Published in final edited form as:

Psychol Health. 2011 April ; 26(4): 433–447. doi:10.1080/08870440903477212.

A Randomised Controlled Trial of Written Self-Disclosure for Functional Recurrent Abdominal Pain in Youth

Jan L. Wallander,
University of California, Merced

Avi Madan-Swain,
University of Alabama at Birmingham

Josh Klapow, and
University of Alabama at Birmingham

Shehzad Saeed
University of Alabama at Birmingham

Abstract

Written self-disclosure (WSD) has rarely been evaluated as an intervention for paediatric diseases. To test the efficacy of WSD for youth ages 11–18 with a diagnosis of functional recurrent abdominal pain (RAP), 63 were randomly assigned to receive standard medical care (SMC) alone or WSD in addition to SMC. WSD was administered in three 20-minute sessions, one in the clinic and two by phone in the home. Measures of self-reported pain frequency, somatisation severity, and quality of life were completed at baseline and three-month and six-month follow-up points. Blind review of electronic medical records provided data on clinic visit and phone consultation utilization for the six months prior to and following baseline. Practice of WSD in addition to SMC was associated with significantly fewer activity-limiting GI pain experiences ($d = .61$) and reduced health care utilization ($d = .59$) six-months later compared to SMC alone. There were no significant effects for somatisation severity or quality of life at six months. WSD may be a useful treatment adjunct for reducing pain frequency and resulting health care utilization in a portion of youth with functional RAP.

Keywords

recurrent abdominal pain; adolescents; randomized controlled trial; written self-disclosure; symptom reporting; health care utilization

---

Recurrent abdominal pain (RAP) is a common gastrointestinal (GI) complaint in childhood, with a prevalence between 10–15% in school-aged children (Apley, 1975; Banez & Cunningham, 2003). Typically, youth diagnosed with RAP experience functional impairment, such as reduced school attendance and academic performance (Banez & Cunningham, 2003). These youth are frequent users of medical services (Finney, Riley, & Cataldo, 1991) and often present with multiple somatic complaints such as nausea, vomiting, headache, and limb pains (Walker, Garber, & Greene, 1991). Yet, despite both the time and expense related to repeated office visits, laboratory testing, and referral to subspecialty care, there is no clear evidence of treatment benefit (Frazer & Rappaport, 1999). Although many

youth with functional RAP will become symptom free without treatment, 50% continue to report pain several years later (Janicke & Finney, 1999).

While RAP is not a diagnostic entity, it is commonly divided into three groups according to pain source (Barr, 1983): (1) A distinct organic cause is identified (e.g., Crohn's disease, duodenal ulcer). (2) A specific pain syndrome with a distinct pattern of symptoms of a recognized GI disorder is identified (e.g., irritable bowel syndrome [IBS]), but for which there is no objective diagnostic test. (3) There is a nonspecific pain syndrome with no recognized pattern of symptoms and the pain does not relate temporally to eating, constipation, or exercise. The second and third groups are referred to as functional RAP and were targeted in this study.

Given the negative consequences and the high cost of functional RAP, it is important to identify cost effective interventions that may reduce pain and improve quality of life in youth with these disorders (Walker, Garber, Van Slyke, & Greene, 1995). In addition to the pharmacological approach, various behavioural interventions have been used, such as behaviour modification, diet, and cognitive behavioural therapy (cf. Janicke & Finney, 1999). However, these procedures can be labour intensive and challenging to implement in routine health care, especially in the current economic climate of health care delivery. Written self-disclosure (WSD) is one intervention that is brief and low-cost, and appears well-suited to RAP because it targets psychosocial stress processes that are implicated in the expression of this disease (Banez & Cunningham, 2003). Pennebaker and colleagues developed WSD as a laboratory-based paradigm and have tested it in numerous experiments (e.g., Harber & Pennebaker, 1992; Pennebaker, 1991; Spera, Buhrfeind, & Pennebaker, 1994). A person is asked to write about his/her "deepest thoughts and feelings about the most distressing experience in his/her entire life" for 20–30 minutes on three or four occasions within three days to three weeks.

