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## Written Expressive Disclosure in Adults with Irritable Bowel Syndrome: A Randomized Controlled Trial

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### Abstract

**Background.**—The benefits of written expressive disclosure (WED) to health are documented in a variety of healthy and clinical populations. This study investigates the effect of WED on health-related outcomes in irritable bowel syndrome (IBS).

**Methods.**—Adults (N=189) meeting Rome III criteria for IBS were randomly assigned to write about their: (1) deepest thoughts and feelings about the most stressful life event of the past five years (n=67), (2) deepest thoughts and feelings about their IBS (n=61) or (3) daily activities in an objective manner (control condition; n=61). Participants completed four 20-minute writing sessions over 2–6 weeks. Gastrointestinal (GI) symptoms, healthcare utilization, health-related quality of life (HR-QOL), pain catastrophizing, and pain self-efficacy were assessed at baseline, one month post-writing completion, and three months post-writing completion.

**Results.**—A significant group (combined WED vs. control) X time interaction was detected for healthcare utilization,  $F(1,147)=6.16$ ,  $p=0.014$ ,  $\eta^2=0.04$ . Specifically, number of GI-related medical appointments significantly increased from baseline to 3-month follow-up in the control group, while no significant change was observed in the combined WED group. Among the WED group, individuals assigned to write about their IBS experienced greater improvements in pain self-efficacy than those assigned to write about a life stressor,  $F(1,92)=3.89$ ,  $p=0.024$ ,  $\eta^2=0.08$ . GI

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**Informed consent:** Informed consent was obtained from all individual participants included in the study.

**Ethical approval:** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Welfare of animals:** This article does not contain any studies with animals performed by any of the authors.

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symptom severity, HR-QOL, and pain catastrophizing improved significantly across groups over time, with no significant between-groups differences.

**Conclusion.**—Writing about one’s deepest thoughts and feelings about IBS may increase pain self-efficacy and reduce healthcare utilization compared to control writing in adults with IBS.

### Keywords

chronic pain; expressive writing; Disorders of Gut-Brain Interaction; irritable bowel syndrome; journaling; minimal-contact

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## Introduction

Irritable bowel syndrome (IBS) is a painful and often debilitating disorder of the brain-gut axis [1] which affects 7–16% of the population in the United States [2] and lacks a universally effective medical treatment [3, 4]. Estimates of annual direct costs in the United States range from \$950 million to \$1.35 billion, making IBS a serious public health concern [5, 6]. Individuals with IBS experience poor quality of life (QOL) compared to individuals with other non-life threatening chronic physical conditions such as gastroesophageal reflux disease (GERD), asthma, and migraine [7]. Those who seek medical attention for IBS are particularly affected by their symptoms, with QOL estimates similar to those of individuals with ischemic heart disease, heart failure, and diabetes [8, 9].

The high overlap of IBS with psychological disorders [10–12] and demonstrated role of stress in IBS symptomatology [13] has led to the development of effective psychological therapies for IBS [14, 15]. However, access to clinicians offering such interventions is limited, and the substantial burden of IBS on healthcare services is unlikely to be met with current models of service delivery [16]. As such, there is a pressing need for effective minimal-contact and self-administered interventions [17].

Benefits of written expressive disclosure (WED) on health have been demonstrated in a variety of healthy and clinical populations [18–21]. The first documented WED experiment was conducted by Pennebaker and Beall (1986), who randomly assigned undergraduate students to write about either a traumatic experience (WED group) or “trivial” topics (control group) for 15 minutes on 4 consecutive days. Several weeks after writing, the WED group demonstrated a significant reduction in illness-related medical appointments compared to controls. Since that time, more than 150 studies of WED have been published [18], including one uncontrolled trial of WED for IBS [23]. In that study, participants were instructed to write about their deepest thoughts and feelings about having IBS. At 1-month and 3-month follow-up, those individuals who had completed their writing assignments reported significantly greater improvements in gastrointestinal (GI) symptoms compared to those who never initiated their writing. However, because participants were not randomized to experimental condition, other participant characteristics may account for the effect.

