

UCSF

UC San Francisco Previously Published Works

Title

Perceived Stress in Patients with Common Gastrointestinal Disorders: Associations with Quality of Life, Symptoms and Disease Management

Permalink

<https://escholarship.org/uc/item/0987c5qf>

Journal

Explore: The Journal of Science & Healing, 13(2)

ISSN

1550-8307

Authors

Edman, Joel S
Greeson, Jeffrey M
Roberts, Rhonda S
[et al.](#)

Publication Date

2017-03-01

DOI

10.1016/j.explore.2016.12.005

Peer reviewed



Published in final edited form as:

Explore (NY). 2017 ; 13(2): 124–128. doi:10.1016/j.explore.2016.12.005.

Perceived stress in patients with common gastrointestinal disorders: Associations with quality of life, symptoms and disease management

Joel S. Edman¹, Jeffrey M. Greeson², Rhonda S. Roberts³, Adam B. Kaufman⁴, Donald I. Abrams⁵, Rowena J. Dolor⁶, and Ruth Q. Wolever⁷

¹Nutrition Sciences Department, Drexel University, Philadelphia, PA

²Department of Psychiatry, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA

³Duke Clinical Research Institute, Duke University, Durham, NC

⁴Main Line Gastroenterology Associates, Malvern, PA

⁵UCSF Osher Center for Integrative Medicine, University of California San Francisco, San Francisco, CA

⁶Division of General Internal Medicine, Duke University Medical Center, Durham, NC

⁷Osher Center for Integrative Medicine, Vanderbilt University, Schools of Medicine and Nursing, Nashville, TN

Abstract

Objective and Methods: Given associations between stress, and gastrointestinal (GI) symptoms and disorders, this pilot study assesses relationships between perceived stress, quality of life (QOL) and self-reported pain ratings as an indicator of symptom management in patients who self-reported gastroesophageal reflux disease (GERD), irritable bowel syndrome (IBS) and inflammatory bowel disease (IBD).

Results: In a sample of GI patients (n=402), perceived stress positively correlated with depression (r=0.76, p<0.0001), fatigue (r=0.38, p< 0.0001), sleep disturbance (r=0.40, p<0.0001), average pain (r=0.26, p<0.0001) and worst pain (r=0.25, p< 0.0001). Higher perceived stress also correlated with lower mental health-related QOL. Assessed in subgroups, similar correlations were found for the participants with GERD (n=188), IBS (n=132) and IBD (n=82). Finally, there were significant correlations within both the GERD and IBD cohorts between perceived stress, and average pain (r=0.34, p<0.0001; r=0.32, p<0.0001 respectively) and worst pain (r=0.29, p<0.0001; r=0.35, p<0.01 respectively).

Conclusions: Perceived stress broadly correlated with QOL characteristics in patients with GERD, IBS, and IBD, and their overall QOL was significantly lower than that of the general population. Perceived stress also appeared to be an indicator of symptom management (self-

reported pain ratings) in GERD and IBD, but not IBS. Future research is needed using objective measures of stress and symptom/disease management to confirm these associations, and to prospectively evaluate the ability of stress reduction interventions to improve perceived stress, QOL and disease management in these GI disorders; integrative medicine treatment programs that simultaneously target such multiple symptoms may be particularly beneficial to study.

Keywords

perceived stress; quality of life; stress management; gastroesophageal reflux disease; irritable bowel syndrome; inflammatory bowel disease

INTRODUCTION

Stress is an important contributor to gastrointestinal (GI) dysfunction and symptoms in gastroesophageal reflux disease (GERD), irritable bowel syndrome (IBS), and inflammatory bowel disease (IBD), the most common disorders seen in GI clinical practice (1–2). Several bodies of clinical research support this association including: (a) studies of anxiety, depression and stressful life events in GI disorders (1,3); (b) the prevalence of physical and emotional abuse and neglect in these disorders (4); and (c) benefits of stress management (5,6). Nonetheless, how much of an impact stress has on overall quality of life (QOL) and GI symptoms in GERD, IBS and IBD is not well understood.

