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Well-Being among Older Adults with OA: Direct and Mediated Patterns of Control Beliefs, Optimism and Pessimism

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Abstract

Objectives—To assess the contribution of important psychological resources (i.e., optimism, pessimism, control beliefs) to the psychological well-being of older adults with Osteoarthritis (OA); to assess the direct and mediated association of these psychosocial resources to outcomes (depressive symptoms, life satisfaction, and self-esteem). These objectives are important because OA is a significant stressor, treatments are limited, and psychological functioning is at risk for those coping with the condition, even compared to other chronic illnesses.

Method—A cross-sectional survey of 160 community-dwelling older adults with OA (81% women). Participants were not randomly selected, but nonetheless reflected the demographic makeup of the selection area.

Results—Ordinary least squares regression analyses using the PROCESS macro (Hayes, 2012) revealed that optimism and pessimism were associated with higher depressive symptoms and lower self-esteem indirectly through constraints beliefs. The analysis of life satisfaction showed that optimism and pessimism were each partially mediated through mastery and constraints beliefs.

Discussion—These results suggest that prior research, which has assessed these psychological resources as having singular relationships to outcomes, may have underestimated the importance of the relationship *between* these variables. We discuss possible points of intervention for older adults with OA who may experience increasing constraints beliefs over time.

Keywords

personality; older adults; osteoarthritis; mediation

Chronic illness is a significant stressor for older adults (Gignac, Cott, & Badley, 2000). Thus, it is important to understand the contribution of psychological resources that promote well-being while coping with impaired health. Osteoarthritis (OA) is an extremely common chronic illness in older adulthood. The CDC estimated that one in every two people will experience some form of OA in their lifetime, and OA currently impacts about 27 million adults in the US, most of them older over the age of 60 (retrieved from <http://www.cdc.gov/features/osteoarthritisplan/>). OA is associated with pain and physical limitation (Creamer, 2000; Felson et al., 2000), as well as impairment in psychological well-being and quality of life, including depressive symptoms (Bookwala et al., 2003; Ferreira & Sherman, 2007) and lower life satisfaction (Ferreira & Sherman; Germano, Misajon, & Cummins, 2001). Taylor

and Stanton's (2007) model postulated that different coping resources are linked to psychological and physical processes, which then increase or decrease the risk of further physical and psychological impairment. Taylor and Stanton's model details the influential role of several psychological resources. We investigate two of these constructs: dispositional expectancies (e.g., optimism and pessimism) and control beliefs (e.g., mastery and constraints). Expectancies and control beliefs are known to 1) change with age and 2) have important consequences for people with chronic illness. We address the role of these resources as they relate to psychological well-being (measured by depressive symptoms, self-esteem, and life satisfaction) in older adults with OA in order to distinguish factors that may ameliorate the risk for psychological impairment in the face of OA. Further, we note that optimism, pessimism and control beliefs are most often studied in the context of chronic illness as constructs assumed to be independent of one another. There may, however, be important relationships between these resources that should also be addressed.

Osteoarthritis

Osteoarthritis is a leading cause of disability in the United States, resulting in substantial lost time at work, as well as high rates of early retirement (Hermans et al., 2012; White, Birnbaum, Janagap, Buteau, & Schein, 2008). Older adults with OA experienced more frequent psychological distress in the form of more depressive symptoms and more anxiety than older adults with cancer, diabetes, or heart problems (Penninx et al., 1997). This disparity may be observed because OA leads to more functional limitations and may have a longer course, with more prolonged pain, than other conditions. Further, medical treatments for OA, including medications, joint replacement surgery, and exercise, focus on decreasing pain and improving joint movement, but are not always effective (Felson, 2009, 2010) or may require significant recovery time, or are difficult to implement, such as routine exercise (Dunlop et al., 2011). As OA can present a significant challenge to older adults, in terms of both physical limitations and risk for psychological impairment, it is important to understand factors that can impact psychological well-being for those with the condition. Thus, we apply the Taylor and Stanton (2007) model to the context of OA in order to further illuminate the important psychological processes that may be at play.

Control Beliefs

Control beliefs are defined as "expectancies about personal mastery and environmental contingencies that influence outcomes and performance" (Lachman, Neupert, & Agrigoroaei, 2011, p. 176). These beliefs have been referred to as internal and external locus of control (Rotter, 1966) and health locus of control (Wallston, Stein, & Smith, 1994), primary and secondary control (Heckhausen, Wrosch, & Schulz, 2010), self-efficacy (Bandura, 1997), and personal control (Lachman et al., 2011). Lachman and Weaver (1998) conceptualize control beliefs as including two elements: *mastery*, an internal sense of efficacy and effectiveness at meeting goals, and *constraint*, beliefs about obstacles and factors beyond one's control that interfere with attaining goals. These conceptualizations are similar, but not identical to, internal and external control beliefs, respectively.

Several investigations have shown that mastery beliefs remain fairly stable across time, but that beliefs about constraints on control increase, such that older adults report stronger beliefs that their environment is constrained compared to younger adults (Lachman & Firth, 2004; Lachman et al., 2011). Further, specific beliefs about mastery over, and constraint on, health outcomes also show the same age-pattern: older adults report more external control over health than younger adults do (Perrig-Ciello, Perrig, & Stahelin, 1999).