In addition to the question of whether WED improves mental or physical health in IBS, it is also unknown whether the specific writing instruction moderates WED efficacy. Whereas healthy participants in WED trials are generally asked to write about a stressful life event of

their choosing, participants with chronic illness are often instructed to write about their illness. Only one study, to our knowledge, has directly compared these instructions in an effort to determine which writing instruction has the greatest benefit to health in a medical population [24]. Early-stage breast cancer survivors (N=97) who were assigned to write about their breast cancer experience demonstrated significantly larger improvements in QOL at 1- and 6-month follow-up than did those who wrote about a self-selected worst trauma. Whether these results generalize to individuals with IBS is unknown.

To our knowledge, this is the first RCT of WED conducted with adults with IBS. Our aims were to determine: 1) Is WED is feasible and efficacious for improving health-related outcomes in adults with IBS; and 2) Does the specific WED instruction (most traumatic event within five years vs. experience with IBS) significantly moderate this effect?<sup>1</sup> Outcomes were GI symptom severity as well as two health outcomes previously found to improve with WED: healthcare utilization [25, 26] and health-related QOL (HR-QOL) [27]. These outcomes are particularly relevant given the 50% greater healthcare resource consumption by individuals with IBS compared to controls [6, 28] as well as the poor HR-QOL observed in this population [7–9]. We also examined two outcomes commonly assessed in behavioral interventions for IBS due to their hypothesized role in treatment response: pain catastrophizing [29] and pain self-efficacy [30].

## Method

### Participants

Participants were eligible if they were aged >18 years, endorsed being able to read and write easily in English, felt comfortable using the internet, had a computer and home internet access, and met Rome III criteria for IBS [31]. Data were collected between 2010 and 2014. All procedures were approved by the relevant Institutional Review Boards.

### Procedure

**Recruitment.**—Participants were recruited via online research databases and website postings (65% of participants), physician referral (15%), a database of participants from previous studies (12%) and flyers posted on two university campuses (8%). To reduce potential for non-specific (placebo) effects, study staff refrained from presenting the study as a clinical trial and from suggesting that participants were expected to benefit from writing. Additional recruitment details are provided in Appendix A.

**Protocol.**—Measures were administered online at baseline, one month after writing completion, and three months after writing completion. After completing the baseline survey, participants were contacted by the first author or a trained research assistant to schedule a phone call for administration of the first writing session. When a phone call was inconvenient for participants, they were offered the choice of self-administering the writing sessions. In this case, participants were emailed a link with the writing instructions and were told to open the link when ready to conduct their writing session. A computer-generated

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<sup>1</sup>We also explored other potential moderators, including avoidance of the stressor (IBS vs. other stressor), early life adversity, and neuroticism. None of these significantly moderated the effects of WED, and they are not discussed further.

randomization protocol assigned participants to write about either their 1) deepest thoughts and feelings regarding the most stressful life event of the past five years (stress condition); 2) deepest thoughts and feelings regarding their IBS (IBS condition), or 3) daily activities in an objective manner (control condition [32]). We limited the choice of stressful life event to the past five years because research indicates larger effect sizes for more recent traumas [18]. Participants were unaware of their condition assignment prior to the first writing session and were allowed a maximum of six weeks to complete all writing sessions. Following intent-to-treat methodology, all randomized participants were asked to complete follow-up surveys and analyses used all available data. As an incentive, participants were entered into a lottery to win one of five \$100 gift cards.

## Measures

**GI symptom severity.**—The IBS Severity Scoring System (IBS-SSS; Francis, Morris, & Whorwell, 1997) is a validated five-item scale that assesses abdominal pain severity, abdominal pain frequency, abdominal distension severity, satisfaction with bowel habits, and life interference using a visual analogue scale. Participants respond based on how they “currently feel (i.e., over the last 10 days or so)”. Responses are summed for a total possible score of 500 (higher scores indicate greater severity).

**GI healthcare utilization.**—At baseline, 1-month follow-up, and 3-month follow-up, participants were asked how many appointments they had for their GI symptoms over the past three months, one month, and two months, respectively. This allowed for calculation of total GI-symptom-related medical appointments over a 3-month period leading up to baseline and a 3-month follow-up period. Data were imputed for 11 participants who were missing the 1-month or 3-month assessment (see Appendix B). Studies suggest that self-report is a reliable method of estimating healthcare utilization [33] and that this variable is responsive to change [22].