While it is accepted that stress can influence QOL through effects on mood, sleep, fatigue and pain in general (7,8), specific influences in GI disorders are not consistently or well described and therefore are not often clinically addressed. In addition, basic research supports an association between stress and GI dysfunction such as altered gut motility, visceral perception, GI secretions, intestinal permeability, mucosal blood flow and repair, and bowel flora (2,9). These associations suggest that stress may not only have direct effects on QOL and GI dysfunction or symptoms, but that worse QOL resulting from chronic stress could exacerbate GI symptoms, contributing to a vicious cycle of stress and chronic disease. One could then argue that stress management such as Mindfulness-Based Stress Reduction (MBSR) should be included in treatment programs for GERD, IBS and/or IBD to improve specific QOL factors (6), to potentially improve GI dysfunction, as well as to help mediate the potential cycle of stress and chronic disease.

This study therefore describes the associations between perceived stress and a range of QOL characteristics in a large sample of GI patients (n=402) with GERD (n=188), IBS (n=132), and IBD (n=82) who sought care at integrative medicine (IM) clinical practices that comprised the Bravewell practice-based research network (PBRN), called BraveNet (10). We hypothesized that in all three GI disorders, higher levels of perceived stress would be correlated with lower QOL as indicated by poorer mood, fatigue, and sleep quality, and higher pain ratings as an indicator of worse symptom management.

RESEARCH DESIGN AND METHODS

Patient Recruitment and Inclusion

Nine centers that comprised the BraveNet PBRN contributed to this study. The Duke Clinical Research Institute (DCRI) provided study coordination, data management, and statistical support. Four-hundred and two participants from a larger survey study (n = 4182) reported a diagnosis of GERD, IBS or IBD according to their clinicians and/or medical record review.

Research staff approached participants at their visits, by phone or by email and invited them to participate. Eligible participants were at least 18 years old, English literate, and received treatment from or consulted with an IM clinician (e.g., MD/DO, acupuncturist, massage therapist, psychologist, nutritionist/dietician). Participants were classified as new (one to three visits) or follow-up patients (> three visits). Enrollment occurred January 5, 2008 thru August 16, 2010.

This was a self-selected cross-sectional sample and all participants provided informed consent. There was no compensation for participation. Procedures for each clinical center and the DCRI received full institutional review board approval.

Measures

Participants provided demographic information as well as data on lifestyle and current symptoms. Patients' perception of stress was reported on the four-item Perceived Stress Scale (PSS, 11). QOL was assessed using the 12-Item Short Form Health Survey (SF-12v1®) (12). Mood was assessed with the 20-item Center for Epidemiologic Studies Depression Scale (CES-D, 13). Four self-report numerical rating scales (NRS) reflecting the prior month were used to measure fatigue, quality of sleep and pain (worst pain and average pain). Each of the 4 NRS have a range from 0–10 where 0 was no fatigue, not rested at all, and no pain and 10 is indicative of worst fatigue, very rested, worst pain imaginable. The fatigue assessment measured the overall level of fatigue through the day in the past month; the quality of sleep assessment measured how well rested one felt within the first hour upon waking after an adequate amount of sleep during the past month; and the pain assessment measured the worst and average pain one experienced in the past month.

Data Analysis

Descriptive summaries were presented as means and standard deviations for continuous variables and as frequencies and percentages for categorical variables. Group comparisons were assessed utilizing independent samples t-tests and chi-square tests, respectively. Given multiple comparisons, a conservative alpha was set at 0.01 to control for Type I error. Analyses were performed in SAS (version 9.43, Cary, NC).

RESULTS

The majority of participants were female (75.6 %), white (84.8%) and well educated (70.5 % completed college), with a mean age of 52.3 years (See Table 1). There were some sociodemographic and lifestyle differences among the three GI cohorts. The GERD cohort

was oldest ($p<0.01$), had the lowest percentage of white participants ($p<0.0001$), had the lowest percentage of participants who completed college ($p<0.0001$) and they were most overweight ($p<0.01$).

Participant QOL, Perceived Stress, Depression, Sleep Quality, Pain and Fatigue

QOL scores on the SF-12 were below the national norm of 50.0 ($sd=10$) on both the physical component score and the mental component score (See Table 2). The SF-12 physical score was significantly different as a function of GI condition, with the lowest scores in the IBD group (GERD=41.2, IBS=44.2 and IBD=40.9, $p<0.01$). The GI cohorts' scores on the SF-12 mental health component score and the rating scales for fatigue, sleep quality and pain did not significantly differ.