These age-related differences have important implications for psychological and physical health outcomes (Lachman & Firth, 2004; Taylor, Kemeny, Reed, Bower, & Gruenewald,

2000; Thompson & Kyle, 2000). For example, Grotz, Hapke, Lampert, and Baumeister (2011) report that older German adults reported higher external health control beliefs than younger participants did, and that the external beliefs were associated with poorer health behaviors. Gerstorf, Röcke and Lachman (2011) also reported that initial level of perceived control (combined mastery and constraints items) was associated with subsequent physical health outcomes. Similarly, Infurna, Gerstorf, and Zarit (2011) report that control beliefs were especially consequential for changes in health in late life, though less so in mid-life. One reason that control beliefs are associated with health is because of their relationship with emotional or physical reactivity to stressors. Neupert, Almeida and Turk Charles (2007) found that lower constraints were associated with lower physical and emotional reactivity to interpersonal stress for older adults, while high mastery beliefs worked as a buffer against reactivity to work stressors for younger and older adults.

In addition to physical health more broadly, control beliefs are important correlates of psychological functioning, especially in the context of a chronic condition (see review by Thompson & Kyle, 2000). Seville and Robinson (2000) reported that internal pain locus of control was associated with better well-being, while external pain locus of control was associated with more pain and depression. Paukert, LeMaire and Cully (2009) found that beliefs in chance (external) locus of control were significantly associated with depressive symptoms for older heart disease patients. Penninx et al. (1998) found that higher mastery was associated with lower depressive symptoms for samples of chronic illness patients. Thus, even with fairly disparate operationalizations of control beliefs, the construct has important consequences of well-being in the face of chronic illness. Thompson and Kyle (2000) argue that there are at least two main pathways linking control beliefs with better outcomes in the context of chronic illness. One lies in the domain of health behaviors such that those with stronger beliefs about their own control are more likely to be adherent to medial regimens and engage in other health-protective behaviors. A second possible link lies in the psychological processes associated with control: “the perception that one’s situation is controllable changes the meaning and emotional flavor of the experience” (Thompson & Kyle, 2000, p. 138). It is this second link that is of most interest in the present study.

Optimism and Pessimism

Another dispositional construct with implications for successful adjustment to chronic illness is optimism/pessimism. Scheier and Carver (1992) define dispositional optimism as generalized expectancies for positive outcomes and pessimism as expecting the worst. Pessimism was originally conceptualized as the opposite of optimism (Scheier & Carver, 1987). However, additional work has revealed the independence of optimism from pessimism (Hart & Hittner, 1995; Robinson-Whelen, Kim, MacCallum, & Kiecolt-Glaser, 1997), especially among older adults and in those experiencing OA (Benyamini, 2005; Brenes, Rapp, Rejeski & Miller, 2002). However, not all studies measure both optimism and pessimism in the same sample, leading to difficulties in reviewing across studies.

As dispositional orientations, optimism and pessimism have usually been considered relatively stable across time. However, Kotter-Gruhn and Smith (2011) report that optimism declined in their sample of Germans in late life (aged 70-100) and that changes in optimism, as well as declines in future orientation, were associated with subsequent declines in well-being. Kotter-Gruhn and Smith argue that the context of very late life may involve an accumulation of negative age-related changes (e.g., loss of social partners, changes in health and stamina) that cannot be entirely offset by initial levels of optimism. Thus, the aging experience may increase constraints beliefs and reduce optimism. Since OA is largely a disease of aging, these psychological resources may be critical to assess in relation to well-being for those with OA.

Several investigations have found that dispositional optimism and/or pessimism have positive effects on physical and psychological health (e.g., Chang & Sanna, 2001; Taylor et al., 2000; Taylor & Stanton, 2007). Specific to chronic illness, optimism has been associated with better quality of life and psychological well-being for men with HIV/AIDS (Reed, Kemeny, Taylor, Wang, & Visscher, 1994), breast cancer survivors (Friedman et al., 2006), rheumatoid arthritis (RA) patients (Treharne, Lyons, Booth, & Kitas, 2007), and OA patients (Ferreira & Sherman, 2007). Fournier, DiRidder and Bensing (2002) found that the positive impact of optimism on anxiety and depression over time was mediated by coping strategies for participants diagnosed with three different chronic illnesses (multiple sclerosis, RA, and type 1 diabetes). Optimism was linked to lower anxiety and depression through the expression of personal mastery in less emotion-focused coping and more task-oriented coping strategies. Thus, over time, optimism could provide opportunities for experiences of mastery, while pessimism could increase feelings of constraints; these pathways would lead to different mediated outcomes.

Linking control beliefs and optimism/pessimism

Several investigations have used control beliefs and optimism and/or pessimism together to predict outcomes for patients with chronic illness. For example, Perkins et al. (2008) report that optimism was correlated with measures of psychological well-being (life satisfaction, depressive symptoms, and health perceptions) among older breast cancer survivors. Mastery, however, was correlated with life satisfaction only. Gruber-Baldini, Ye, Anderson, and Shulman (2009) reported that higher optimism and lower pessimism were associated with better psychological quality of life, while higher internal health control beliefs were associated with less difficulty with activities of daily living in a sample of Parkinson's disease patients. External health control beliefs were not associated with outcomes for the Gruber-Baldini et al. sample. Kurtz, Kurtz, Given, and Given (2008) found that higher mastery beliefs and higher optimism predicted lower levels of pain, while mastery alone predicted lower fatigue among patients in chemotherapy treatment for cancer. Neither constraints nor pessimism were measured by Kurtz and colleagues.