**HR-QOL.**—The 34-item IBS-QOL [34, 35] asks respondents to indicate the extent to which each statement applies to them over the past month on a scale from 1 (*not at all*) to 5 (*extremely*). Items are summed and transformed to a 0–100 scale (100 indicates maximum QOL).

**Pain catastrophizing.**—The six-item catastrophizing subscale of the Coping Strategies Questionnaire (CSQ) [36] was developed for individuals with chronic pain. Participants are informed that each item represents a “thought or feeling that some patients report when they have symptoms” and indicate how much they experience each thought or feeling when they have symptoms on a scale from 0 (*never think or feel that*) to 6 (*always think or feel that*). Individual item ratings are averaged.

**Pain self-efficacy.**—The two pain self-efficacy items from the CSQ were administered to assess participants’ confidence in their ability to 1) control their pain and 2) decrease their pain. The response scale ranges from 0 (*no control*) to 6 (*complete control*).

## Data Analysis

Analyses were conducted using IBM SPSS version 26.0. Data were analyzed using repeated measures analyses of variance (ANOVAs) using all available data (baseline, 1-month follow-up, 3-month follow-up). One outcome variable, healthcare utilization, was measured using a 3-month window of reference and therefore only available at baseline and 3-month follow-up. To test the primary hypothesis, analyses were first conducted with the two WED conditions combined (WED vs. control). Next, sensitivity analyses investigated whether the target of WED (IBS vs. stressful life experience) affected change in outcomes. Mauchly's test of sphericity was conducted for each analysis; the assumption of sphericity was met unless otherwise indicated. Effect size magnitude was interpreted using Cohen's guidelines ( $\eta^2$  of 0.01 as "small"; 0.06 as "medium", and 0.14 as "large") [37].

## Results

### Descriptive Data

Characteristics of the sample (N=189) are summarized in Table 1. The average age of participants was 42 years (range=20–90 years). The majority of participants were White, female, had completed 16 years of formal education, and were employed at least part-time. Means, SDs, internal reliability coefficients and observed Pearson correlations between major variables are presented in Table 2. Means and SDs of the WED and control groups for all variables and time points are presented in Table 3.

No significant differences between groups on any variable were observed at baseline. Mean IBS-QOL score at baseline ( $M=42.80$ ;  $SD=20.27$ ) was roughly a SD lower (worse) than that in a sample of 156 adults with moderate-to-severe IBS symptoms ( $M=65.84$ ,  $SD=19.92$ ) [34] and 0.4 SD lower than a sample of adults with severe IBS symptoms ( $M=50.86$ ;  $SD=20.69$ ) [35]. Twenty-four (12.70%) of participants identified IBS as the most stressful or traumatic experience of the past 5 years.

### Feasibility

**Writing completion.**—Of the 189 randomized participants, 181 (96%) completed all 4 writing sessions, 183 (97%) completed 3 writing sessions, and 188 (99%) completed 2 writing sessions. One participant never completed the first writing session (see Figure 1). The number of completers was similar across groups ( $\chi^2=1.33$ ,  $p=0.515$ ,  $df=2$ ). No participant who completed fewer than two writing sessions completed a follow-up survey.

**Survey completion.**—The number of participants who completed the 1-month and 3-month follow-up surveys was 141 (75% retention) and 146 (77% retention), respectively.

### Effects of WED on Outcomes

**GI symptom severity.**—There was no significant main effect of group (WED vs. Control) on GI symptom severity  $F(1, 135)=0.23$ ,  $p=0.633$ . Symptom severity decreased significantly over time,  $F(2, 270)=11.26$ ,  $p < 0.001$ ,  $\eta^2=0.08$  (a medium-sized effect). Group (WED vs. Control) did not interact significantly with time (baseline vs. 1 month vs. 3 months),  $F(2, 270)=0.61$ ,  $p=0.547$ .

**GI healthcare utilization.**—Healthcare utilization was winsorized to remove outliers ( $n=1$  at baseline and  $n=1$  at 3-month follow-up). There were no significant main effects of group (WED vs. Control),  $F(1, 147)=1.68, p=0.197$ , or time (baseline vs. 3-month follow-up for this outcome only),  $F(1, 147)=2.71, p=0.102$ . Group interacted significantly with time for healthcare utilization,  $F(1,147)=6.16, p=0.014, \eta^2=0.04$  (small effect). As shown in Figure 2, the number of appointments for GI symptoms significantly increased from baseline to 3-month follow-up in the control group,  $F(1,46)=5.19, p=0.027, \eta^2=0.10$ . No significant change was observed in the number of appointments reported by the combined WED group,  $F(1,101)=3.57, p=0.44$ .