A large number of studies evaluating the effects of WSD with a wide range of populations have since been completed. A recent meta-analysis examined 146 such studies, including about two dozen with participants with pre-existing medical conditions, and reported based on random-effects analyses that WSD has a positive and significant effect, with an average unweighted *r*-effect size of .075 (Frattaroli, 2006). There were significant effects on psychological health (*r*-effect size = .056), physiological functioning (.060), and reported health (.072). These effects from WSD are larger, for example, than the effect of taking a daily aspirin to prevent death from a second heart attack, which has an *r*-effect size of .034 (Rosenthal, 1994). The findings from Frattaroli's meta-analysis specifically regarding effects on participants with *pre-existing medical conditions* are more mixed; while there was no overall significant effect (.090), there was for the category reported health (e.g., measures of specific disease outcome, clinic visits, general physical symptoms) (.188). In as much many studies do report positive effects (e.g., Beckwith, Greenberg, & Gevirtz, 2005; Junghaenel, Schwartz, & Broderick, 2008; Kraft, Lumley, D'Souza, & Dooley, 2008; Petrie, Fontanilla, Thomas, Booth, & Pennebaker, 2004), more research is needed to determine *for which* medical conditions WSD may be beneficial (cf. Pennebaker, 2004).

In this vein, one question that has rarely been addressed is whether the health of paediatric patients may be improved through WSD. We are aware of only two studies that have evaluated WSD with patients younger than age 18. One targeted 39 patients ages 15 and up with cystic fibrosis (Taylor, Wallander, Anderson, Beasley, & Brown, 2003), where randomized design was integrated into the ongoing health care. This study demonstrated a marked reduction in inpatient hospitalization days for the CF patients over the three months following completion of WSD compared to standard medical care, but no improvements on any other measured health outcomes. A study with 50 adolescents with asthma administered

the WSD completely at home (Warner, Lumeley, Casey, Pierantoni, Salazar, Zoratti, Enberg, & Simon, 2006). At the relatively short two-month follow-up, WSD was found generally to improve positive affect and internalizing problems. However, asthma symptoms and functional disability were improved only among those with baseline elevations of these difficulties. Effect on health care utilization was not evaluated.

The present study was therefore conducted to expand research on WSD in paediatric health care. Using a randomized controlled design and follow-up period extended to six months, we test herein the efficacy of WSD in improving health status in the population of youth ages 11–18 with a diagnosis of functional RAP, when implemented as part of their health care. To make WSD a feasible health care intervention, only the initial writing session was introduced in person in conjunction with a gastro-intestinal (GI) clinic visit. The subsequent two sessions were administered by trained staff over the phone with the adolescent completing the writing in private at home. This modification makes it feasible to participate in the WSD intervention without having to return to the GI clinic on two additional occasions within a short time frame and reduces health care cost. In addition, larger effects have been associated with completing the disclosure at home than elsewhere (Frattaroli, 2006). Also with respect to evaluating WSD as a health care intervention, we choose as the control condition standard medical care (SMC) rather than writing about a neutral topic, as has been done in earlier WSD research. In our judgment it would be inappropriate to expose patients during ongoing health care to a condition (writing about a neutral topic) that has been demonstrated in the vast majority of research not to improve health. Rather we address the clinically important question of whether WSD enhances health outcome beyond that expected from SMC (cf. Kazdin, 2000).

The following a priori directional hypothesis was therefore tested in the current study: Compared to SMC alone, WSD in addition to SMC will be associated with improvements at 3-and 6-months follow-up in (a) GI pain frequency, (b) general somatisation, (c) health-related quality of life, and (d) GI clinic health care utilization compared to SMC alone. We also explore whether there is differential effect of WSD on the outcome variables dependent on initial level of these variables, as suggested by Warner et al. (2006).

Methods

All procedures were approved by a university IRB

Sample

Participants were consecutively recruited from among those ages 11–18 attending a GI specialty clinic at a children's hospital in southern United States over a period of 16 months who met Apley's (1975) criteria for functional RAP as determined by a paediatric GI specialist: (a) abdominal pain that waxes and wanes, (b) occurring on at least three occasions, (c) over a period of at least three months, (d) severe enough to interrupt activities and (e) occurring without an identifiable organic cause. During this period, 99 youth met the criteria for functional RAP. An assistant approached the parents of these youth during a clinic visit to further determine eligibility. Additional inclusion criteria were failed by 20 (three youths whose parents could not communicate in English, 12 who were deemed not to be able to complete the protocol due to special education placement or facility with English, and five who were diagnosed with an additional chronic illnesses), leaving 79 eligible youth. Of those eligible 16 refused participation, resulting in that 63 (80%) were enrolled in the study and completed the baseline assessment. The three-month follow-up assessment was completed by 60 (95% of enrolled) and 56 (89%) completed the six-month follow-up assessments, as shown in the CONORT Flowchart in Figure 1. The demographic characteristics of the sample are in Table 1

Procedures

Baseline assessment and randomization—A parent provided informed consent and the youth provided formal assent to participate. Each enrolled youth and a parent separately completed the measures described below at baseline. The reading ability of the youth was checked informally prior to starting, and if questionable, all youth measures were read by an assistant. A computer generated randomisation list was created by the senior investigator for use in allocating participants to the two conditions. Strictly applied by the research associate following enrolment and completion of the baseline assessment instruments, this list led to the assignment of $n = 27$ participants to the control condition of SMC and of $n = 36$ to the experimental condition of WSD in addition to SMC (WSD+SMC).