The distinction between optimism and pessimism, and between mastery and constraints, may be particularly important to consider in the context of chronic illness. Pessimism and constraints beliefs may cause individuals to negatively bias their expectations and cope less effectively, thus seeking treatment less often and adhering less to treatment regimens (Taylor & Stanton, 2007). Alternatively, optimism and mastery may encourage engagement in proactive processes that promote health and well-being, such as accumulating resources, recognizing potential stressors, and using feedback, consistent with the position of Thompson and Kyle (2000). However, some studies report only optimism or only mastery, leading to an incomplete examination of the role of control beliefs and dispositional expectancies in the context of chronic illness. Similarly, other studies only report on external locus of control or external health control beliefs. Further, a specific examination of these important psychosocial resources for those with OA is lacking, as studies which include participants with OA have most often included other chronic illness samples as well.

The present study

We extend previous work by considering the potential of mastery and constraints control beliefs to mediate the association of dispositional optimism and pessimism on important psychological outcomes for older adults with OA. As reviewed above, the joint contribution of these personality and psychological resources has not been fully explored in the context of OA. However, older adults managing the condition of OA are at high risk for psychological impairment (Penninx et al., 1997) and experience several challenges associated with chronic illness, such as increased daily hassles, discomfort associated with

medication or treatments, and threats to daily routines and activities (Thompson & Kyle, 2000). In previous work, optimism, pessimism and control beliefs have most often been examined as individual predictors, without examination of the possible mediation patterns. No study to date has looked at the potential mediating patterns for older adults with OA which we propose to test here, so our hypotheses must be considered exploratory.

However, applying the logic of Taylor and Stanton's (2007) model to the context of OA, we argue that the personality dispositions of optimism and pessimism may help determine choices that individuals make regarding how they manage their health, and these choices may lead to experiences of mastery or constraints. Individuals with more optimistic dispositions will engage in activities that require them to use their sense of control. These individuals may enhance their mastery beliefs when health management strategies are successful, thus building their self-esteem and life satisfaction and reducing their depressive symptoms. On the other hand, individuals with more pessimistic dispositions may focus on the constraints that limit their ability to manage their illness, thus undermining their mental health. This proposed order of mediation is consistent with the patterns found by Fournier et al. (2002) who tested mediation of optimism (but not pessimism) by mastery-oriented coping behaviors, and therefore this direction will be tested in the current data. However, we acknowledge that complete testing of this model would require multiple longitudinal waves of data.

The theoretical relationship between optimism, pessimism, mastery and constraints, coupled with our review of the literature, leads to the following hypotheses:

1. Mastery beliefs and optimistic expectancies will be associated with higher self-esteem and life satisfaction, and with lower depressive symptoms.
2. Constraints beliefs and pessimistic expectancies will be associated with lower self-esteem and life satisfaction, and with higher depressive symptoms.
3. The relationship of optimism to outcomes will be mediated by mastery and the relationship of pessimism to outcomes will be mediated by constraints.

Method

Recruitment and Participants

Recruitment strategies for this study included four methods: flyers, advertisements in a Boston area monthly publication directed toward older adults, ads on Boston area public transportation, and presentations at area senior centers and Elder Affairs locations. Potential participants who were interested in participating called our office, where they were screened by trained research assistants, or expressed interest in participating after a presentation, when they were screened in person. In all cases, the screening procedure included a definition of OA as "a degeneration of the joint's cartilage, causing the bones to rub against each other, unlike osteoporosis, which causes bones to become fragile and more likely to break." Then participants were told that the study was including participants with OA only and asked specifically whether they have OA of the hip or knee, if the OA had been diagnosed by a medical professional, whether they were age-eligible, and whether their OA condition caused them to feel pain on at least three days of a typical week. Only potential participants who met these inclusion criteria during screening were subsequently interviewed.

One hundred sixty older adults from the greater Boston metropolitan area who were aged 58 to 94 years ($M = 73.25$, $SD = 8.19$) volunteered to participate (80% women). Participants were asked how long ago a medical professional had diagnosed them with OA. Thirty-eight

percent of participants reported that their OA had been diagnosed by a medical professional five or more years before their baseline participation, 22% reported that their diagnosis had occurred in the past 12 months. Five participants who answered their condition was “self-diagnosed” were excluded from analyses. Most participants were Caucasian (90%), one third of the participants were married, participants were well educated (78% had attended at least some college), and the median annual income was \$20,000-50,000.

Measures

Optimism and pessimism—were measured with the revised Life Orientation Test (LOT-R; Scheier, Carver, & Bridges, 1994) which consists of three items measuring optimism, and three items measuring pessimism, defined in terms of generalized outcome expectancies. Participants rate agreement with statements like ‘In uncertain times, I usually expect the best’ and ‘If something can go wrong for me, it will,’ on a 5-point scale (1 = strongly disagree, 5 = strongly agree). Higher scores indicate more optimism or more pessimism, with possible scores ranging between 1 and 15 for each factor. Scores for this sample ranged between 6 and 15 ($M = 11.01$, $SD = 2.03$) for optimism, and 3 and 15 ($M = 7.35$, $SD = 2.73$) for pessimism. Internal consistency for this sample was slightly low for optimism ($\alpha = .54$) but adequate for pessimism ($\alpha = .74$).