**HR-QOL.**—There was no significant main effect of group on QOL,  $F(1, 136)=0.05, p=0.833$ . Mauchly's test of sphericity indicated that the assumption of sphericity was violated,  $\chi^2(2)=20.189, p<0.001$ . Epsilon ( $\epsilon$ ) was 0.878, as calculated according to Greenhouse & Geisser (1959), and was used to correct the repeated-measures ANOVA. A main effect of time remained significant after this correction, such that across groups, HR-QOL increased over time  $F(2,272)=6.49, p=0.003, \eta^2=0.05$  (small effect). The group X time interaction was not significant,  $F(2,272)=0.03, p=0.952$ .

**Pain catastrophizing.**—There was no significant effect of group on pain catastrophizing,  $F(1, 136) <0.001, p=0.994$ . The assumption of sphericity was violated,  $\chi^2(2)=14.479, p <0.001$ . Epsilon ( $\epsilon$ ) was 0.908, as calculated according to Greenhouse & Geisser (1959), and was used to correct the repeated-measures ANOVA. Catastrophizing decreased significantly over time,  $F(2,272)=5.47, p=0.006, \eta^2=0.04$  (small effect). The group X time interaction was not significant,  $F(2,272)=0.02, p=0.979$ .

**Pain self-efficacy.**—Effects of group,  $F(1, 136)=0.04, p=0.850$ , time ( $F(2,272)=1.38, p=0.252$ ), and group X time ( $F(2,272)=2.30, p=0.102$ ) were not significant. However, sensitivity analyses to investigate whether the target of WED (IBS vs. stressful life experience) affected change in self-efficacy revealed a significant WED target X time interaction. Individuals who were assigned to write about their IBS evidenced greater improvements in pain self-efficacy than did participants assigned to write about a stressful life experience,  $F(2,186)=3.47, p=0.033, \eta^2=0.04$  (a small effect; see Table 4). No significant effect of WED target was found for any other outcome.<sup>2</sup>

## Discussion

Results indicate that WED is feasible in adults with IBS, as 96% of randomized participants completed all four writing sessions. Participants assigned to the control condition experienced a significant increase in the number of GI-related medical appointments from baseline to 3-month follow-up, whereas participants in the combined WED group did not. Although the size of this effect was small, it may nevertheless have important implications, in that IBS is associated with high rates of healthcare utilization [5, 6, 38] and is estimated to

<sup>2</sup>Of the 67 participants assigned to write about the most stressful life event of the past five years, 8 (12%) wrote about their IBS. When sensitivity analyses were conducted based on actual, rather than assigned, writing topic, results remained the same for all outcomes. A significant interaction of time X actual writing topic on pain self-efficacy was observed among the WED participants,  $F(2,186)=3.88, p=0.022, \eta^2=0.04$ .

account for roughly one fifth of all visits to gastroenterologists [39]. Moreover, the present sample reported more severe IBS symptoms on average at baseline compared to prior samples of individuals described as having moderate-to-severe [34] and severe [35] IBS symptoms. Given that participants in the current study were highly symptomatic, even a modest reduction in healthcare utilization could represent meaningful change in the behavioral and economic burden of IBS.

