



Relationships between irritable bowel syndrome, generalized anxiety disorder, and worry-related constructs

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ABSTRACT. This *ex post facto* study aimed to replicate previous research demonstrating an association between generalized anxiety disorder (GAD) and irritable bowel syndrome (IBS) and to extend this work by examining possible relationships between IBS and psychological constructs associated with the development of GAD. A total of 391 undergraduate psychology students completed self-report diagnostic measures of IBS and GAD as well as questionnaire measures of trait anxiety, worry, experiential avoidance, intolerance of uncertainty, and problem-solving confidence. Consistent with previous research, an association between IBS and GAD was found. Compared to participants without IBS, participants endorsing Rome II diagnostic criteria for IBS reported greater trait anxiety, worry, and experiential avoidance. No group differences on measures of intolerance of uncertainty and problem-solving confidence were found. Etiological factors considered specific to the development of GAD (*i.e.*, increased intolerance of uncertainty and deficits in problem-solving confidence) do not account for the observed relationships between IBS and general anxiety variables. However, experiential avoidance, or attempts to avoid unwanted bodily sensations, emotions, or other internal events, does appear elevated among IBS individuals. Implications of these findings are discussed within the context of a biopsychosocial model of IBS.

KEYWORDS. Experiential avoidance. Generalized anxiety disorder. Irritable bowel syndrome. Worry. *Ex post facto* study.

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RESUMEN. El propósito de este estudio *ex post facto* fue replicar una investigación anterior que demostró la asociación entre el trastorno de ansiedad generalizada (TAG) y el síndrome de colon irritable (SCI) y ampliar este trabajo buscando posibles relaciones entre SCI y los constructos psicológicos relacionados con el desarrollo del TAG. Un total de 391 estudiantes de Psicología completó los autoinformes para diagnosticar el SCI y el TAG junto con un cuestionario para medir ansiedad estado, preocupación, evitación experiencial, intolerancia a la incertidumbre y confianza en la resolución de problemas. En consistencia con la investigación anterior, se encontró relación entre SCI y TAG. En comparación con los participantes sin SCI, los que cumplieron los criterios diagnósticos del Rome II del SCI demostraron mayor ansiedad estado, preocupación y evitación experiencial. No se encontraron diferencias entre grupos en intolerancia a la incertidumbre o confianza en la resolución de problemas. Los factores etiológicos considerados específicos en el desarrollo del TAG (*i.e.* mayor intolerancia de la incertidumbre y déficit en la confianza en la resolución de problemas) no parecen tener su papel en la relación observada entre el SCI y variables de ansiedad generales. No obstante, la evitación experiencial o los intentos de evitar las sensaciones corporales no deseadas, emociones u otros eventos internos aparecen elevados entre los individuos con SCI. Se discuten las implicaciones de estos resultados dentro del contexto del modelo biopsicosocial del SCI.

PALABRAS CLAVE. Preocupación. Evitación experiencial. Trastorno de ansiedad generalizada. Síndrome de colón irritable. Estudio *ex post facto*.

Irritable bowel syndrome (IBS), a functional gastrointestinal disorder, affects an estimated 10-20% of the general adult population (Camilleri and Choi, 1997; Talley, 1999). Individuals who worry excessively and suffer from generalized anxiety disorder (GAD) may especially be prone to such gastrointestinal distress, one of the many somatic symptoms historically associated with this anxiety disorder (American Psychiatric Association, 1987). Indeed, 37% of a clinical GAD sample also met diagnostic criteria for IBS (Tollefson, Tollefson, Pederson, Luxenberg, and Dunsmore, 1991), while 34% of a sample of IBS patients had a lifetime history of GAD (Lydiard, 1992).

IBS appears to be as prevalent among university students as in previous community survey studies and is associated with a higher frequency of GAD and greater trait worry, neuroticism, anxiety sensitivity, and visceral anxiety sensitivity (Hazlett-Stevens, Craske, Mayer, Chang, and Naliboff, 2003). However, it remains unclear whether individuals with IBS share the same predisposing characteristics believed to underlie chronic worry and GAD. The current study sought to clarify the relationships between IBS and psychological constructs suspected in the development of GAD: experiential avoidance, intolerance of uncertainty, and problem-solving confidence.

In their prominent "avoidance theory" model of GAD, Borkovec, Alcaine, and Behar (2004) proposed that the chronic worry seen in GAD functions as a covert form of experiential avoidance behavior. Borkovec and colleagues drew upon several lines of research demonstrating that worry suppresses somatic responses to feared stimuli as well as aversive imagery and other emotional material (see Borkovec *et al.*, 2004 for a review of this literature). An experiential avoidance measure correlated with levels of

trait worry ($r = .36, p < .001$), with level of distress associated with GAD symptoms ($r = .48, p < .001$), and with the degree of impairment in daily life functioning caused by GAD symptoms ($r = .50, p < .001$) (Roemer and Orsillo, 2002). However, experiential avoidance, often defined as attempts to avoid unwanted private experiences such as bodily sensations or emotions, is considered common to many forms of psychopathology other than anxiety (Hayes, Wilson, Gifford, Follette, and Strosahl, 1996).