Correlations Between Perceived Stress and QOL Measures

In the overall GI cohort, perceived stress correlated positively with depression scores (CES-D, $r=0.76$, $p<0.0001$) and fatigue ($r=0.38$, $p<0.0001$), and correlated negatively with sleep quality ($r=-0.40$, $p<0.0001$) and mental functioning (SF-12 mental component, $r=-0.65$, $p<0.0001$). These highly significant correlations were observed across the GERD, IBS and IBD diagnostic groups (see Table 3).

In the overall GI cohort, perceived stress also positively correlated with average pain ($r=0.26$, $p<0.0001$) and worst pain ($r=0.25$, $p<0.0001$). However, the pattern of associations between perceived stress and pain ratings differed as a function of specific GI diagnosis (see Table 3). Whereas perceived stress levels were positively correlated with average pain and worst pain in the GERD and IBD subgroups, perceived stress was not significantly correlated with such in the IBS cohort.

DISCUSSION

This paper is the first report that simultaneously describes and compares the psychosocial characteristics and symptom ratings of three different cohorts of GI patients, those with GERD, IBS and IBD. Compared to the general population, GI patients considered together or separately, have significantly worse physical and emotional QOL. For example, both the physical and mental components of QOL in IBD patients were almost one standard deviation below the norm of the general population (11). For GERD and IBS patients, the mental and physical component of QOL was $\frac{1}{2}$ to $\frac{3}{4}$ standard deviation below the norm. Similarly, perceived stress in our sample was significantly higher than published norms of 4.5 ($sd = 2.96$). When compared to norms for similar demographic groups in terms of age, education, or income, our sample falls almost a full standard deviation above the mean (14). In other words, perceived stress in our sample was higher than that reported by 84% of the population.

These data also suggest that in GERD, IBS and IBD, the patient experience of stress, as measured by the 4-item PSS, significantly correlates with a broad range of QOL indicators and symptoms, including mood, fatigue, and sleep quality. Perhaps most notable of these research findings is that perceived stress scores were correlated with average and worst pain ratings in the overall GI population, as well as in the GERD and IBD cohorts, suggesting

potentially important implications for how symptoms are managed. This is not surprising in GERD, since retrosternal chest pain is a common symptom (15) and it has been previously reported that worse emotional and physical health-related QOL are associated with a less effective response to proton pump inhibitors (16). In IBD, pain may result from inflammation, surgical complications, bacterial overgrowth and/or neurobiological processes (17), raising the probability that perceived stress may have some influence on these factors. While directionality cannot be ascertained from this cross-sectional work, stress reduction appears to be a salient target that may improve not only QoL in GERD and IBD patients, but also pain. This warrants further investigation.

While monitoring and treating perceived stress may improve pain and symptom management in GERD and IBD patients, our data did not support an association between perceived stress and pain ratings in IBS patients. This finding was surprising given the demonstrated positive impact that Mindfulness-Based Stress Reduction (MBSR) has on IBS symptom severity (6, 18). The lack of correlation in our sample could not be explained by a restricted range of variance in either correlate, or by a lack of power in the subsample of 132 patients. The lack of correlation might be explained by the fact that we only assessed pain while IBS severity is a much broader constellation, including pain and bloating severity, dissatisfaction with bowel habits, and interference with daily activities. Another possibility is that the MBSR mechanism that improves GI symptoms in IBS is not direct stress reduction. Rather, the mechanisms may have more to do with training to better use the perceptual information-processing system (19) through practicing nonjudgmental awareness of body sensations and emotions. Since alexithymia is highly predictive of IBS symptoms (20,21), but less related to IBD symptoms (22), this differential mechanism potentially explains why MBSR improves IBS symptoms even though perceived stress and pain ratings may not be correlated. This seems likely given that models explaining IBS severity show that the only two psychological variables directly associated with IBS severity are catastrophizing and somatization. Anxiety and stressful life events appear to act through catastrophizing and somatization (23). In fact, a path model explaining the positive impact of MBSR on IBS symptoms and QOL suggests that MBSR may train IBS patients in non-judgment of gut-focused anxiety and catastrophic appraisals while also supporting a focus on interoceptive sensations that produce less emotion reactivity (24).