WED did not produce significant effects on GI symptom severity, HR-QOL, or pain catastrophizing compared to control writing. However, statistically significant small-to-medium sized effects were observed over time for each of these outcomes, indicating improvement across groups. These results are similar to those of a dissertation study in which 53 adults with IBS were pseudo-randomly assigned to write about their worst trauma or neutral daily activities [40]. GI symptoms and HR-QOL significantly improved across groups over the course of the study, but no group X time interaction was detected. Thus, GI symptom and QOL improvements may be common in research studies of IBS regardless of the specific intervention under investigation. Indeed, non-specific (“placebo”) effects are high in IBS [41]; a meta-analysis of 73 RCTs of investigational pharmacological treatments indicated a pooled placebo response rate of 37.5% [42]. In the current study, non-specific effects were observed despite our efforts to minimize them by refraining from referring to the study as a clinical trial or suggesting that participants could benefit from writing. This is consistent with results of an RCT demonstrating that even “open-label” placebos are effective for reducing GI symptoms in IBS [43]. In that trial, 80 adult participants were randomized to either open-label placebo (presented as “placebo pills made of an inert substance, like sugar pills, that have been shown in clinical studies to produce significant improvement in IBS symptoms through mind-body self-healing processes”; p. 1) or a no-treatment control condition with the same quality of interaction with providers. Open-label placebo produced significantly greater improvement on all three measures of GI symptoms assessed. These results challenge conventional wisdom that placebo effects require “intentional ignorance” and suggest that a range of behaviors associated with confronting one’s illness (e.g., taking a sugar pill, factual writing about daily activities for a research study of IBS) may constitute a ritual with potential for placebo effects, even when the activities are not presented as active treatments.

In light of our efforts to minimize treatment expectancy, observed effects likely underestimate the potential utility of WED taking place within an intentionally therapeutic context. The value of expectancy in predicting treatment effects has been demonstrated in a range of clinical populations and outcomes, including pain, functioning, and QOL [44]. A recent study experimentally manipulated treatment expectancy related to WED by randomly assigning undergraduate students to receive one of two rationales for their writing [45]. Participants who were told that their writing would improve their long-term mood reported significantly greater decreases in negative affect 46 days later compared to participants who were told that their current mood would affect the content of their writing. Additional research and transdisciplinary conversations are needed to better inform the work of medical and mental health providers wishing to harness the therapeutic potential of expectation in a manner consistent with informed consent [43, 46].



In the current study, participants assigned to write about IBS experienced greater improvements in pain self-efficacy compared to participants assigned to write about a stressful life experience. We postulate that writing about one's deepest thoughts and feelings about IBS may have prompted participants to reflect on how they cope with their symptoms (including pain), which may have increased their self-efficacy for coping with these symptoms. Although WED about a stressful life experience may have prompted a parallel reflection process and improved self-efficacy for coping with other life stressors, self-efficacy for coping with stressors unrelated to IBS was not assessed. In a recent RCT of WED in women with breast cancer, writing about cancer led to greater improvements in HR-QOL compared to writing about a self-selected recent trauma [24]. Together, these findings suggest that WED about one's illness may be more beneficial to illness-related outcomes than writing about a stressful life event among individuals with medical conditions.

Several limitations of the study should be noted. First, the sample was primarily comprised of White, female, and highly educated participants with severe symptoms of IBS. Indeed, the baseline IBS-QOL scores of our participants were almost half a SD poorer than those of participants characterized as having "severe" IBS symptoms in a previous study [35], and one eighth of participants in the current study identified IBS as their most stressful or traumatic experience of the past 5 years. The extent to which these results generalize to other samples is unknown. Second, because the study sample was primarily recruited online, medical records that may have allowed better characterization of the sample were not available. Furthermore, how participants' engagement in other concurrent treatments for IBS may have affected the results is unknown. The decision to include self-selected participants recruited via the internet was informed by research suggesting that such individuals may have poorer QOL than those recruited from clinics (Jones, Bratten, & Keefer, 2007) and thus may be in even greater need of intervention. Although it is possible that the online recruitment and lack of verification by a medical doctor may have incentivized participants to exaggerate their symptoms to ensure study entry, we believe this is highly unlikely. Participants were not paid for study participation but rather entered into a lottery for a chance to win \$100, and participants were aware that this chance was low (3%).

A third limitation is that, because of the unfunded nature of the study and limited personnel, it was not feasible to blind the experimenter to condition assignment or to the hypotheses of the study. As such, the role of experimenter expectancies and biases cannot be ruled out. Finally, multiple analyses were conducted, which increases the possibility of experiment-wise error.

