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Gratitude Uniquely Predicts Lower Depression in Chronic Illness Populations: A Longitudinal Study of Inflammatory Bowel Disease and Arthritis

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Abstract

Objective: Although gratitude has been identified as a key clinically relevant trait for improving well-being, it is understudied within medical populations. The current study addressed this gap and extended previous and limited cross-sectional research by examining the longitudinal associations of gratitude to depression in two chronic illness samples, arthritis and IBD.

Methods: Two chronic illness samples, arthritis ($N = 423$) and inflammatory bowel disease (IBD; $N = 427$), completed online surveys at Time 1 (T1). 163 people with arthritis and 144 people with IBD completed the six-month follow-up survey (T2). Depression, gratitude, illness cognitions, perceived stress, social support, and disease-related variables were assessed at T1 and T2.

Results: At T2, 57.2 percent of the arthritis sample and 53.4 percent of the IBD sample met the cut off scores for significant depression. T1 gratitude was negatively associated with depressive symptoms at T1 and T2 in both samples (*r*'s from -.43 to -.50). Regression analyses revealed that T1 gratitude remained a significant and unique predictor of lower T2 depression after controlling for T1 depression, relevant demographic variables, illness cognitions, changes in illness-relevant variables, and another positive psychological construct, thriving, in both samples.

Conclusion: As the first investigation of the longitudinal associations of gratitude to psychological well-being in the context of chronic illness, the current study provides important evidence for the relevance of gratitude for health-related clinical populations. Further intervention-based research is warranted to more fully understand the potential benefits of gratitude for adjustment to chronic illness.

KEYWORDS: gratitude; depression; arthritis; inflammatory bowel disease; adjustment

Introduction

Characterized by persistent inflammation and symptom fluctuations, chronic diseases such as arthritis and inflammatory bowel disease (IBD) can have far-reaching and negative effects on both physical and psychological well-being (Gafvels, Hagerstrom, Nordmark, & Wandell, 2014; Iglesias-Rey et al., 2015). The toll on mental well-being is perhaps best demonstrated by the concerning and high rates of depression in both IBD and arthritis. Among arthritis patients, rates are reported to be as high as 18 percent (Murphy, Sacks, Brady, Hootman, & Chapman, 2012); among IBD patients lifetime prevalence rates are estimated at 27.2 percent (Walker et al., 2008). Although the etiology of depression in these patient populations is complex, functional losses, pain, and psychosocial challenges are common factors associated with the development of depressive symptoms (Benka et al., 2012; Fuller-Thomson & Sulman, 2006; Hirsch, Sirois, & Lyness, 2011; Katz & Yelin, 1995; Kool, van Middendorp, Lumley, Bijlsma, & Geenen, 2013). Considering the mutually reinforcing interrelations of depression with inflammatory processes (Almond, 2013; Raison & Miller, 2011) and subsequent pain (Bair, Robinson, Katon, & Kroenke, 2003), understanding the factors that may help alleviate depressive symptoms in individuals living with chronic disease that involve inflammatory processes is an important clinical goal for improving quality of life, physical symptoms and functioning.

Positive clinical psychology (Wood & Tarrier, 2010) has highlighted a number of personality traits as being potentially beneficial for adjustment to chronic disease. For example, a review of the literature concluded that focusing on the positive with respect to one's illness is one of four important themes for improving adjustment to chronic illness (de Ridder, Geenen, Kuijer, & van Middendorp, 2008). Among arthritis patients, positive psychological qualities and traits such as optimism (Brenner, Melamed, & Panush, 1994), benefit finding (Danoff-Burg &

Revenson, 2005), and self-compassion (Sirois, Molnar, & Hirsch, 2015) have been linked cross-sectionally and longitudinally to better adjustment related outcomes such as reduced distress, pain, and disability (see Sirois, 2014b for a review). Less is known about the role of such qualities for improving adjustment in IBD as empirical research on the psychological determinants of quality of life in IBD is scarce (van der Have et al., 2014). However, a qualitative narrative biographical study found that patient reports of optimism about living with the disease, and appreciation of help from others, were concepts that mapped on to better health and well-being outcomes (Dür et al., 2014). It is therefore likely that certain *positive* traits may also be beneficial for adjustment to IBD. However, it should be noted that referring to these traits as positive is a misnomer, as they reflect a continuum of characteristic ways of responding to challenges that can range from positive responses (presence of the trait) to negative responses (lack of the trait), and therefore provide an opportunity to examine functioning in the context of illness from a more holistic perspective.