Control beliefs—were measured with the Mastery and Perceived Constraints Scales (Lachman & Weaver, 1998). Mastery was measured with 4 items such as ‘I can do just about anything I really set my mind to.’ Perceived constraints were measured with eight items, such as ‘I have little control over the things that happen to me.’ Respondents indicate their level of agreement with items on a 7-point scale (1 = strongly agree, 7 = strongly disagree). Higher scores reflect greater mastery or perceived constraints. Possible scores range from 4 to 28 for mastery and 8 to 56 for constraints. Scores for this sample reflect the possible range for mastery ($M = 21.38$, $SD = 4.32$) and for constraints ($M = 37.93$, $SD = 9.95$). Lachman and Weaver report high internal consistency for both scales. Internal consistency was also high for this sample ($\alpha = .84$ for mastery, $\alpha = .86$ for constraints).

Depressive symptoms—were measured with the Center for Epidemiological Studies – Depression Scale (CES-D; Radloff, 1977). This scale measures depressive symptoms with 20 items based on agreement with statements such as: ‘In the past week, I felt lonely.’ Participants respond on a 4-point scale (0 = often/most of the time, 3 = rarely/none of the time), which we reverse coded such that higher scores reflect more depressive symptoms. Possible scores range from 0 to 60. The scores for this sample ranged from 0 to 44 ($M = 14.10$, $SD = 9.28$). Radloff reported a high reliability and demonstrated convergent and divergent validity for this scale. Reliability for this sample was also high ($\alpha = .88$).

Life satisfaction—was measured with the Life Satisfaction Inventory (LSI; Neugarten, Havighurst, & Tobin, 1961), which includes 18 items based on a 5-point scale (1 = strongly agree, 5 = strongly disagree). The measure includes questions like: ‘As I look back on my life, I am fairly well satisfied.’ Higher score indicate more life satisfaction. Possible scores range between 18 and 90. The scores for this sample ranged from 27 to 80 ($M = 59.71$, $SD = 9.17$). Neugarten et al. have shown this scale to be reliable and valid; reliability for this sample was also high ($\alpha = .85$).

Self-esteem—was measured with the Rosenberg Self-Esteem Scale (Rosenberg, 1962, 1979). Items include ‘I feel that I have a number of good qualities,’ and ‘At times, I feel I am no good at all’ (reverse scored). Responses options range from 1 (strongly disagree) to 4 (strongly agree); higher scores indicate higher self-esteem. Possible scores ranged from 18

to 40 ($M = 35.03$, $SD = 4.46$). Tippet and Silber (1965) have reported good reliability and validity for this scale. Reliability in this sample was high ($\alpha = .85$).

Pain—was assessed with the 15-item short-form McGill Pain Questionnaire (SF-MPQ), a widely used pain measure (Melzack, 1987). The SF-MPQ includes 15 pain adjectives to assess pain qualities. Pain adjective responses are presented on a 4-point continuum from ‘I have not experienced this type of pain’ to ‘severe.’ For the SF-MPQ adjectives, participants were asked to evaluate their pain over the past three days. Pain was assessed over the previous three days because evaluations of pain over longer durations are more likely to be inaccurate and tend to be positively skewed (Martire et al., 2006). Grafton, Foster, and Wright (2005) as well as Love, LeBoeuf and Crisp (1989) reported that the SF-MPQ was a reliable multidimensional measure of pain. Reliability for the SF-MPQ was high for the current study (Cronbach’s $\alpha = .90$). Scores in the present sample ranged from 3 – 57 ($M = 20.51$, $SD = 11.63$).

Procedure

The survey was administered on the Windows research software MediaLab (Empirisoft), which presented individual questionnaires in random order for the first half of the survey, after which the participants took a short break. The order of questions was fixed for the second half of the survey to ensure that the less burdensome questions were saved for the end of the session, thus reducing participant fatigue. Thirty-one participants opted to fill out paper surveys instead of computer surveys. The order of individual questionnaires within the paper surveys was not randomized. A researcher was available throughout the study to answer participants’ questions.

Analysis Plan

All variables were normally distributed and bivariate correlations were calculated between all variables (see Table 1). Next, ordinary least squares regression analyses using the PROCESS macro (Hayes, 2012) in SPSS 20 were used to examine multivariate models. Control beliefs were examined for their potential as mediators of the relationship between optimism/pessimism and well-being. According to Baron and Kenny (1986), a variable acts as a mediator when the following conditions are met: a) the independent variable significantly predicts the dependent variable, b) the independent variable significantly predicts the mediator variable, c) the mediator variable significantly predicts the dependent variable, and d) the relationship of the independent variable to the dependent variable is reduced or eliminated when the mediator is added to the equation. We also conducted tests of mediation to examine the direction and significance of indirect effects in Hayes’s PROCESS macro, which provided 95% confidence intervals around the indirect effects based on 1000 bootstrap samples. The macro also allows for multiple mediators, so mastery and constraints beliefs were considered parallel mediators in analyses (as opposed to estimating their mediating effects in sequence).

Demographic variables (pain, ethnicity, income), that were significantly correlated with an outcome variable were entered at Step 1 of all regression analyses to control for their relationships with depressive symptoms, self-esteem, and life satisfaction.

Mean imputation was used in regression analyses when variables were missing data. However, we could not impute information regarding ethnicity. Therefore, listwise deletion was utilized for regression analyses including ethnicity.

Results

Table 1 reveals several significant bivariate correlations of interest. Pessimism and optimism are negatively correlated, as are mastery and constraints. Further, pessimism is negatively correlated with mastery and positively correlated with constraints, while optimism is also correlated with both mastery and constraints, in the opposite direction from pessimism. Finally, all four of these variables are significantly correlated with the three outcome measures (depressive symptoms, life satisfaction, and self-esteem) in the hypothesized directions.