Considering that WED has virtually no costs and can be initiated by individuals without the need for a professional, even the non-specific effects on GI symptoms and QOL observed in the current study are worth noting. However, in cases where cost, time, and accessibility are not prohibitive, psychotherapeutic interventions administered by a trained therapist are almost certainly more effective than WED at improving mental and physical health in IBS. A recent meta-analysis of RCTs of IBS found that psychotherapy had a medium-sized effect on GI symptom severity ( $\bar{d}=0.69$ ) compared to a mixed group of control conditions [14]. Although no significant differences in efficacy were detected between psychotherapeutic modalities with regard to GI symptoms [14], cognitive behavioral therapies were associated

with the greatest improvements in daily functioning [15]. This may be attributable to the higher likelihood of these therapies to encourage confrontation of uncomfortable situations via systematic exposure. Interoceptive exposure to visceral sensations aims to decrease behavioral avoidance in IBS, and RCTs have demonstrated the incremental benefit of interoceptive exposure in cognitive behavioral interventions for IBS [47, 48].

Preliminary evidence suggests that WED may serve a similar function to exposure therapy via prolonged exposure and approach toward trauma-related thoughts and feelings through writing [49, 50]. Consistent with an exposure model, an RCT found that WED about the same traumatic experience across writing sessions was more effective than WED about different traumatic experiences for improving psychological and physical symptoms in adults with posttraumatic stress symptoms [51]. Evidence that WED facilitates autonomic habituation and improved regulation of the stress responses comes from an RCT of WED in women with breast cancer, which found that within-session heart rate habituation mediated effects of WED on physical symptoms [49]. Similarly, an RCT that randomly assigned adults with posttraumatic stress symptoms to WED, insight and cognitive assimilation, or control writing found that WED led to greater initial psychophysiological reactivity, greater subsequent psychophysiological habituation, and greater health improvements compared to the other two conditions [50]. However, results of an RCT with adults who met criteria for PTSD found no effect of WED on physiological reactivity or mental health compared to control writing [52]. Thus, for individuals with more severe psychological or physical symptoms, 3–4 sessions of WED may be insufficient to produce significant autonomic habituation and corresponding improvements in mental and physical health. These findings are consistent with those of the current study, as WED did not significantly improve QOL or GI symptoms compared to control writing.