In a 2010 review, Wood et al. (2010) identified gratitude as a key clinically relevant trait that is beneficial for well-being. As a trait, gratitude involves a life orientation towards noticing the positive in life, including both thankfulness to others and a wider sense of appreciation for what one has (Wood, Maltby, Stewart, & Joseph, 2008). Gratitude arises both from the features of the objective situation (Wood, Brown, & Maltby, 2011), and the characteristic appraisals through which individuals view the world (Wood, Maltby, Stewart, Linley, & Joseph, 2008). Trait gratitude relates to well-being beyond the 30 facets of the Big Five (Wood, Joseph, & Maltby, 2009), more positive coping (Wood, Joseph, & Linley, 2007), and better sleep (Wood, Joseph, Lloyd, & Atkins, 2009). In student populations, gratitude leads to better well-being over time (Wood, Maltby, Gillett, Linley, & Joseph, 2008), and in adult samples, gratitude predicts

decreased depression over time via positive life events (Disabato, Kashdan, Short, & Jarden, 2016). Importantly, techniques to improve gratitude cause reduced symptomatology in impaired mental health populations (Geraghty, Wood, & Hyland, 2010) and improved mental health in health-care practitioners (Cheng, Tsui, & Lam, 2015). Collectively, longitudinal and experimental research provide a compelling case for a causal relationship of gratitude to well-being (Wood et al., 2010). A key recommendation of the 2010 review was to examine gratitude specifically within chronic illness populations, in which it is highly understudied.

The aim of the current research is to address this important gap by examining the longitudinal associations of gratitude to depressive symptoms in two chronic illness samples, arthritis and IBD. The dearth of research on the role of gratitude in chronic illness has been limited to cross-sectional studies, which found that gratitude was associated with less depressed mood in individuals with breast cancer and heart failure (Mills et al., 2015; Ruini & Vescovelli, 2013), and enhanced quality of life in a mixed chronic illness sample (Eaton, Bradley, & Morrissey, 2014). We expanded on this limited research by prospectively testing the hypothesized associations of trait gratitude with lower depression in individuals with IBD or arthritis, and further tested whether these associations held over and above other relevant illness-related variables, cognitions, and perceptions. An important consideration for understanding the potential value of gratitude for improving well-being in individuals with chronic illness is to demonstrate that any effects found are not simply due to the presence of related positive appraisals or the absence of negative appraisals. Positive cognitions known to relate to better psychological well-being and adjustment in chronic illness populations include benefit finding and illness acceptance (Carver & Antoni, 2004; Evers et al., 2001; McCracken, 1998; Pinto-Gouveia, Costa, & Marôco, 2013). These illness-related cognitions involve retrospectively

finding benefits from having become chronically ill, and learning to accept that one has to live with chronic illness, respectively (Evers et al., 2001). In contrast, appraisals of helplessness, and perceived stress, in general and in direct relation to the disease, are associated with depression in both arthritis (Chaney, Mullins, Uretsky, Doppler, & et al., 1996; Vriezekolk, van Lankveld, Geenen, & van den Ende, 2011; Wright et al., 1996), and IBD (Goodhand et al., 2012; Searle & Bennett, 2001) patients.

A final issue worth addressing is the extent to which gratitude as a positive psychological construct is unique in predicting depression. It is possible that the expected effects of gratitude are simply reflective of a wider range of positive psychology constructs that may be equally beneficial for adjustment to chronic illness. For example, psychological thriving, a positive temporal self-appraisal characterized by perceptions of growth and flourishing in the context of chronic illness (Carver, 1998; O'Leary & Ickovics, 1995), prospectively predicted depression symptoms in a sample of arthritis patients (Sirois & Hirsch, 2013). Whether gratitude is distinct or shares overlap with thriving for predicting depression has not been explored.

If the relations of gratitude to depressive symptoms are consistent with previous research in non-medical populations (Wood et al., 2010), and other chronic illness populations (Mills et al., 2015), then this would provide good preliminary evidence to warrant further investigations into the utility of increasing gratitude to improve depression in other chronic disease populations. Indeed, there is a growing body of evidence demonstrating the efficacy of gratitude interventions for improving well-being (Wood et al., 2010). Investigating gratitude in these populations is also in keeping with previous research suggesting that certain personality traits can provide insight into the process of quality of life in IBD patients (Moreno-Jiménez, López Blanco, Rodríguez-Muñoz, & Garrosa Hernández, 2007), and arthritis patients (Brenner et al., 1994; Sirois et al.,

2015).

We examined the prospective associations of Time 1 (T1) gratitude to depression at the six month follow-up in both samples, controlling for baseline levels of depression, relevant demographic variables (i.e., age and respondent sex), and health status, as well as a number of other important variables that may predict change in depression, such as pain, stress, and social support. We included both the T1 and Time 2 (T2) for pain, stress and social support to account for how changes in these variables might impact depression at T2. In keeping with previous research demonstrating that gratitude predicts well-being over and above a number of related constructs (Wood et al., 2010), we then examined the effects of trait gratitude on Time 2 depression while additionally controlling for three illness cognitions (benefit finding, illness acceptance, and helplessness). Finally, to provide a more stringent test of the unique predictive value of gratitude for explaining depressive symptoms in relation to other relevant positive psychology constructs, we added psychological thriving to the model to examine if the proposed effects of gratitude would hold.