Another possible explanation for the lack of correlation between perceived stress and pain in IBS is due to symptom variability, given that there are three subtypes of IBS (diarrhea predominant, constipation predominant, or alternating). While our data does not permit IBS subtype categorization, we speculate that those with constipation predominant IBS may experience greater pain. Stress can also contribute to altered intestinal permeability, immunomodulation and bowel flora in IBS patients, which might promote diarrhea and other food intolerance symptoms in these patients (25,26). In other words, the relationship between stress and pain may be mediated by type of bowel symptoms, making it difficult to observe a direct correlation. Future research will benefit from exploring stress contributions to worse constipation and pain in some IBS patients, and worse diarrhea in others.

There are several limitations to this study. First, the data are from a convenience sample of GI patients with GERD, IBS and IBD, some of whom self-reported their diagnoses to health

professionals. While there were healthcare practitioner consultations, there was not a systematic procedure that definitively confirmed their diagnoses (10). Second, since this was a cross-sectional survey, we do not know whether perceived stress levels are causally associated with QOL, pain and symptom management, nor how the reported pattern of associations may shift over time. Third, given the narrow sociodemographics of the sample, the generalizability of the findings may be limited. Longitudinal research, using more demographically diverse patients with GERD, IBS and IBD, is needed to determine whether perceived stress levels prospectively predict variation in QOL, and symptom management ratings over time.

Based on prior literature suggesting a causal role of stress in GI symptom severity, as well as the current results linking perceived stress to QOL and, for GERD and IBD, to pain, future clinical research should examine potential benefits of stress reduction on QOL and symptom management in each of these distinct GI populations. Moreover, the relationships between perceived stress and QOL, depressive symptoms, fatigue, sleep quality and to a lesser extent pain, merit the inclusion of stress ratings in the clinical assessment of GI patients. Monitoring the impact of stress with the 4-item PSS may help assess QOL and disease management in GI patients longitudinally, as well as indicate those who could benefit from a range of potentially beneficial stress management interventions such as meditation, relaxation techniques, aerobic exercise, and psychotherapy, effectively targeting stress-related psychophysiological processes (e.g., associated sympathetic activation) (26). MBSR appears to be particularly useful for IBS patients, as the multiple mechanisms through which it works may target multiple functional symptoms.

These GI disorders would also more effectively be described as chronic disorders in which stress can worsen overall symptoms (e.g., depression, fatigue, sleep, pain, etc) and quality of life, exacerbating a cycle of stress and chronic disease. In addition to stress management, it seems prudent to target the range of symptoms with an integrative medicine approach that also includes healthy and specific dietary guidelines, targeted nutritional supplementation, movement and exercise, and perhaps other approaches. Since evidence also suggests that the integrative medicine population is generally more health conscious (10), this could suggest that treatment programs may be more easily implemented. Finally, since we are unaware of any research that has examined an integrative or holistic medicine treatment program for GERD, IBS or IBD, this research is warranted and could conceivably optimize QOL, symptom management and the management of the cycle of stress and chronic disease.

ACKNOWLEDGEMENTS AND AUTHOR DISCLOSURE STATEMENT

The Bravewell Collaborative funded the creation of BraveNet and this study. For JMG, preparation of this manuscript was supported by grant R00AT004945 from the National Center for Complementary and Integrative Health.

No competing financial interests exist for any of the authors.

REFERENCES

1. Lee SP, Sung IK, Kim JH, et al.: The effect of emotional stress and depression on the prevalence of digestive diseases. *J Neurogastroenterol Motil* 2015;10:5056 epublication.