Depressive Symptoms

As Table 2 indicates, depressive symptoms were significantly associated with the psychological resources of optimism, pessimism, control beliefs, as well as ethnicity and pain. Furthermore, constraints beliefs also partially mediated the relationships of both optimism and pessimism to depressive symptoms, as shown in Figure 1. Forty-eight percent of the total variance in depressive symptoms was explained in the model examining optimism as the independent variable, $F(5, 146) = 35.01, p < .001$. The model examining pessimism as the independent variable explained 46% of the total variance in depressive symptoms, $F(5, 146) = 31.04, p < .001$.

As explained above, a few conditions must be met in order for mediation to be present (Baron & Kenny, 1986). First, the independent variable must significantly predict the dependent variable. The regression analysis revealed that optimism and pessimism both had significant relationships to depressive symptoms in the expected directions (see Table 2 for the direct effects). Second, the independent variable must significantly predict the mediator variable. Analyses revealed that optimism was significantly associated with mastery ($B = .81, SE = .23, p < .001$) and constraints ($B = -.91, SE = .45, p = .05$) in the predicted directions. Pessimism was also significantly associated with mastery ($B = -.48, SE = .18, p = .007$) and constraints ($B = 1.71, SE = .30, p < .001$) in the predicted directions. Next, the mediator variable must significantly predict the dependent variable. As shown in Table 2, constraints beliefs had a significant relationship to depressive symptoms in the expected direction, but mastery did not predict depressive symptoms.

The final condition for mediation is that the relationship of the independent variable to the dependent variable must be reduced or eliminated in the presence of the mediator. In the model examining *optimism* and the independent variable, the total effect of optimism on depressive symptoms ($B = -1.48, SE = .34, p < .001$) was partially attributed to the borderline-significant indirect effect of constraints beliefs ($B = -.35$ [95% CI: $-.74, -.05$], $SE = .18, p = .06$). There was no significant indirect effect of mastery beliefs ($B = -.01$ [95% CI: $-.40, .34$], $SE = .18, p = .94$). In the model examining *pessimism* and the independent variable, the total effect of pessimism on depressive symptoms ($B = 1.36, SE = .26, p < .001$) was partially attributed to the significant indirect effect of constraints beliefs ($B = .54$ [95% CI: $.28, .89$], $SE = .15, p < .001$). There was no significant indirect effect of mastery beliefs ($B = .07$ [95% CI: $-.11, .34$], $SE = .11, p = .58$). Thus, taken together, constraints beliefs partially mediated the relationships of optimism and pessimism to depressive symptoms.

Self-Esteem

As shown in Table 2, self-esteem was significantly associated with the psychological resources of optimism, pessimism, control beliefs, and income. Furthermore, constraints beliefs also partially mediated the relationships of both optimism and pessimism to self-esteem, as shown in Figure 2. Thirty-seven percent of the total variance in self-esteem was

explained in the model examining optimism as the independent variable, $F(4, 155) = 16.28$, $p < .001$. The model examining pessimism as the independent variable explained 33% of the total variance in self-esteem, $F(4, 155) = 12.67$, $p < .001$.

In keeping with the conditions for mediation (Baron & Kenny, 1986), the regression analysis revealed that optimism and pessimism both had significant relationships to self-esteem in the expected directions (see Table 2 for the direct effects). Furthermore, the independent variable significantly predicted the mediator variable: optimism was significantly associated with mastery ($B = .77$, $SE = .23$, $p = .001$) and constraints ($B = -1.16$, $SE = .43$, $p = .008$) in the predicted directions. Pessimism was also significantly associated with mastery ($B = -.45$, $SE = .17$, $p = .01$) and constraints ($B = 1.85$, $SE = .28$, $p < .001$) in the predicted directions. Moreover, one of the potential mediator variables consistently and significantly predicted the dependent variable. As shown in Table 2, constraints beliefs had a significant relationship to self-esteem in the expected direction, but mastery only predicted self-esteem in the model containing pessimism as the independent variable.

Finally, similar to the effects for the model examining depressive symptoms as the dependent variable, the relationships of optimism and pessimism to self-esteem were reduced by constraints beliefs. In the model examining *optimism* and the independent variable, the total effect of optimism on self-esteem ($B = .10$, $SE = .02$, $p < .001$) was partially attributed to the significant indirect effect of constraints beliefs ($B = .02$ [95% CI: .00, .04], $SE = .01$, $p = .03$), while the indirect effect of mastery beliefs was not significant ($B = .01$ [95% CI: $-.00$, .03], $SE = .01$, $p = .14$). In the model examining *pessimism* and the independent variable, the total effect of pessimism on self-esteem ($B = -.07$, $SE = .01$, $p < .001$) was partially attributed to the significant indirect effect of constraints beliefs ($B = -.02$ [95% CI: $-.05$, $-.01$], $SE = .01$, $p = .007$). There was no significant indirect effect of mastery beliefs ($B = -.01$ [95% CI: $-.03$, $-.00$], $SE = .01$, $p = .09$). In summary, constraints beliefs partially mediated the relationships of optimism and pessimism to self-esteem.