Method

Participants and Procedure

After receiving clearance from the institutional research ethics board, two chronic illness samples, arthritis ($N = 423$) and inflammatory bowel disease (IBD; $N = 427$), completed online surveys at Time 1 (T1), and agreed to be contacted six months later. At Time 2 (T2), 168 (39.7%) people with arthritis and 155 (36.3%) people with IBD completed the follow-up survey. However, only 163 people with arthritis and 144 people with IBD provided complete data for all of the measures included in the analyses. A listwise deletion was used to handle the missing data (5 arthritis cases, and 11 IBD cases), as Little's (1988) missing completely at random test was

non-significant for both samples. People diagnosed with any form of arthritis (i.e., any major rheumatic disease) or IBD were recruited via notices posted on on-line arthritis or IBD support boards, online classified ads, online psychological research web pages, ads placed in the community and on the Arthritis Society's online research web page, and via the Crohn′s and Colitis Foundation of Canada′s newsletter. A participant-generated code was used to link the T1 and T2 surveys. Data collection was continued until approximately 400 participants had completed the Time 1 measures to allow for attrition at Time 2. The data analyzed for this paper was collected as part of a larger multi-aim study examining the psychological, social, and treatment-related factors associated with adjustment to chronic illness (Sirois, 2014a; Sirois & Hirsch, 2013; Sirois et al., 2015).

The demographic characteristics of the two samples are presented in Table 1. The distribution of disease subtypes were consistent with population norms for arthritis (Gariepy, Rossignol, & Abby, 2009) and IBD (Bernstein et al., 2006). In the arthritis sample, the majority of participants reported having rheumatoid arthritis (40.7 %), osteoarthritis (28.1 %), psoriatic arthritis (6.2 %), or ankylosing spondylitis (6.2 %). In the IBD sample, most participants reported having Crohn's disease (55.1 %), ulcerative colitis (38.8 %), or another IBD (6.1 %).

Measures

In addition to demographic questions, participants indicated whether they had been diagnosed with a mental health issue by responding "yes" or "no." Those that answered "yes" were prompted to list their medically diagnosed mental health issues in an open-ended follow-up question. The measures of interest described below were administered at both T1 and T2. Scale means and reliabilities are shown in Table 2.

Gratitude. Gratitude was assessed with the Gratitude Questionnaire-6 (GQ-6)

(McCullough, Emmons, & Tsang, 2002), a well validated 6-item scale that assesses gratitude as a life orientation towards noticing and appreciating the positive in life. Participants responded to items (two reverse coded) on a 1 (strongly disagree) to 7 (strongly agree) scale. Items asked about how frequently and intensely participants experience gratitude (e.g., ‘‘I feel thankful for what I have received in life,’’ and ‘‘long amounts of time can go by before I feel grateful to something or someone.’’). The GQ-6 has good temporal stability ($r = .59$, $p < .01$) (Wood, Maltby, Gillett, et al., 2008), no relationship with socially desirable responding ($r < .01$, $p = .97$) (Wood, Maltby, Stewart, & Joseph, 2008), and independence from other related constructs (McCullough et al., 2002). The scale has shown good internal consistency previously (McCullough et al., 2002). In the current study, the GQ-6 demonstrated very good temporal stability in the IBD sample ($r = .74$, $p < .01$), and adequate temporal stability in the arthritis sample ($r = .43$, $p < .01$).

Depressive symptoms. A 10-item version of the Center for Epidemiological Studies Depression (CES–D) scale (Radloff, 1977) assessed depressive symptoms at both T1 and T2. Participants rate the frequency of depressive symptoms over the past two weeks on a 4-point scale ranging from “rarely or none of the time” (0) to “most or all of the time” (3). Scores are summed and range from 0 to 30, with scores of 10 or over indicating the presence of significant depressive symptoms (Zhang et al., 2012). The 10-item version has shown comparable precision to the original 20 item scale in classifying patients with depressive symptoms (Zhang et al., 2012), and very good reliability in other samples with chronic health issues (alpha = .92) (Sirois, Davis, & Morgan, 2006).

Self-rated health. Current self-rated health was assessed with a version of the global health rating item from the Medical Outcomes Survey 36 item short form (SF-36) health

questionnaire (Ware & Sherbourne, 1992). The SF-36 is a widely used, well-validated, reliable measure of subjective health and overall physical well-being, and the global health item is an important predictor of objective health and health-related outcomes such as cortisol responses to stress, morbidity, and mortality (Jylhä, 2009; Kristenson, Olsson, & Kucinskiene, 2005; Tamayo-Fonseca et al., 2013). Respondents rated their overall health on a 6-point scale ranging from 1 (Excellent) to 6 (Very poor); the item was reverse scored with higher values reflecting better current self-rated health.

Pain. Frequency of pain experienced in each sample was assessed with a single item administered as part of a disease severity scale. For the arthritis sample, the frequency of pain was measured with an item from the Arthritis Impact Measurement Scales 2 (Meenan, Mason, Anderson, Guiccione, & Kazis, 1992). Participants rated how often they had severe pain from their arthritis in the past month on a 5-point Likert-type scale ranging from "all days" to "no days." Scores were reverse-coded with higher values reflecting more frequent pain.

For the IBD sample, pain frequency was assessed with the pain item from the 10-item Bowel Symptoms subscale of the Inflammatory Bowel Disease Questionnaire (Guyatt et al., 1989), a widely used measure of disease-related activity in IBD (Han, McColl, Steen, Barton, & Welfare, 1998). Participants rated how often they had been troubled by abdominal pain in the past 2 weeks on a 7-point Likert-type scale ranging from 1 ("more frequent than ever before") to 7 ("no increase or normal"), and scores were reversed with high scores reflecting more frequent pain.