In conclusion, writing about one's deepest thoughts and feelings about one's illness may help reduce healthcare utilization and improve pain self-efficacy in adults with IBS. Significant improvements in other mental or physical health outcomes were not observed with WED compared to control writing. It is possible that a greater number of writing sessions or guidance from a trained mental health professional are necessary to produce significant improvements with WED in individuals with severe IBS. Additional investigation of the psychophysiological mediators of exposure-based interventions will inform the development of more effective, targeted, and individualized interventions for this population.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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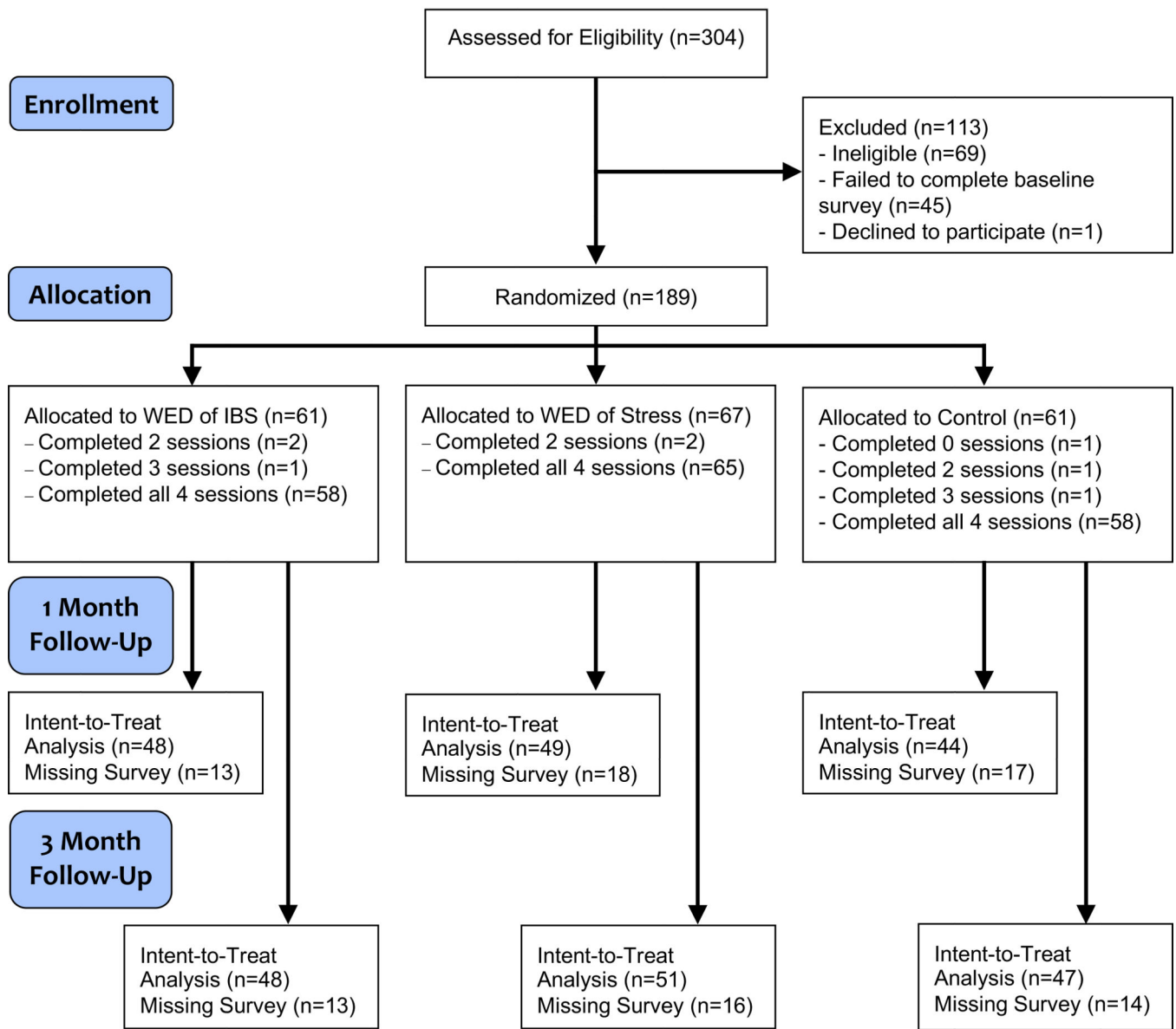
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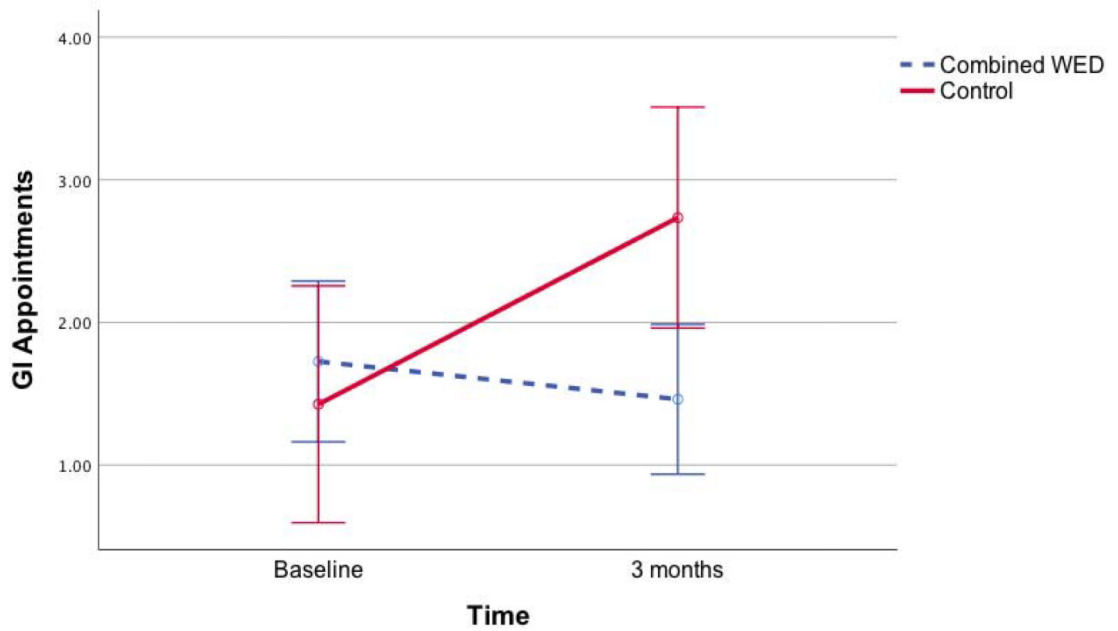
### Highlights

- We tested the effects of expressive writing on adults with irritable bowel syndrome
- Randomized conditions included expressive or control (non-emotional) writing
- Expressive writing about IBS may increase pain self-efficacy and reduce healthcare utilization

### CONSORT Flow Diagram



**Figure 1:**  
Consort flow diagram.



**Figure 2:** Mean number of appointments for GI symptoms at baseline and 3-month follow-up within the combined WED and control writing groups. Error bars denote 95% confidence intervals of the mean.