2. Konturek PC, Brzozowski T, Konturek SJ: Stress and the gut: pathophysiology, clinical consequences, diagnostic approach and treatment options. *J Physiol Pharm* 2011;62:591–9.
3. Bernstein CN, Singh S, Graff et al.: A prospective population-based study of triggers of symptomatic flares in IBD. *Am J Gastroenterol* 2010;105:1994–2002. [PubMed: 20372115]
4. Drossman DA, Talley NJ, Leserman J, et al.: Sexual and physical abuse and gastrointestinal illness. *Ann Intern Med* 1995;123:782–94. [PubMed: 7574197]
5. Kuo B, Bhasin M, Jacquart J, et al.: Genomic and clinical effects associated with a relaxation response mind-body intervention in patients with IBS and IBD. *PLoS One* epublication, 4 30, 2015.
6. Gaylord SA, Palsson OS, Garland EL, et al. Mindfulness training reduces the severity of irritable bowel syndrome in women: results of a randomized controlled trial. *Am J Gastroenterol* 2011;106:1678–88. [PubMed: 21691341]
7. Slavich GM. Life stress and health: a review of conceptual issues and recent findings. *Teaching Psychol* 2016;43:346–55.
8. Gallagher J, Parenti G, Doyle F. Psychological aspects of cardiac care and rehabilitation: time to wake up to sleep? *Curr Cardiol Rep* 2015;17:111. [PubMed: 26482754]
9. Qin H, Chang C, Tang X, Bian Z. Impact of psychological stress on IBS. *World J Gastroenterol* 2014;20:14126–31. [PubMed: 25339801]
10. Wolever RQ, Abrams DI, Kligler B, et al. Patients seek integrative medicine for preventive approach to care. *Explore* 2012;8:348–52. [PubMed: 23141791]
11. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *Journal of Health and Social Behavior* 1983;24:385–396. [PubMed: 6668417]
12. Ware J, Kosinski M, Keller SD. A 12-item short form health survey: construction of scales and preliminary tests of reliability and validity. *Med Care* 1996;34:220–233. [PubMed: 8628042]
13. Radloff LS The CES-D scale: A self report depression scale for research in the general population. *Applied Psychological Measurement* 1997;1:385–401.
14. Cohen S, Williamson GM. Perceived stress in a probability sample of the United States In: Spacepan S, Oskamp S, (Eds). *The Social Psychology of Health*. Newbury Park, CA: Sage; 1988:31–67.
15. Mikami DJ, Murayama KM. Physiology and pathogenesis of gastroesophageal reflux disease. *Surg Clin North Am* 2015;95:515–25. [PubMed: 25965127]
16. Becher A, El-Serag H. Systematic review: the association between response to proton pump inhibitors and health-related quality of life inpatients with gastro-esophageal reflux disease. *Aliment Pharmacol Ther* 2011;34:618–27. [PubMed: 21770991]
17. Srinath AI, Walter C, Newara MC, Szigethy EM. Pain management in patients with inflammatory bowel disease: insights for the clinician. *Ther Adv Gastroenterol* 2012;5:339–357.
18. Ljottson B, Hedman E, Lindfors P, et al. Long-term follow-up of internet-delivered exposure and mindfulness based treatment for irritable bowel syndrome. *Behav Res Ther* 2011;49:58–61. [PubMed: 21092934]
19. Pashko S Implications of the differences between our perceptual and conceptual views. *Psychol Neuroscience* 2016;9:267–81.
20. Phillips K, Wright BJ, Kent S. Psychosocial predictors of irritable bowel syndrome diagnosis and symptom severity. *J Psychosom Res* 2013;75:467–74. [PubMed: 24182637]
21. Porcelli P, De Carne M, Leandro G. Alexithymia and gastrointestinal-specific anxiety in moderate to severe irritable bowel syndrome. *Compr Psychiatry* 2014;55:1647–53. [PubMed: 25011689]
22. Porcelli P, Taylor GJ, Bagby RM, De Carne M, Alexithymia and functional gastrointestinal disorders. *Psychother Psychosom* 1999;68:263–269. [PubMed: 10516531]
23. van Tilburg MAL, Palsson OS, Whitehead WE. Which psychological factors exacerbate irritable bowel syndrome? Development of a comprehensive model. *J Psychosom Res* 2013;74:486–92. [PubMed: 23731745]
24. Garland EL, Gaylord SA, Palsson OS, et al. Therapeutic mechanisms of a mindfulness-based treatment for IBS: effects on visceral sensitivity, catastrophizing and affective processing of pain sensations. *J Behav Med* 2012;35: 591–602. [PubMed: 22161025]

25. Shulman RJ, Jarrett ME, Cain KC, Broussard EK, Heitkemper MM: Associations among gut permeability, inflammatory markers, and symptoms in patients with irritable bowel syndrome. *J Gastroenterol* 2014;49:1467–76. [PubMed: 24435814]
26. Bailey MT. Influence of stressor-induced nervous system activation on the intestinal microbiota and the importance for immunomodulation. *Adv Exp Med Biol* 2014;817:255–76. [PubMed: 24997038]

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Explore Article Highlights:

Compared to the general population, GI patients have significantly lower QOL.

Perceived stress correlated with symptoms and QOL in patients with GERD, IBS and IBD.