Perceived stress. The Perceived Stress Scale (PSS; Cohen & Williamson, 1988) is a 10-item version of the most widely used empirically established index of general perceived stress which assesses the perceived stressfulness of events experienced within the past month. Items

such as “In the last month, how often have you felt nervous and stressed?" are rated on a 5-point scale with response options ranging from “never” to very “often.” The PSS demonstrates good convergent and predictive validity with life events, depression, health behaviors, and use of health services (Cohen, Kamarck, & Mermelstein, 1983; Cohen & Williamson, 1988; Hewitt, Flett, & Mosher, 1992), and adequate internal consistency in previous research (Cohen & Williamson, 1988).

Social support. The Duke-UNC Functional Social Support questionnaire (Broadhead, Gehlbach, De Gruy, & Kaplan, 1988) is a well-validated 8-item scale that assesses the qualitative and functional aspects of social support. Questions are rated on a 5-point Likert-type scale with response options ranging from 1 (much less than I would like) to 5 (as much as I would like). Items assess the emotional (e.g., “I have people who care what happens to me.”) and practical (e.g., “I get chances to talk about money matters.”) dimensions of social support with higher scores indicating a greater perceptions of social support. The Duke-UNC has demonstrated good internal consistency in IBD (alpha = .96; Gick & Sirois, 2010) and arthritis (alpha = .92; Sirois & Gick, 2016) samples, and shows good criterion-related validity, with higher scores on the Duke-UNC predicting lower stress and better coping (Sirois & Gick, 2016), as well as better subjective health, and less chronic morbidity (Bellon Saameno, Delgado Sanchez, Luna del Castillo, & Lardelli, 1996).

Illness Cognitions. The Illness Cognition Questionnaire (ICQ; Evers et al., 2001) assessed 3 different illness cognitions that reflect both favorable and unfavorable adjustment to chronic illness. This 18-item measure includes three subscales comprised of 6 items. Agreement with each statement is indicated on a 4-point scale ranging from 1 (“not at all”) to 4 (“completely”). The Helplessness subscale (e.g., “My illness frequently makes me feel

helpless.") has predicted increases in functional disability in rheumatoid arthritis and multiple sclerosis patients (Evers et al., 2001). The Acceptance subscale (e.g., "I have learned to live with my illness.") and Perceived Benefits subscale (e.g., "My illness has made life more precious to me.") predicted beneficial changes in physical and psychological health in these populations (Evers et al., 2001). The three factor structure has been validated in chronic pain and chronic fatigue samples (Lauwerier et al., 2010). The ICQ demonstrates good convergent and discriminant validity with personality dimensions, coping, and mood, and good predictive validity with physical and psychological health outcomes across different chronic illness samples (Evers et al., 2001; Roerink et al., 2013). The ICQ also shows good internal consistency for each of the subscales with alpha coefficients of .85, 91, and .88, for the Perceived Benefits, Acceptance, and Helplessness, subscales respectively (Evers et al., 2001).

Psychological thriving. A previously validated three item thriving scale based on Carver's (1998) model of psychological thriving addressed the perception of change over time due to chronic illness. The scale includes perceptions of growth across three domains: life satisfaction, self-improvement, and quality of personal relationships. Responses for each domain are rated on a 4-point Likert-type scale ranging from extreme loss (negative change) to gain (thriving). Items are reverse-scored with higher scores reflecting greater thriving. The thriving scale has demonstrated good internal consistency (alpha = .80), and good convergent and divergent validity with related constructs (e.g., life satisfaction, coping efficacy) in a sample of people with arthritis (Sirois & Hirsch, 2013).

Analyses

Descriptive analyses were first conducted to assess the proportion of each illness sample that met the criteria for significant depressive symptoms at T1 and T2. Differences between the

T2 responders and non-responders were assessed using *t*-tests, *chi-square* tests, and Fisher's exact tests. Paired sample *t*-tests were used to examine potential change in depressive symptoms from T1 to T2. Bivariate correlations among the T1 and T2 predictor and control variables and T2 depressive symptoms were calculated to examine significant associations at the $p < .01$ level given the large number of correlations calculated per sample.

The longitudinal associations of gratitude to T2 depressive symptoms were assessed with a hierarchical linear regression for each of the illness samples. The first step of the regression included T1 depressive symptoms, age, sex, disease duration, self-rated health, T1 and T2 pain and social support. In the next step, the three T1 illness cognitions and psychological thriving were added. In the third step T1 gratitude was added to test its unique incremental contribution to T2 depression over that of the illness cognitions and the other predictors. Marital status, education level (as a proxy for socio-economic status), and ethnicity, were also tested as potential covariates to be added to the regression models if there was evidence that either T1 gratitude or T2 depression scores varied significantly as a function of these demographic variables. Marital status and education group differences were tested with one way analysis of variance (ANOVA) tests, and ethnicity (White versus non-White) was tested with a Mann-Whitney test in each sample given the expected non-normal distribution this variable.

Results

Descriptive Results

A comparison of those who did and did not respond to the T2 survey revealed that in both the arthritis and the IBD samples, T2 non-responders were younger compared to T2 responders (see Table 1). Non-responders at T2 in the arthritis sample were also more likely to be from the U.S. In the arthritis sample non-responders scored significantly higher on the measure of

depressive symptoms at T1 (M =12.65, SD = 7.24) compared to responders (M =10.38, SD = 7.12; t (416) = 3.11, $p < .01$). However, in the IBD sample there were no significant differences between the T2 responders and non-responders on the T1 depressive symptoms scores t (410) = .40, p = .69).