Ladouceur and colleagues have proposed that “intolerance of uncertainty” plays a critical role in the development and maintenance of GAD specifically (Freeston, Rhéaume, Letarte, Dugas, and Ladouceur, 1994). Individuals with GAD were more likely than individuals in other anxiety disorder diagnostic categories to endorse difficulty tolerating or accepting uncertainty (Dugas, Gagnon, Ladouceur, and Freeston, 1998). In their recent cognitive model, Dugas and Robichaud (2007) argued that this cognitive factor is a “dispositional characteristic” that captures the fundamental beliefs of individuals with GAD. On a similar note, Davey (1994) proposed that the worry seen in GAD represents thwarted problem solving. This conceptualization was supported by research showing that poor problem-solving confidence can lead to catastrophic worry (Davey, Jubb, and Cameron, 1996) and is lower among GAD patients than nonclinical controls despite similar problem-solving abilities (Ladouceur, Blais, Freeston, and Dugas, 1998). Deficits in problem-solving confidence also appear specific to GAD, as scores on related problem-solving orientation measures differentiated GAD patients from patients with other anxiety disorders (Ladouceur *et al.*, 1999).

Although previous research has revealed elevated rates of GAD among IBS sufferers (Hazlett-Stevens *et al.*, 2003; Lydiard, 1992), the roles of experiential avoidance, intolerance of uncertainty, and problem-solving confidence in IBS have not been examined. If individuals with IBS share the same predisposing characteristics believed to underlie chronic worry and GAD, then individuals reporting symptoms of IBS would score higher than individuals without IBS on measures of constructs considered specific to GAD (*i.e.*, intolerance of uncertainty and problem-solving confidence). Alternatively, if IBS involves different psychological processes, then such group differences would not be found. Experiential avoidance, a process theoretically not specific to GAD, may still be more prominent among IBS individuals than individuals without IBS if IBS involves avoidance of unwanted bodily sensations and other internal states.

Method

Participants

A total of 391 university students, 66.20% female with a mean age of 19.50 years ($SD = 3.69$ years), enrolled in undergraduate psychology courses completed a series of questionnaires. The sample was ethnically diverse: 77.20% self-identified as Caucasian, 2% as African American, 6.40% as Latino, 11.50% as Asian/Asian American, .30% as Middle Eastern, .50% as Native American, and .80% as other.

Measures

- IBS diagnosis. Five items assessing Rome II diagnostic criteria for IBS were taken from a more extensive bowel symptom questionnaire (Schmulson, Lee, Chang, Naliboff, and Mayer, 1999).

- GAD diagnosis. The Generalized Anxiety Disorder Questionnaire (GAD-Q-IV) (Newman, Zuellig, and Kachin, 2002) is a 9-item self-report diagnostic measure of GAD that accurately identified individuals meeting DSM-IV (American Psychiatric Association, 1994). GAD diagnostic criteria following an extensive semi-structured diagnostic clinical interview and reliably distinguished GAD from panic disorder and social phobia.
- Trait anxiety. The State-Trait Anxiety Inventory-Trait Version (STAI-T) (Spielberger, 1983) is a widely used and psychometrically sound 20-item measure of trait anxiety, or individuals' general tendency to experience anxiety.
- Worry. The Penn State Worry Questionnaire (PSWQ) (Meyer, Miller, Metzger, and Borkovec, 1990) is a widely used and psychometrically sound 16-item measure of the frequency and intensity of individuals' worry.
- Experiential avoidance. The Acceptance and Action Questionnaire (AAQ) (Hayes *et al.*, 2004) is an internally consistent and valid 9-item measure of experiential avoidance, conceptualized as unwillingness to experience a variety of unwanted private events such as sensations, emotions, or thoughts.
- Intolerance of uncertainty. The Intolerance of Uncertainty Scale (IUS) (Freeston *et al.*, 1994) is a 27-item measure with strong internal consistency as well as criterion-related, convergent, and discriminant validity. This questionnaire assesses beliefs about the emotional and behavioral consequences of being uncertain, how being uncertain reflects a person's character, the expectation that the future will be predictable and frustration when it is not, attempts to control the future, and all-or-nothing responses in uncertain situations.
- Problem-solving confidence. The Problem-Solving Inventory, Confidence Subscale (PSI-C) (Heppner and Petersen, 1982) is a face valid 11-item measure with demonstrated internal consistency, test-retest reliability, concurrent and construct validity, and discriminant validity that assesses individuals' perception of their confidence in solving personal problems.

Design and the procedure

The present work is an *ex post facto* study (Montero and León, 2007) and follows the editing norms established by Ramos-Alvarez, Valdés-Conroy, and Catena (2006). All questionnaires were administered in the classroom during a mass testing session. Participants completed screening measures during class time and received extra credit for their participation.

