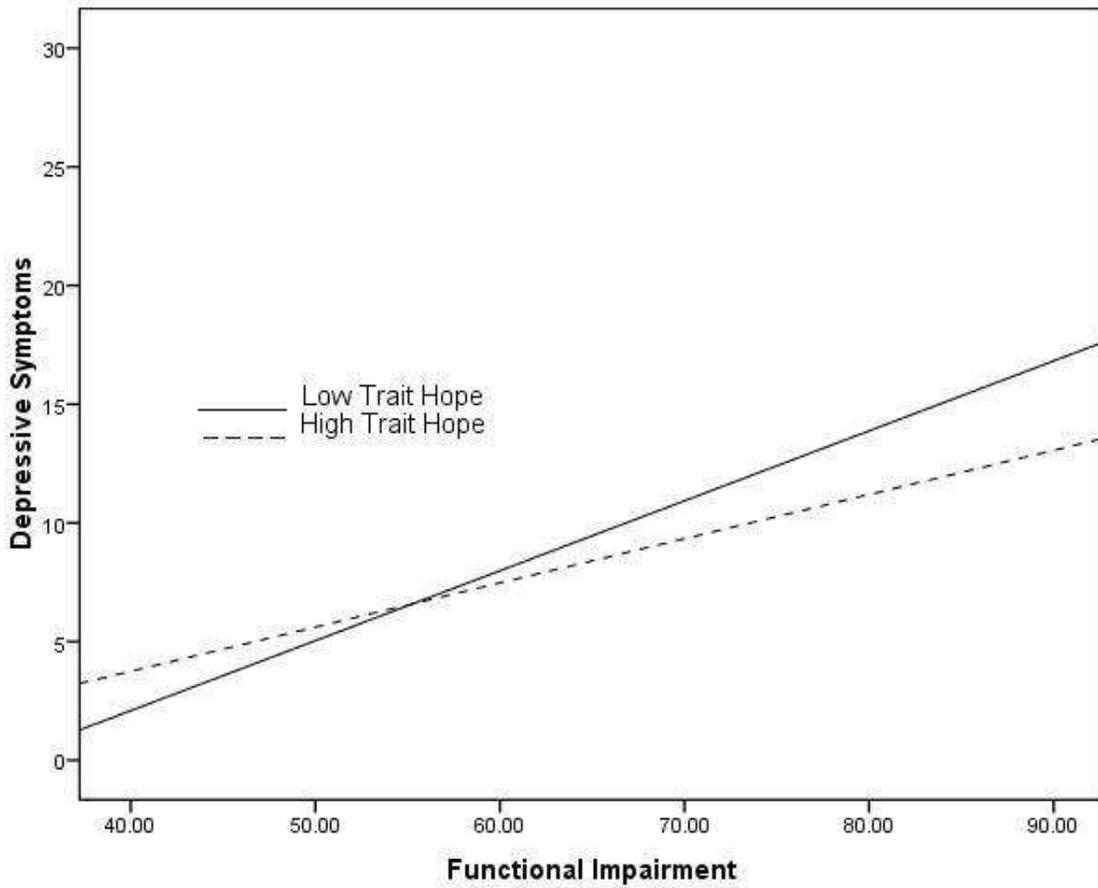
Table 2: Trait hope total score and subscale scores moderate association between functional impairment and depressive symptoms

	Model I: Trait Hope Total Score			Model II: Agency			Model III: Pathways		
	t [p]	β [SE]	Stand β	t [p]	β [SE]	Stand β	t [p]	β [SE]	Stand β
Step One:									
Age	-.15 [.88]	-.01 [.08]	-.01	-.02 [.99]	-.00 [.08]	-.00	-.02 [.99]	-.00 [.08]	-.00
Gender	-1.47 [.14]	-1.24 [.84]	-.12	-1.42 [.16]	-1.20 [.85]	-.11	-1.42 [.16]	-1.20 [.85]	-.11
Mental Status	.89 [.37]	.05 [.06]	.07	.64 [.52]	.04 [.06]	.05	.64 [.52]	.04 [.06]	.05
Cumulative Illness Burden	2.41 [.02]	.39 [.16]	.24	2.44 [.02]	.39 [.16]	.24	2.44 [.02]	.39 [.16]	.24
Functional Impairment	4.07 [.00]	.16 [.04]	.41	3.97 [.00]	.16 [.04]	.40	3.97 [.00]	.16 [.04]	.40
Trait Hope: Total Score	-1.39 [.17]	-.11 [.08]	-.11	-	-	-	-	-	-
Trait Hope: Agency Subscale	-	-	-	-1.49 [.14]	-.27 [.19]	-.15	-1.49 [.14]	-.27 [.19]	-.15
Trait Hope: Pathways Subscale	-	-	-	.22 [.83]	.04 [.17]	.02	.22 [.83]	.04 [.17]	.02
Step Two:									
Age	-.07 [.94]	-.01 [.08]	-.01	.06 [.95]	.01 [.08]	.01	.11 [.92]	.01 [.08]	.01
Gender	-1.99 [.05]	-1.67 [.84]	-.16	-1.76 [.08]	-1.50 [.85]	-.14	-1.96 [.05]	-1.65 [.84]	-.16
Mental Status	.93 [.35]	.05 [.06]	.07	.38 [.71]	.02 [.06]	.03	.98 [.33]	.06 [.06]	.08
Cumulative Illness Burden	2.36 [.02]	.37 [.16]	.23	2.29 [.02]	.36 [.16]	.22	2.60 [.01]	.40 [.16]	.25
Functional Impairment	3.21 [.00]	.65 [.20]	1.63	2.64 [.01]	.56 [.21]	1.41	3.50 [.00]	.57 [.16]	1.44
Trait Hope: Total Score	2.12 [.04]	.85 [.40]	.82	-	-	-	-	-	-
Trait Hope: Agency Subscale	-	-	-	1.52 [.13]	1.20 [.79]	.63	-1.30 [.20]	-.24 [.18]	-.12
Trait Hope: Pathways Subscale	-	-	-	.44 [.66]	.07 [.17]	.04	2.58 [.01]	1.72 [.67]	.99
Functional Impairment x Trait Hope Total Score	-2.46 [.02]	-.02 [.01]	-1.45	-	-	-	-	-	-
Functional Impairment x Agency	-	-	-	-1.93 [.06]	-.02 [.01]	-1.20	-	-	-
Functional Impairment x Pathways	-	-	-	-	-	-	-2.60 [.01]	-.03 [.01]	-1.39

Note: p<.05*; p<.01**; Mental status = Mini Mental Status Exam total score; Cumulative illness burden = Cumulative Illness Rating Scale total score; Functional impairment = Karnofsky Performance Status Scale total score; Trait hope = Goals Scale total score, agency and pathways subscale scores; Depressive symptoms = Hamilton Rating Scale of Depression total score.

Note: Model I = Trait Hope Total Score as a moderator; Model II = Agency as moderator; Model III = Pathways as moderator.

Figure 1: Interaction diagram of trait hope as a moderator of functional impairment and depressive symptoms



Note: Functional impairment = Karnofsky Performance Status Scale total score; Trait hope = Goals Scale total score; Depressive symptoms = Hamilton Rating Scale of Depression total score.

Note: High and low trait hope groups = +/- 1 SD from Goals Scale mean score.

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