Approximately one third of those in the arthritis sample and one fifth of those in the IBD sample reported being diagnosed with a mental health issue, with depression being the most frequently reported diagnosis (Table 1). At T1, 57.2 percent of the arthritis sample and 53.4 percent of the IBD sample met the cut off scores (i.e., 10 or over, Zhang et al., 2012) for significant depressive symptoms as assessed by the CESD. At T2, 50.9 percent of the arthritis sample and 41.1 percent of the IBD sample met the cut off scores for significant depressive symptoms according to the CESD. *T*-tests revealed that no significant change in depressive symptoms from T1 to T2 for the arthritis sample, $t(162) = -1.47$, $p = .15$. However, depressive symptoms significantly decreased from T1 from T2 for the IBD sample, $t(143) = 3.10$, $p = .002$. Comparisons on the study variables between illness samples revealed that those with arthritis had lived with their illness longer, reported less stress at T1, lower social support at T1 and T2, and had lower levels of benefit finding in comparison to those with IBD (see Table 2 for means and standard deviations).

The correlation analyses revealed that gratitude was robustly, significantly, and negatively associated with depressive symptoms at T1 and T2 in both illness samples (r's from -.43 to -.50; see Table 3). Across both samples, gratitude also demonstrated consistent negative associations with T1 and T2 perceived stress, and helplessness (r's from -.36 to -.49), and consistent positive associations with self-rated health, benefit finding, and illness acceptance (r's from .24 to .48). Gratitude was also robustly correlated with psychological thriving in each

sample. However, gratitude was modestly associated with T1 pain in the IBD sample, and unrelated to pain at T1 and T2 in the arthritis sample. Across the two samples, the magnitude of the correlations of gratitude and depression with the other study variables were very similar. Depressive symptoms at each time point were significantly associated with the demographic, disease-related, and health-related cognitions covariates in the expected directions. Time since diagnoses was not significantly correlated with gratitude and depressive symptoms in either sample.

None of tests of the effects of marital status, education level and ethnicity on T1 gratitude and T2 depression scores were found to be significant in either the arthritis or the IBD sample. Accordingly, these demographic variables were not included as covariates in the regression analyses.

Longitudinal Associations of Gratitude to Depressive Symptoms

For both the arthritis and the IBD samples, the first and second steps of the regression analyses revealed that T1 depressive symptoms and T2 stress were unique and robust predictors of T2 depression after controlling for demographic and disease-related variables (see Table 4). In the IBD sample, T2 pain was also associated with T2 depression. Interestingly, in the arthritis sample, T1 benefit finding was modestly associated with higher T2 depression scores. None of the other illness cognitions were significant covariates. Psychological thriving was negatively associated with T2 depression in both samples.

The addition of gratitude in the third step revealed that it was significantly associated with lower depressive symptoms at T2 in both the arthritis and the IBD sample, and explained significant additional variance (arthritis: $R^2 = .03$; $R = .17$; IBD: $R^2 = .01$; $R = .10$) in T2 depressive symptoms over that explained by T1 depressive symptoms, demographic, disease-

related, health cognition and other positive psychological covariates. From the perspective of incremental validity, these effects can be considered somewhat consequential, as an effect size (*R*) of .15 is suggested to make "a reasonable contribution" (p. 451; Hunsley & Meyer, 2003) to explaining the variance when other closely related variables are controlled as they were in the current analyses. In the IBD sample, psychological thriving remained a significant covariate once gratitude was entered into the model. Overall, the complete set of variables explained 57 percent of the variance in T2 depression scores in the arthritis sample, and 73 percent of the variance in T2 depression scores in the IBD sample.

Discussion

The current study addressed several important gaps in the research on the role of gratitude for well-being by providing evidence that gratitude is prospectively associated with lower levels of depression in two chronic illness samples. Across both arthritis and IBD samples, gratitude predicted lower levels of depressive symptoms over a six month period over and above initial levels of depression, and a large set of demographic, disease-related and psychological variables known to predict depression, including age, respondent sex, disease duration, self-rated health, illness cognitions, and changes in pain, social support and perceived stress. Importantly, gratitude was one of only a small set of predictors that made a significant and robust contribution to explaining T2 depression in both samples, with T1 depression and T2 stress. Despite the moderate sized associations between gratitude and thriving, gratitude explained significant incremental variance in depression in both samples over and above that explained by this positive psychological construct known to predict depression (Sirois & Hirsch, 2013). This provides some evidence that the effects of gratitude can be viewed as specific to this particular positive orientation rather than as reflecting effects that might be expected from other positive

psychological constructs.

Our findings provide an important extension to previous research with non-medical populations (Wood et al., 2010), and cross-sectional research with medical populations (Eaton et al., 2014; Ruini & Vescovelli, 2013; Sacco, Park, Suresh, & Bliss), by demonstrating that gratitude is a unique prospective predictor of well-being over and above other possible predictors in chronic illness samples. Together, these findings complement and expand on current research on the role of positive clinical qualities in adjustment to chronic illness by providing new evidence that gratitude is an important quality for adjustment to IBD and arthritis.