Perceived stress correlated with average and worst pain in GERD and IBD.

Stress reduction should be a part of GI patients' symptom and disease management.

Future research should study holistic approaches, targeting patients' multiple symptoms.

Table 1.

GI Disorder Participant Demographic and Lifestyle Characteristics

	All GI Disorders (N=402)	GERD (N=188)	IBS (N=132)	IBD (N=82)	P-value
Demographics					
Age (years) (mean (std))	52.3 (14.3)	55.3 (12.6)	49.5 (15.6)	50.1 (14.5)	<0.01
Female (n/N (%))	303/401 (75.6)	143/188 (76.1)	98/132 (74.2)	62/81 (76.5)	0.91
White (n/N (%))	341/402(84.8)	144/188 (76.6)	123/132 (93.2)	74/82 (90.2)	<0.0001
Completed College (n/N (%))	282/400 (70.5)	110/186 (59.1)	103/132 (78.0)	69/82 (84.2)	<0.0001
Lifestyle Indicators					
Current Tobacco Use (Any use) (n/N (%))	25/399 (6.3)	13/185 (7.0)	8/132 (6.1)	4/82 (4.9)	0.79
No Current Alcohol (< 1 drink/week) (n/N (%))	116/359 (32.3)	55/172 (32.0)	36/117 (30.8)	25/70 (35.7)	0.78
Aerobic exercise 20 minutes (<1×/week) (n/N (%))	136/391 (34.8)	59/180 (32.8)	45/131 (34.4)	32/80 (40.0)	0.52
BMI > 25 (n/N (%))	(177/387) (45.7)	100/184 (54.4)	49/123 (39.8)	28/80 (35.0)	<.01

Table 2.

Mean Scores for Symptoms and Quality of Life: GERD, IBS and IBD

Parameter Mean (std)	All GI Dx's (N=402)	GERD (N=188)	IBS (N=132)	IBD (N=82)	P-Value
Perceived Stress (0 [*] -16)	6.3 (3.1)	6.2 (3.2)	6.3 (3.2)	6.8 (3.0)	0.52
Fatigue (0 [*] -10)	5.4 (2.3)	5.2 (2.3)	5.5 (2.3)	5.7 (2.3)	0.37
Quality of Sleep (0-10 [*])	5.2 (2.6)	5.5 (2.6)	5.0 (2.5)	4.9 (2.8)	0.20
Average Pain (0 [*] -10)	3.8 (2.4)	3.8 (2.6)	3.6 (2.5)	4.0 (2.1)	0.39
Worst Pain (0 [*] -10)	5.8 (3.0)	5.8 (3.1)	5.5 (2.9)	6.3 (2.7)	0.18
SF-12 Physical (0-100 [*])	42.1 (9.7)	41.2 (9.8)	44.2 (9.9)	40.9 (8.5)	<0.01
SF-12 Mental (0-100 [*])	42.7 (10.6)	44.4 (10.6)	42 (10.8)	40.4 (10.0)	0.02
CES-D (0 [*] -30)	10.1(6.1)	9.8 (5.9)	10 (6.2)	11.1(6.3)	0.33
n/N (%)					
CES-D 16	76/389 (19.5)	30/149 (16.8)	30/132 (22.7)	16/78 (20.5)	0.41

* indicates better health/QOL

Table 3.

Correlation Coefficients Between Perceived Stress, and Symptoms and Quality of Life: GERD, IBS and IBD

	All GI Dxs (N=402)	GERD (N=188)	IBS (N=132)	IBD (N=82)
CES-D	0.76 ^a	0.76 ^a	0.76 ^a	0.76 ^a
Fatigue	0.38 ^a	0.40 ^a	0.34 ^a	0.40 ^a
Quality of Sleep	-0.40 ^a	-0.39 ^a	-0.36 ^a	-0.46 ^a
Average Pain	0.26 ^a	0.34 ^a	0.12	0.32 ^a
Worst Pain	0.25 ^a	0.29 ^a	0.13	0.35 ^c
SF-12 Physical	-0.09 ^d	-0.13 ^d	0.02	-0.020 ^d
SF-12 Mental	-0.65 ^a	-0.67 ^a	-0.64 ^a	-0.63 ^a

^a = p<0.0001;^b = p<0.001;^c = p<0.01;^d = p<0.1