Life Satisfaction

The final set of analyses examined life satisfaction as the outcome (see Table 2). Optimism, pessimism, control beliefs, and pain were associated with self-esteem. Furthermore, both constraints beliefs and mastery beliefs also partially mediated the relationships of optimism and pessimism to life satisfaction, as shown in Figures 3a and 3b. The model examining optimism as the independent variable explained 53% of the total variance in life satisfaction, $F(4, 155) = 34.76$, $p < .001$, while the model examining pessimism as the independent variable explained 46% of the total variance in life satisfaction, $F(4, 155) = 25.29$, $p < .001$.

The regression analysis revealed that optimism and pessimism both had significant relationships to life satisfaction in the expected directions (see Table 2 for the direct effects). Furthermore, the independent variable significantly predicted the mediator variable: optimism was significantly associated with mastery ($B = .77$, $SE = .23$, $p < .001$) and constraints ($B = -.97$, $SE = .44$, $p = .03$) in the predicted directions. Pessimism was also significantly associated with mastery ($B = -.45$, $SE = .17$, $p = .01$) and constraints ($B = 1.75$, $SE = .28$, $p < .001$) in the predicted directions. Moreover, both of the potential mediator variables consistently and significantly predicted the dependent variable: As shown in Table 2, constraints beliefs had a significant negative relationship to life satisfaction, and mastery had a significant positive relationship to life satisfaction.

Finally, the relationships of optimism and pessimism to life satisfaction were reduced by both mastery and constraints beliefs. In the model examining *optimism* and the independent variable, the total effect of optimism on life satisfaction ($B = 2.52$, $SE = .34$, $p < .001$) was partially attributed to the significant indirect effect of constraints beliefs ($B = .30$ [95% CI: .

06, .63], SE = .14, $p = .05$) and mastery beliefs ($B = .39$ [95% CI: .12, .82], SE = .17, $p = .02$). Likewise, in the model examining *pessimism* and the independent variable, the total effect of pessimism on life satisfaction ($B = -1.72$, SE = .36, $p < .001$) was partially attributed to the significant indirect effect of constraints beliefs ($B = -.39$ [95% CI: -.73, -.14], SE = .15, $p = .02$) and mastery beliefs ($B = -.32$ [95% CI: -.69, -.11], SE = .14, $p = .03$). Thus, both mastery and constraints beliefs partially mediated the relationships of optimism and pessimism to life satisfaction.

Reverse Directionality

When examining mediation using cross-sectional data, the direction of effects is somewhat unclear. Thus, it is prudent to examine the reverse causal order of effects. In the present data, five models containing constraints beliefs were supported in the reverse order (e.g., pessimism mediated the relationship of constraints beliefs to depressive symptoms). While the possibility of bi-directional processes is likely to be important in the complex interplay between the progression of OA and psychological well-being over time, it is important to note that not all of the models reported here supported bi-directionality. We chose to report the causal direction that was supported by theoretical and empirical literature, as well as the order for which the pattern of significant findings in the current sample was consistent. The results of the alternative direction models are available upon request from the second author.

Discussion

As expected, higher levels of mastery and optimism, along with lower levels of constraints and pessimism, were associated with three measures of psychological well-being important for this sample of older adults with OA. Further, the present findings uniquely demonstrate direct and indirect patterns of association between dispositional expectancies and control beliefs in relation to different well-being outcomes. Specifically, analyses of depressive symptoms and self-esteem as outcomes indicate that, as hypothesized, pessimism was mediated through higher constraints beliefs; more pessimism was associated with higher constraints beliefs, which in turn were associated with higher depressive symptoms and lower self-esteem. Unexpectedly, optimism was also mediated by constraints beliefs in relation to both outcomes; more optimism was associated with lower constraints, which, in turn, were associated with lower depressive symptoms and higher self-esteem. Mastery, did not act as a mediator for either optimism or pessimism in association with either depressive symptoms or self-esteem, as we had hypothesized. The pattern of results for life satisfaction was unique: both optimism and pessimism were partially mediated by both mastery and constraints. In this analysis, higher optimism was related to higher mastery and lower constraints, which were both associated with higher life satisfaction. Pessimism was related to lower mastery and higher constraints, which were both associated with lower life satisfaction. Thus, in this sample of older adults, the theoretical importance of both control beliefs and optimistic/pessimistic dispositions was empirically supported and novel indirect pathways were detected.

Direct effects

Consistent with the theoretical and empirical understanding of the relationship between age and control beliefs, we found that constraints beliefs were more reliably associated with our three outcomes, while mastery was associated with only one (life satisfaction), a finding similar to Perkins et al. (2008). Given that opportunities to experience mastery decline during late life (Grotz et al., 2011; Lachman et al., 2011), especially as one copes with a long-term chronic illness such as OA, and that actual limitations on one's goals or activities likely also increase, this pattern of findings is understandable. Further, our results confirm Lachman and Weaver's (1998) conceptualization of control beliefs as including both

mastery and constraints. In our results, mastery was not unimportant, acting as a partial mediator of both pessimism and optimism in relation to life satisfaction. However, constraints worked as a more robust influence on psychological functioning in this sample, being associated directly and indirectly with all three outcomes.

Our results also expand prior research asserting that optimism and pessimism are theoretically distinct (e.g., Benyamini, 2005; Brenes et al., 2002), and have differing importance for psychological outcomes. In our sample, both optimistic and pessimistic dispositions had direct effects on the three outcomes. Further, as discussed below, both of these variables had important relationships with control beliefs. These findings suggest that optimism is a strong individual psychological resource for meeting the challenges of aging and of chronic illness, consistent with Friedman et al. (2006) in their work with breast cancer survivors and Treharne et al. (2007) in their study of RA patients. Further, we showed that pessimism is a liability for older adults with OA, consistent with Ferreira and Sherman (2007).