Overall, our findings indicate that gratitude may be beneficial for improving psychological health in individuals with IBD or arthritis. Although it may be tempting to reason that gratitude is protective for well-being because it facilitates adaptive coping such as seeking social support (Wood et al., 2007), or by increasing positive affect which can be protective for a number of mental health issues including depression (Wood et al., 2010), the evidence to date indicates that neither of these routes fully explains the gratitude-well-being association in non-medical samples (Wood et al., 2010). Previous research has similarly found that gratitude persisted in predicting well-being after controlling for other higher order personality factors and their facets (Wood, Joseph, & Maltby, 2009). Because none of the covariates tested in the current research accounted for the link between gratitude and depression, future research is needed examine the possible factors that might explain the link between gratitude and psychological health in medical samples, and whether the processes involved are unique to these populations.

Our findings may have a number of important clinical implications for people living with chronic diseases such as IBD and arthritis. Although ameliorating depressive symptoms is an important treatment goal for improving psychological well-being in these individuals, evidence

also indicates that depressive symptoms may exert a negative influence on disease activity and functioning in people with IBD (Graff & Dudley-Brown, 2013; Mittermaier et al., 2004), and arthritis (Brionez et al., 2009). Indeed, one review recommended that managing psychological health, including depressive symptoms, is an important clinical goal for disease management in patients with IBD (Graff & Dudley-Brown, 2013). Addressing depression can also have important consequences for medication adherence, as a meta-analysis found that individuals with chronic disease who were depressed were 1.76 times more likely to be non-adherent (Grenard et al., 2011). Importantly, gratitude has also been linked to lower levels of inflammatory biomarkers in individuals with heart failure (Mills et al., 2015), suggesting that gratitude may be particularly relevant for chronic illness characterized by inflammatory processes. Given the current results, and the implications of depression for disease management in IBD and arthritis, further intervention-based and randomized controlled trial research is clearly warranted to more fully investigate the potential benefits of gratitude for these populations. For example, a recent randomized control trial found that a gratitude intervention was effective in reducing depressive symptoms in health-care practitioners (Cheng et al., 2015), suggesting that such interventions may also be effective for the chronic illness patients they treat.

Strengths and Limitations

To our knowledge, this is the first investigation of the longitudinal associations of gratitude to psychological well-being in the context of chronic illness, and the first to examine gratitude with respect to both IBD and arthritis. The use of two community-based samples of people with IBD or arthritis recruited from professional association web sites and support networks is a note-worthy strength, as was using a prospective cohort design, controlling for Time 1 depressive symptoms, illness cognitions, and changes in other relevant variables related

to adjustment to test the incremental validity of gratitude. Demonstrating the prospective associations of gratitude to depression in both samples is another strength that lends support to the potential generalizability of the findings, as well as the temporal precedence of gratitude in relation to depression.

Though novel, the current findings should be considered in light of several limitations. Although methodologically stronger than cross-sectional designs, prospective designs cannot completely rule out the presence of other variables that may covary with both gratitude and depression, or the possibility of reverse or reciprocal causality. The participation rate at T2 in both samples was less than ideal due largely to changes in contact information over the six months of the study. However, those who did not participate at T2 differed significantly from T2 non-participants only on age for both samples, and also for T1 depressive symptoms for the arthritis sample. Controlling for both age and T1 depressive symptoms in the analyses helped address this issue. Despite the fact that a number of variables known to contribute to depression were included in the analyses, current treatment for depression was not assessed and may have accounted for additional variance in the T2 depression scores. Future research should therefore account for current treatments for depression to get a more accurate view of the role of gratitude in depression over time.

Participants self-reported their diagnosis of IBD or arthritis, which may be less reliable than recruiting directly via gastroenterologists or rheumatologists. Nonetheless, evidence from a large, internet-based cohort of people with IBD recruited from a national association suggests that self-reports of IBD compared to physician reports of IBD are generally very reliable (Randell et al., 2014). The arthritis sample was mixed and included a number of different arthritis subtypes, rather than one, which could be seen as making the findings less clear for any

one form of arthritis. However, previous research with population-based samples indicates that the characteristics of individuals with different subtypes of arthritis are not sufficiently distinct to warrant examining subgroups separately (Gariepy et al., 2009), suggesting that our findings apply to a wide range of arthritis subtypes. Not all subtypes in the sample were inflammatory forms of arthritis, although the majority were. Because the study was administered online it was not possible to track whether those who responded were representative of all the individuals who saw the study ads but did not participate. Caution is therefore needed in generalizing the current findings to other IBD and arthritis populations. The samples in the current study had lived with their illness for some time and were in a relatively stable phase of their adjustment, as evidenced by the lack of change in depression scores. It is therefore important that the findings be replicated with samples that are in a less stable phase of their disease to more precisely examine the extent to which gratitude is predictive of resilience to challenge. Finally, although the results were consistent across the two chronic diseases, they may not generalize to other chronic illness groups or to general medical populations, making this an important area for future research to explore.