**Table 1**

## Demographic Characteristics of the Sample

	N(%)
<i>Sex</i>	
Male	13 (7.47%)
Female	161 (92.53%)
<i>Race</i>	
White	152 (89.95%)
African American	13 (7.69%)
Asian	4 (2.37%)
East Indian	2 (1.18%)
Native American	2 (1.18%)
Other race	1 (0.59%)
<i>Ethnicity</i>	
Latino	5 (2.96%)
<i>Education completed</i>	
Doctorate	10 (5.95%)
Master's degree	33 (19.64%)
4-year college	61 (36.31%)
2-year college	39 (23.21%)
High school	24 (14.29%)
Less than high school	1 (0.60%)
<i>Employment Status</i>	
Full time	70 (41.42%)
Student	27 (15.98%)
Disabled	23 (13.61%)
Part time	23 (13.61%)
Retired	16 (9.47%)
Unemployed	17 (9.47%)
Homemaker	11 (6.51%)
Self-employed	3 (1.78%)
<i>Age</i>	
Mean Age (SD)	42.40 (13.96)

Note. Demographic data were collected for 169 out of 189 participants.

**Table 2**

Descriptive Statistics, Reliability Coefficients and Observed Pearson Correlations Among All Variables at Baseline

	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. GI Symptom Severity	279.27	87.96	(0.61)				
2. Healthcare Utilization	1.86	3.35	0.03	(n/a)			
3. Health-Related QOL	42.17	20.28	0.16 *	0.57 **	(0.94)		
4. Pain Catastrophizing	2.18	1.39	0.10	0.52 **	0.71 **	(0.88)	
5. Pain Self-Efficacy	2.62	1.03	-0.09	0.38 **	0.41 **	0.43 **	(0.77)

*Note.* Reliability coefficients (Cronbach's alpha) are listed in the diagonal.

\*\* Correlation is significant at the 0.01 level (two-tailed).

\* Correlation is significant at the 0.05 level (two-tailed).

**Table 3**  
Means and Standard Deviations for the Combined WED and Control Groups on All Variables at All Time Points

	Baseline						1 month						3 months					
	WED (n=128)			Control (n=61)			WED (n=97)			Control (n=44)			WED (n=99)			Control (n=47)		
	M	SD		M	SD		M	SD		M	SD		M	SD		M	SD	
GI Symptom Severity	278.67	85.01		280.51	94.56		240.15	107.17		254.54	112.03		245.70	106.31		254.57	119.31	
Healthcare Utilization	1.73	2.98		1.43	4.04		--	--		--	--		1.46	2.09		2.73	3.67	
Health-Related QOL	42.50	20.61		41.49	19.71		40.97	22.65		39.79	22.10		38.78	22.79		36.99	23.06	
Pain Catastrophizing	2.18	1.33		2.19	1.53		1.93	1.36		1.91	1.33		1.86	1.29		1.76	1.52	
Pain Self-Efficacy*	2.63	1.01		2.61	1.09		2.63	1.05		2.59	0.98		2.78	1.07		2.74	1.10	

\* Sensitivity analyses for pain self-efficacy revealed a significant difference in change over time between the two WED groups (see Table 4).

**Table 4**  
Means and Standard Deviations for Stress WED vs. IBS WED Groups on Pain Self-Efficacy

Baseline		1 month		3 months	
Stress (n=67)	IBS (n=61)	Stress (n=49)	IBS (n=48)	Stress (n=51)	IBS (n=48)
	M   SD	M   SD	M   SD	M   SD	M   SD
2.59	0.96   2.66	2.44   1.03	2.83   1.05	2.68   0.97	2.90   1.16