Mediation pathways

The confirmation of our hypothesis regarding the mediation of dispositional beliefs (both optimism and pessimism) through constraints beliefs in relation to all three of our measured outcomes suggests that these cognitive schemas may be mutually reinforcing over time. Although longitudinal research would be needed to test this idea, it seems likely that dispositional negative perceptions of the world could be increased by actual experience of limitations, which could also lead to perceptions of constraints. Additional experience with challenge would confirm the individual's expectation of limitation and constraint, which could increase pessimistic attitudes, thus leading to more impairment of psychological well-being. Similarly, the negative relationship of optimism with constraints suggests positive beliefs about the environment are also influential for negative control beliefs. These findings are consistent with our expectation that pessimism would lead to an increase in focus on limitations in the environment; however, we did not expect optimism to be protective against higher constraints for these outcomes.

In addition, both optimism and pessimism were partially mediated by mastery in relation to life satisfaction, the only outcome for which mastery was a significant mediator variable. It is unclear why life satisfaction would show a more complex pattern of mediation than the other two outcomes; however, the role of mastery in life satisfaction is consistent with the investigation of Perkins et al. (2008) who found that while optimism was correlated with several different psychological outcomes in their sample, mastery was only correlated with life satisfaction. However, Perkins et al. did not investigate mediation patterns, nor did they test pessimism and constraints in their model of well-being for breast-cancer survivors.

Taken together, the current results suggest that control beliefs may be amenable to influence by multiple psychological processes and imply an avenue of intervention for those older adults who are relatively high in pessimism or low in optimism: meaningful experiences that enhance mastery and reduce constraints. Given the findings that beliefs in constraints increase in late adulthood, so that the ratio of mastery to constraints is different than at younger ages, it cannot be determined from the present data whether lowering constraints or increasing mastery will be most beneficial. However, Taylor and Stanton (2007) reviewed several interventions on coping strategies which resulted in positive changes in optimism for chronic illness patients (HIV-positive men and breast cancer patients)—increasing coping strategies and making them more effective could be interpreted as a mastery-increasing or constraint-lowering experience. In a note of caution, however, Lachman et al. (2011) note that some interventions to increase a sense of control in older adults have been unsuccessful or even backfired when the intervention was withdrawn. The lack of success may have to do

with the complex relationship between control beliefs and dispositional expectancies (optimism and pessimism) noted in the present data. It seems clear that interventions might increase in success with attention to such complexity.

Limitations and conclusion

Although important insights have been gained from this study, it is important to recognize the limitations. For example, although advantaged by the fact that this is a community, i.e. non-clinical, sample, the sample is limited in generalizability, consisting of all volunteers rather than through a clinical referral procedure or a representative sampling frame. However, clinical samples are also limited in generalizability, and the present sample characteristics are not widely disparate from those of the older adult population as a whole and the Boston area specifically. Future research could benefit from addressing the cross-sectional nature of our study, as we cannot determine the precise direction of mediation, nor can we determine how much these patterns of mediation would explain outcomes over time. Since OA is a progressive condition, longitudinal designs could be used to fully capture the influence of dispositional expectancies and control beliefs as people age with OA. Finally, other dispositional or personality dimensions, which we did not measure, may also be mediated through control beliefs. For example, neuroticism is associated with poor health outcomes and psychological impairment (Boyle et al., 2010) and could also orient individuals toward experiences that confirm constraints beliefs.

We conclude that it is critical to recognize the complex influence of dispositional expectancies and control beliefs on psychological outcomes. We have demonstrated that these associations are multidimensional, as indicated by the different patterns of association evident for all four of the constructs investigated here. Using only optimism, rather than both optimism and pessimism, or only one dimension of control beliefs, will lead to an inaccurate reflection of the complex ways these variables are associated directly and indirectly with outcomes. Additionally, even with a complete operationalization of these constructs, modeling the relationships between them, not merely using them as individual predictors, will continue to advance the literature. Finally, we conclude that coping with the challenge of OA entails a variety of opportunities for both mastery and constraints beliefs to flourish. We have added to the literature a demonstration of how these control orientations are also related to optimism and pessimism, suggesting multiple possible points of intervention that could improve the lives of older adults with OA.

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Figure 1a.

The perception of constraints on control partially mediates the relationship of optimism to depressive symptoms, controlling for ethnicity and pain. Path coefficients estimated using PROCESS are presented. For the c path, the total effect appears first, followed by the direct effect in parentheses. * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 1b.

The perception of constraints on control partially mediates the relationship of pessimism to depressive symptoms, controlling for ethnicity and pain. Path coefficients estimated using PROCESS are presented. For the c path, the total effect appears first, followed by the direct effect in parentheses. * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 2a.

The perception of constraints on control partially mediates the relationship of optimism to self-esteem, controlling for income. Path coefficients estimated using PROCESS are presented. For the c path, the total effect appears first, followed by the direct effect in parentheses. * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 2b.

The perception of constraints on control partially mediates the relationship of pessimism to self-esteem, controlling for income. Path coefficients estimated using PROCESS are presented. For the c path, the total effect appears first, followed by the direct effect in parentheses. * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 3a.

Mastery beliefs and the perception of constraints on control partially mediate the relationship of optimism to life satisfaction, controlling for pain. Path coefficients estimated using PROCESS are presented. For the c path, the total effect appears first, followed by the direct effect in parentheses. * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 3b.