Conclusions

A growing body of literature in recent years has demonstrated the relation of gratitude to a number of different forms of well-being. Within the fields of personality and clinical psychology, for example, the value of gratitude for understanding well-being is well documented (Wood et al., 2010; Wood, Joseph, & Maltby, 2009). However, within the field of health psychology, gratitude remains understudied. Our findings are among the first to show the relevance of gratitude for well-being in two medical populations, and the first to do so longitudinally. Along with other emerging research in this area (Eaton et al., 2014; Mills et al.,

2015; Ruini & Vescovelli, 2013), we hope that these promising findings spur further research that may demonstrate that gratitude is as valuable for health psychology as it is for other fields.

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Table 1

Demographic Characteristics of the Arthritis and Inflammatory Bowel Disease (IBD) Sample Participants and Non-responders for Time 1 and Time 2

	Arthritis				IBD			
	T1 *N* = 423	T2 *N* = 163[a]	T2 non-responders *N* = 255	T2 responders vs. non-responders *p* value*	T1 *N* = 427	T2 *N* = 144[a]	T2 non-responders *N* = 272	T2 responders vs. non-responders *p* value*
Sex (% female)	88.1	91.6	85.7	.121 (1)	76.8	77.8	76.3	.807 (1)
Age (SD)	44.5 (12.8)	46.9 (11.5)	43.1 (13.3)	.003 (2)	35.6 (12.2)	38.3 (12.7)	34.18 (11.6)	.001 (2)
Range	18 - 81	19 - 74	18 - 81		16 - 71	16 - 71	16 - 68	
Ethnicity (% White)	89.3	92.6	87.0	.076 (1)	96.6	92.5	95.9	.405 (1)
Country of residence (%)				.009 (3)				.399 (3)
United States	52.0	43.6	58.1		35.4	31.5	38.0	
Canada	40.7	49.7	34.0		46.9	47.9	46.1	
United Kingdom	3.5	4.3	3.2		11.0	13.7	9.2	
Other	3.8	2.4	4.0		6.6	5.5	6.6	
Employment status (%)				.392 (3)				.211 (3)
Full-time	35.3	36.9	34.4		50.2	44.0	53.18	
Part time	19.5	20.6	18.9		18.8	20.6	17.8	
Unemployed / retired	22.9	18.1	25.4		23.2	24.8	22.0	
Disabled	22.4	24.4	21.3		7.7	10.6	6.4	
Education (%)				.921 (3)				.594 (3)
High school or less	13.9	13.5	14.8		14.3	13.7	14.7	
University	65.0	65.6	64.0		67.4	65.8	68.8	
Graduate school	21.8	20.9	21.2		26.9	20.5	16.5	

Relationship status (%)				.535 (3)				.550 (3)
Married / Living with significant other	56.3	56.4	56.1		65.3	68.5	64.7	
Separated / divorced / widowed	18.5	20.9	17.0		7.0	7.7	6.6	
Never married	24.8	22.7	26.1		26.9	23.8	28.7	
Diagnosed mental health problem (%)	29.3	31.3	28.4	.581 (1)	24.8	21.9	26.1	.405 (1)

SD = standard deviations; * (1) Based on Fisher's Exact test, 2 sided, (2) based on an independent sample *t*-test, (3) based on a Pearson chi-square test, 2 sided; [a] Listwise *N*.

Table 2

Summary of the Characteristics of the Study Variables for the Arthritis and Inflammatory Bowel Disease (IBD) Samples at Time 1 and Time 2.

		Arthritis (N = 163)			IBD (N = 144)			
	Range	*M*	*SD*	α	*M*	*SD*	α	*t*(305)
Gratitude T1	1 - 7	5.81	1.05	.87	5.78	1.10	.86	0.244
Depressive symptoms T1	0 - 3	1.04	.71	.91	1.19	.71	.87	1.847
Depressive symptoms T2	0 - 3	1.11	.75	.92	1.04	.72	.91	0.832
Time since diagnosis	years	11.55	10.40	---	9.42	8.98	---	1.908
Self-rated health T1	1 - 6	3.44	1.00	---	3.34	1.15	---	0.815
Pain T1	1 – 5[a] 1 – 7[b]	3.23	1.20	---	3.28	1.96	---	---
Pain T2	1 – 5[a] 1 – 7[b]	3.04	1.20	---	2.83	1.87	---	---
Perceived stress T1	1 - 5	2.75	.75	.90	2.94	.79	.91	2.160*
Perceived stress T2	1 - 5	2.86	.79	.92	2.87	.75	.90	0.113
Social support T1	1 - 5	3.75	1.03	.92	4.02	.87	.89	2.464*
Social support T2	1 - 5	3.75	1.06	.93	4.02	.97	.93	2.317*
Benefit finding T1	1 - 6	24.84	6.35	.87	26.57	6.40	.89	2.373*
Illness acceptance T1	1 - 6	24.32	6.20	.90	24.54	6.87	.91	0.295
Helplessness T1	1 - 6	21.65	6.88	.87	21.31	7.80	.91	0.406
Thriving T1	1 - 4	2.93	.71	.79	2.96	.78	.81	0.353

Note: [a] = scale range for arthritis sample pain rating; [b] = scale range for arthritis sample pain rating; Statistical comparisons of pain frequency were not made due to the differences in the scales and time frames for the pain ratings in each sample; *$p < .05$, **$p < .001$.