Results

IBS and GAD

In the study sample, 10.7% ($n = 40$) met criteria for IBS, 21.7% ($n = 81$) met criteria for GAD, and 4.3% ($n = 16$) met criteria for both IBS and GAD. Among participants meeting criteria for IBS and GAD an overwhelming majority were women. Of those meeting criteria for IBS, 72.2% ($n = 26$) were women; in the GAD group, 77.5% ($n = 62$) were women. In the group of participants who met criteria for both IBS and GAD, 62.5% ($n = 10$) were women.

Participants meeting criteria for IBS were more likely than expected to meet diagnostic criteria for GAD. Of those with IBS, 4% met criteria for GAD compared to 19.5% of those without IBS. Chi-square analysis of IBS and GAD diagnostic frequencies revealed this difference to be significant ($\chi^2_1 = 8.88$, $N = 374$, $p < .005$) and Fisher's exact test was also significant, $p < .005$.

IBS and non-IBS group differences on general anxiety, experiential avoidance, intolerance of uncertainty, and problem-solving confidence measures were then examined with a series of independent-samples t-tests. To correct for inflated Type I error, a Bonferroni correction of $\alpha < .01$ (.05/5) was used to determine the statistical significance of each t-test.

IBS and general anxiety measures

IBS participants reported greater trait anxiety ($M = 43.9$, $SD = 10.7$) than participants without IBS ($M = 38.4$, $SD = 9.9$), $t_{362} = -3.02$, $p < .003$. IBS participants also reported greater trait worry ($M = 53.2$, $SD = 13.1$) than participants without IBS ($M = 45.6$, $SD = 14.1$), $t_{377} = -3.22$, $p < .001$.

IBS and experiential avoidance

IBS participants reported significantly greater experiential avoidance ($M = 36.7$, $SD = 8.5$) than participants without IBS ($M = 32.9$, $SD = 7.5$), $t_{(377)} = -3$, $p < .003$.

IBS and intolerance of uncertainty

IBS participants reported similar levels of intolerance of uncertainty ($M = 64.42$, $SD = 18.91$) as compared to those without IBS ($M = 54.77$, $SD = 19.02$).

No significant group differences were found for intolerance of uncertainty following Bonferroni correction, $t_{355} = -1.99$, $p < .047$.

IBS and Problem-Solving Confidence

Likewise, no significant group differences were found on the measure of problem-solving confidence, $t_{378} = -1.49$, $p < .137$. Participants meeting IBS criteria reported similar levels of problem-solving confidence ($M = 37.43$, $SD = 5.72$) as compared to those not meeting IBS criteria ($M = 36.04$, $SD = 5.56$).

Discussion

As expected, a relationship between GAD and IBS was found in this unselected college student sample, and IBS was associated with higher trait anxiety and worry. IBS was also associated with elevated experiential avoidance, as IBS participants endorsed more avoidance of internal experiences such as unwanted thoughts and feelings on the AAQ than participants without IBS. This finding is consistent with a leading etiological model of IBS (Naliboff, Chang, Munakata, and Mayer, 2000), in which the development of IBS could begin with a precipitating symptom or sensation, such as normal visceral physiological activity, autonomic stress response, or conditioned physiological responses to external stimuli. If an individual is predisposed to perceive such sensations as

threatening, then hypervigilance and excessive cognitive processing of the sensations could follow. This, in turn, might lead to behavioral changes and conditioned fear responses to these interoceptive stimuli that only exacerbate the physical sensations and symptoms. The result is a complex feedback loop between physiological, cognitive, affective, and behavioral systems that perpetuates the symptoms of IBS and its associated functional impairment.

The individual difference variables intolerance of uncertainty and problem-solving confidence do not appear to be associated with IBS. Both constructs are implicated in the development of GAD, but neither of these measures distinguished IBS participants from participants without IBS. Thus, while IBS and GAD individuals may share a general psychological process involving fear and avoidance of unwanted internal experience (*i.e.*, experiential avoidance), they do not appear to share psychological vulnerabilities specifically linked to GAD.

Despite the importance of these findings, limitations of the current study should be acknowledged. First, all measures were self-report in nature. Second, the unusually high rate of GAD detected in this unselected college student sample suggests that the selected GAD-Q-IV cutoff score of 5.70 resulted in more false positive cases than expected. Initial Receiving Operating Characteristic (ROC) research found that the recommended cutoff score of 5.70 yielded an optimal balance of sensitivity (83%) and specificity (89%) (Newman *et al.*, 2002). However, this GAD-Q-IV cutoff score apparently yielded lower specificity in the current investigation. Additional research using traditional diagnostic procedures would address this issue. Finally, the correlational nature of the design does not allow for causal relationships to be determined. Thus, it remains unclear whether generalized anxiety symptoms, worry, and other psychological processes are a reaction to IBS symptoms or whether these factors predispose individuals to the development of IBS. Prospective investigations of the temporal relationships between IBS, GAD, and important psychological processes such as experiential avoidance would make an important contribution to the current literature and possibly inform IBS treatment development.

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