Standard medical care—Participants in both conditions received SMC appropriate to their health status from a paediatric GI specialist. Varying individual treatment plans were implemented to meet the needs of the particular child and family, thereby allowing for a “real world” accounting of SMC. SMC for functional RAP generally consists of follow-up office visits and/or phone consultations, education, support, dietary instructions, as well as possible oral medication and supplements to increase dietary bulk, decrease acid, or increase motility, as deemed medically appropriate by the treating GI specialist (Weydert, Ball, & Davis, 2003).

Written self-disclosure—During a regular appointment at the GI clinic, each participant in the WSD+SMC condition was taken to a private room within the clinic by a trained assistant who was not part of the clinic staff. The standard WSD instructions were both read by the research associate and provided in written form to the participant to introduce the writing session (e.g., see Schwartz & Drotar, 2004; Warner et al., 2006 for verbatim text). When 20 minutes were up, the research associate returned and asked the youth to put the writing sample in an envelope, seal it, and deposit it in a secured box.

The youth was then given detailed instructions for completion of the remaining two writing sessions at home. He or she identified two specific 20-minute periods during the following five days for writing alone in a quiet room at home. Paper designated for writing was given to the youth to take home as well as return-addressed and stamped envelopes for returning the writing samples. The participant was phoned by the research associate at the time of each scheduled home session, when the same WSD instructions as used in the initial session were read verbatim. No other instructions were provided. The research associate kept calling the youth in the case of a missed phone appointment or when writing samples were not returned within an appropriate time frame. Upon receipt the research associate only checked that a writing sample had been provided, but did not read its content. Rather, writing samples were only reviewed by one of the investigators who is a licensed psychologist, and then only for risk management, but no follow-up was indicated.

Follow-up assessments—Three- as well as six-months after the baseline, all measures described below, except the demographic checklist, were mailed to all youths and parents by the research associate. Written instructions stressed that youth and their parents were to complete their respective measurement packet independently and return each separately in prepared return-addressed and –stamped envelopes by a date five days after projected receipt. The research associate then phoned participants after the measures should have been received to address any questions and encourage timely return of completed measures. Returned measures were checked for completion. The youths were provided a check for \$30 for completing each assessment, for a possible total of \$90.

Measures

Demographic information was obtained from the parent upon enrolment using a standard checklist requesting information about the youth's age, sex, race/ethnicity, and grade in school; parent's age, relationship to youth, and educational attainment; and household income and size.

GI pain frequency in the past two weeks was assessed with the Abdominal Pain Frequency Rating (Walker, Garber, & Greene, 1993). The youth rate the frequency of "stomach pain that was bad enough to make it not possible for you to do your usual activities, such as going to school or enjoying activities in your free time" using a six-point scale (0 = not at all, 1 = once, 2 = once a week, 3 = about 2 or 3 times a week, 4 = about every other day, 5 = every day).

Somatisation severity in the past two weeks was assessed by administering the Children's Somatisation Inventory (Walker & Green, 1991) to the youth. It includes 36 symptoms from the criteria for Somatisation Disorder and the Somatisation factor of the Hopkins Symptom Checklist. Ratings are obtained on the severity with which the youth have experienced each symptom (e.g., headaches, pains in the heart, muscle aches) in the past two weeks using a five-point scale (0 = "not at all," 4 = "a whole lot"). This inventory has been well validated with children and adolescents with RAP (e.g., Walker & Green, 1991; Robins, Smith, Glutting, & Bishop, 2005). Test-retest (3 mos.) = .66 and alpha = .90 for the full scale for youth with RAP (Walker & Green, 1991). A total score was calculated in the standard fashion to measure severity of general somatisation symptoms. Cronbach's α for this scale = .82 at baseline for the current sample.