Mastery beliefs and the perception of constraints on control partially mediate the relationship of pessimism to life satisfaction, controlling for pain. Path coefficients estimated using PROCESS are presented. For the c path, the total effect appears first, followed by the direct effect in parentheses. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 1

Bivariate Correlations between All Variables (N = 153)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 Age	-	-.12	-.07	-.07	-.04	-.02	-.04	-.13	.13	.13	-.04	.13	-.12	.23*	.11	-.14	-.07
2 Gender		-	-.05	-.31**	-.06	-.13	-.06	.19	.02	.17*	.04	.00	.07	-.00	.04	.01	-.04
3 Ethnicity			-	.13	.05	.12	-.06	-.05	.01	-.00	.14	-.12	-.05	-.09	.20*	.10	.07
4 Marital Status				-	.09	.32**	-.06	-.01	-.10	-.13	-.01	-.07	-.10	.08	-.18*	.11	.13
5 Education					-	.26**	-.21*	-.03	-.11	-.25*	-.01	-.29**	-.06	-.19*	-.26**	.01	.09
6 Income						-	-.26**	.13	-.09	-.13	-.07	-.18*	-.03	-.24**	-.26**	.22*	.14
7 Pain							--	-.23*	.62**	.45**	-.08	.34**	-.04	.38**	.45**	-.24*	-.26**
8 OA Duration								-	-.11	-.13	.14	-.07	.18*	-.14	-.18*	.14	.13
9 OA Symptoms									-	.60**	-.01	.23*	-.06	.29**	.38**	-.24*	-.19*
10 Functional Limitations										-	.12	.24*	-.11	.31**	.37**	-.24*	-.25*
11 Optimism											-	-.32**	.35**	-.22**	-.37**	.42**	.56**
12 Pessimism												-	-.27*	.56**	.53**	-.42**	-.55**
13 Mastery													-	-.39**	-.26**	.38**	.50**
14 Constraints														-	.58**	-.49**	-.54**
15 Depressive Symptoms															-	-.62**	-.65**
16 Self Esteem																--	.60**
17 Life Satisfaction																	--

* Note. $p < .05$,

** $p < .01$. Gender was dichotomized such that 0 = male and 1 = female, ethnicity was dichotomized such that 0 = White and 1 = non-White, marital status was dichotomized such that 0 = single, divorced, or widowed and 1 = married, education was dichotomized such that 0 = some college or less and 1 = Associates degree or higher, annual household income was dichotomized such that 0 = less than \$20,000 and 1 = more than \$20,000.

Table 2

PROCESS Models Examining Depressive Symptoms, Self-Esteem, and Life Satisfaction

	Depressive Symptoms (N = 152)			Self-Esteem (N = 160)			Life Satisfaction (N = 160)		
	B (CI)	SE	t	B (CI)	SE	t	B (CI)	SE	t
Mastery	-.01 (-.48, .44)	.23	-.07	.02 (-.00, .03)	.01	1.72	.51 (.23, .79)	.14	3.55***
Constraints	.39 (.27, .50)	.06	6.47***	-.02 (-.02, -.01)	.00	-4.16***	-.31 (-.43, -.19)	.06	-5.05***
Optimism	-1.11 (-1.84, -.38)	.37	-3.02**	.07 (.03, .11)	.02	3.36***	1.83 (1.16, 2.50)	.34	5.38***
Pain	.28 (.17, .40)	.06	4.93***	-	-	-	-.10 (-.21, .07)	.06	-1.85
Ethnicity	-3.76 (-6.78, -.74)	1.53	-2.46*	-	-	-	-	-	-
Income	-	-	-	.12 (.01, .24)	.06	2.05*	-	-	-
	$R^2 = .48, F(5, 146) = 35.01, p < .001$			$R^2 = .37, F(4, 155) = 16.28, p < .001$			$R^2 = .53, F(4, 155) = 34.76, p < .001$		
	Depressive Symptoms (N = 152)			Self-Esteem (N = 160)			Life Satisfaction (N = 160)		
	B (CI)	SE	t	B (CI)	SE	t	B (CI)	SE	t
Mastery	-.14 (-.58, .31)	.22	-.61	.02 (.01, .04)	.01	2.46*	.71 (.39, 1.03)	.16	4.36***
Constraints	.31 (.16, .46)	.08	4.13***	-.01 (-.02, -.01)	.00	-2.93**	-.22 (-.39, -.05)	.09	-2.56*
Pessimism	.75 (.14, 1.38)	.32	2.41*	-.04 (-.07, -.01)	.02	-2.35*	-1.02 (-1.78, -.26)	.38	-2.65**
Pain	.25 (.12, .37)	.06	3.97***	-	-	-	-.06 (-.19, .08)	.07	-.81
Ethnicity	-4.31 (-7.48, -1.14)	1.60	-2.69**	-	-	-	-	-	-
Income	-	-	-	.10 (-.03, .23)	.07	1.55	-	-	-
	$R^2 = .46, F(5, 146) = 31.04, p < .001$			$R^2 = .33, F(4, 155) = 12.67, p < .001$			$R^2 = .46, F(4, 155) = 25.29, p < .001$		

* Note. $p < .05$,

** $p < .01$,

*** $p < .001$. Ethnicity was dichotomized such that 0 = White and 1 = non-White and annual household income was dichotomized such that 0 = less than \$20,000 and 1 = more than \$20,000.