Table 3

Bivariate Correlations Among Gratitude, Depressive Symptoms at Time 1(T1) and Time 2 (T2), and the Study Variables for the Arthritis (T2 N = 163), and Inflammatory Bowel Disease (IBD; T2 N =144) Samples.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Gratitude T1	---	-.50**	-.45**	.01	.24**	-.05	.00	-.49**	-.36**	.40**	.35**	.46**	.39**	-.33**	.50**
2. Depressive symptoms T1	-.49**	---	.65**	-.11	-.44**	.26**	.19	.83**	.52**	-.42**	-.43**	-.22**	-.42**	.50**	-.51**
3. Depressive symptoms T2	-.43**	.63**	---	-.12	-.43**	.19	.12	.60**	.63**	-.25**	-.34**	-.06	-.21	.32**	-.36**
4. Time since diagnosis	.02	-.11	-.09	---	-.07	.12	.01	-.07	-.14	-.06	-.07	.12	.20	.01	.14
5. Self-rated health T1	.24**	-.44**	-.43**	-.08	---	-.35**	-.12	-.44**	-.32**	.20	.05	-.07	.24**	-.43**	.29**
6. Pain T1	-.01	.28**	.22**	.12	-.34**	---	.36**	.24**	.08	-.16	-.11	-.02	-.07	.35**	-.14
7. Pain T2	-.01	.19	.24**	-.01	-.14	.37**	---	.28**	.18	-.06	-.12	.02	-.06	.16	-.04
8. Perceived stress T1	-.49**	.82**	.57**	-.10	-.42**	.20**	.21**	---	.57**	-.38**	-.31**	-.19	-.45**	.48**	-.42**
9. Perceived stress T2	-.36**	.51**	.65**	-.15	-.34**	.10	.22**	.55**	---	-.18*	-.43**	-.21	-.32**	.21**	-.25**
10. Social support T1	.42**	-.41**	-.23**	-.02	.18	-.08	-.00	-.41**	-.22**	---	.52**	.17	.25**	-.33**	.40**
11. Social support T2	.36**	-.43**	-.35**	-.05	.05	-.11	-.10	-.34**	-.48**	.53**	---	.27**	.31**	-.31**	.35**
12. Benefit finding T1	.48**	-.20**	-.03	.15	-.07	.01	.10	-.19**	-.16	.20**	.28**	---	.47**	-.23**	.43**
13. Illness	.40**	-.43**	-.21**	.23**	.24**	-.04	-.04	-.47**	-.30**	.26**	.31**	.45**	---	-.50**	.44**

acceptance T1															
14. Helplessness T1	-.35**	.50**	.32**	.03	-.44**	.34**	.15	.44**	.23**	-.29**	-.28**	-.23**	-.48**	---	-.53**
15. Thriving T1	.50**	-.52**	-.37**	.14	.29**	-.20**	-.04	-.42**	-.39**	.38**	.35**	.43**	.43**	-.53**	---

Note: Correlations for the arthritis sample are shown above the diagonal, and the correlations for the IBD sample are shown below the diagonal. *N*'s reflect listwise deletions. **$p < .01$; SD = standard deviation.

Table 4

Hierarchical Regression Analyses of the Longitudinal Associations of Gratitude with Time 2 Depressive Symptoms in the Arthritis and Inflammatory Bowel Disease (IBD) Samples Controlling for Time 1 (T1) Age, Respondent Sex, Illness-related Variables, Illness Cognitions, Perceived Stress, and Thriving.

	Arthritis			IBD		
Predictor (df)	Step 1 β (11, 151)	Step 2 β (4, 147)	Step 3 β (1, 147)	Step 1 β (11, 132)	Step 2 β (4, 128)	Step 3 β (1, 127)
Depressive symptoms T1	.41**	.36**	.33**	.41**	.36**	.34**
Age	-.04	-.04	-.03	.04	.01	.03
Sex	.01	-.01	.01	.01	.00	.02
Time since diagnosis	.01	-.02	-.04	.09	.11	.09
Self-rated health	-.12[a]	-.11	-.09	-.04	-.05	-.04
Pain T1	.02	.00	.04	-.04	-.05	-.03
Pain T2	.06	.04	.04	.18*	.19**	.19**
Perceived stress T1	-.06	.00	-.03	-.16	-.16[a]	-.18*
Perceived stress T2	.42**	.42**	.40**	.61**	.60**	.59**
Social support T1	.03	.04	.08	.05	.04	.04
Social support T2	.01	-.02	-.02	-.03	.01	.02
Benefit finding T1	---	.10	.18*	---	-.01	.04
Illness acceptance T1	---	.12	.11	---	.08	.11
Helplessness T1	---	.02	.01	---	.01	.00
Thriving T1	---	-.12	-.08	---	-.21**	-.17*
Gratitude T1	---	---	-.22**	---	---	-.14*
R^2	.53	.54	.57	.70	.72	.73
F	17.73	13.88	14.35	31.46	25.18	24.59

ΔR^2	---	.02	.03**	---	.02*	.01*
ΔF	---	1.99	9.43**	---	2.92*	4.70*

NOTE: [a]$p = .06$, *$p < .05$, **$p < .01$