Quality of life was assessed with the Paediatric Quality of Life: PedsQL (Varni, Burwinkle, Seid, & Skarr, 2003), which is a 23-item well-validated scale with excellent internal consistency. Ratings are obtained for how much of a problem various physical activities, feelings, social situations, and school activities have been in the past month using a five-point scales (0 = "never a problem," 4 = "almost always a problem"). Scores can be calculated for a range of QOL domains. To reduce the number of dependent statistical tests while still distinguishing between major domains of QOL, we restricted analyses to (a) physical (8 items) and (b) psychosocial (15 items) QOL in this study. Cronbach's α for the physical and psychosocial QOL scales = .75 and .83, respectively, at baseline for the current sample.

GI clinic service use was measured by a review of the electronic record of each youth at the children's hospital housing the GI clinic. The review covered the period starting six months prior to and ending six month past the baseline date. Counts were made separately for the pre-and post-baseline periods for (a) GI clinic outpatient visits and (b) consultative phone contacts initiated by the youth or a parent (i.e., administrative phone calls, e.g. to reschedule an appointment, were not included). Two assistants who were blind to the assigned condition or any other characteristics of the participants had to agree on each service contact to be counted in either category. The counts for both types of service contacts were combined into a total GI clinic service use count. This was done to address the issue that a portion of patients resided a far distance from the GI clinic and could not readily return for visits. For those patients phone consultations were used to provide some follow-up health services. Because inpatient hospital days occurred for only three participants during the 12-month observation period and resulted in minimal variance, they were not included in the analysis.

Data Analytic Approach

A priori power analysis, using instrument properties reported in the literature, indicated that an analysis sample of > 50 would enable us to detect medium effects sizes ($d = .50$) with a power of at least 80%. The smallest analysis sample, $n = 56$ occurring for the six-month follow-up analysis, exceeded this threshold. Group equivalence was first determined by comparing WSD+SMC and SMC groups on all baseline measures using t-tests or Chi-square tests. Analyses of covariance (ANCOVA) were planned to test the primary hypothesis regarding the effects of WSD on specified health outcomes, in which the baseline value was covaried. A one-tailed test of significance was used for this directional hypothesis. However, the presence of a baseline-by-group interaction would have precluded using an ANCOVA approach (Aiken & West, 1991). We therefore first tested whether the baseline level of each outcome variable moderated group effects on that outcome. The baseline value of the outcome measure, group, and baseline value-by-group interaction were entered into a regression equation. Following recommendation (Sabin, Lepri, & Phillips, 2000), hypothesis tests were repeated according to intention-to-treat basis, but results were identical and are therefore not reported here. Effect sizes are reported as Cohen's d .

Results

Group Equivalence

The WSD+SMC group did not differ significantly from the SMC group on demographic variables (all $ps > .190$) or on any of the outcome measures at baseline (all $ps > .138$; see Table 2 for M s and SD s), including number of GI clinic contacts in the six months prior to enrolment ($p = .320$).

Intervention Completion

All WSD group members completed all three writing sessions. All writing samples were examined by one investigator and determined to be about personal experiences, as instructed.

Examining the Use of ANCOVAs

In preparation to employing ANCOVAs to test the primary hypothesis, we found that none of the health outcome measures at either assessment point had group-by-baseline interactions. Thus ANCOVAs, using baseline level of the outcome measure as a covariate, could be applied to test for differential outcomes at either follow-up assessment (Aiken & West, 1991).

GI Pain and Somatisation

Means for all outcome measures at each assessment are presented in Table 2. While there were no differences at three months, youth-rated GI pain frequency was significantly better for the WSD+SMC group at the six-month follow-up compared to the SMC group, $F(1,51) = 6.50$, $p = 0.014$, Cohen's $d = .61$. Based on the mean ratings, reflecting ordered categories of number of days, the WSD+SMC group reported at the six-month follow-up about 50% fewer days with activity-limiting GI pain in the past two weeks than did the SMC group. There was no difference between conditions in general somatisation severity at either follow-up assessment.

QOL

Physical QOL did not differ significantly between the groups at either the three- or six-month follow-up, although there was a trend in favour of the WSD+SMC group at the six-month follow-up compared to the SMC group, $F(1,51) = 3.71$, $p = 0.060$, Cohen's $d = .46$.

Applying the standard for a clinically significant gain in QOL to be an increase in an individual's scale score of at least 0.5 SD for the total sample at baseline, 39% in the WSD+SMC group versus 15% in the SMC group made clinically significant gains in physical QOL by the six-month follow-up.

However, psychosocial QOL was significantly better for the SMC group compared to the WSD+SMC group at three months, $F(1,51) = 6.26, p = 0.016$. This difference had disappeared at the six-month follow-up at which time there was no difference. The prevalence of clinical improvement in psychosocial QOL was highly similar between the two groups (16% for WSD vs. 15% WSD+SMC, Cohen's $d = .21$) by the six-month follow-up.

GI Clinic Service Use

GI clinic service contacts by the WSD+SMC group was significantly lower compared to the SMC group in the six-month period following the baseline, $F(1,51) = 6.19, p = 0.016$, Cohen's $d = .59$. As noted previously, there was no difference between the groups in GI clinical service use in the six-months prior to enrolment in this study. As shown in Figure 2, the mean number of clinic contacts in the SMC group was more than twice that in the WSD+SMC group in the six-month period following enrolment. Only 11% in the SMC versus 43% in the WSD+SMC group had reduced their service contacts to zero in this six-month period.

Exploration of Interaction between Baseline Level and Outcomes

Given Warner et al.'s (2006) finding positive effects among those at higher elevations of asthma symptoms at baseline, we explore here whether there is an interaction between baseline level and health outcomes in youth with functional RAP. The preliminary tests reported above whether ANCOVAs could be used to test the primary hypothesis also directly address this issue, which is concerned with a differential effect of WSD on outcome variables dependent on initial level of these variables. As reported above, interactions between the baseline levels of the outcomes and group membership did not predict any of the outcome measures collected at three- and six-month follow-up.

Discussion

This study indicates that a three-session dose of written self-disclosure (WSD) administered in the clinic and at home, in addition to standard medical care (SMC), is associated with improvements in some health-related outcomes in youth with functional RAP over the ensuing six months. More specifically, compared to youth who received only SMC, those who in addition were instructed to and practiced three sessions of WSD reported fewer activity-limiting GI pain experiences six-months later. At that point, they reported on average about 50% fewer days in the past two weeks with activity-limiting GI pain than did those who did not practice WSD. Those who practiced WSD also reported a marginally better physical QOL six months later than did the youth who did not practice WSD.

Moreover, those who practiced WSD in addition to receiving SMC experienced a significantly reduced health care utilization beyond those who received only SMC. GI clinic visits and phone consultations were more than twice as common over the subsequent six months for youth receiving only SMC compared to those who in addition practiced WSD. Over 40% of all patients receiving WSD had apparently no need for additional GI clinical health care following WSD; this outcome occurred in only 11% of those receiving solely SMC. Because of the costs associated with a GI clinic visit and medical staff time for phone consultations, this effect from WSD is financially noteworthy, especially with the challenges

in adequately funding health care currently. At the same time, it can be argued that a reduction in clinic contacts for patients is not necessarily a positive outcome. Certainly, it is not desirable that patients avoid the use of clinic services when indicated. However, the reduction in clinic contacts in this sample coincided with a reduction in pain frequency ratings, suggesting that utilization reflected symptom experience. This study reiterates an earlier finding of WSD significantly reducing paediatric health care utilization in patients with cystic fibrosis (Taylor et al. 2003).

Inspection of mean values (see Table 2 and Fig. 2) suggests that the differences between the groups resulted primarily from improvements among those who engaged in WSD, rather than exacerbation of symptoms among those who did not. Unlike reported for youth with asthma (Warner et al., 2006), where some of the improvements only occurred in those with elevated baseline symptoms, youth with RAP improved across the range of initial health status. However, not all health outcomes improved for participants in WSD. There appeared to be no additional benefit of adding WSD to SMC on reporting of somatisation severity and psychosocial QOL.

With positive effects associated with WSD noted now in three studies with paediatric populations (Taylor et al., 2003; Warner et al., 2006), an intriguing question is how WSD might improve health and health care utilization? Pennebaker himself concluded after over 25 years of research into mechanisms of effects from WSD that there is no single mechanism (Pennebaker & Chung, 2007). Any of the observations of potential mechanisms can be dissected at multiple levels. Moreover, an event that takes weeks or even months to unfold, as is apparently the case with WSD where effects are typically observed only three to six months later, will necessarily have multiple determinants that can inhibit or facilitate the process over time. Rather than, WSD may be seen to set off a cascade of possibly related effects. These may range across individual and social inhibition processes; expression of emotions; habituation to emotional stimuli; expressing emotions in words; constructing a story about emotional experiences; changes in insight, causal attributions for, and perspective on events; changes in social interactions; and making life course corrections (cf. Pennebaker & Chung, 2007; Sloan & Marx, 2004). Research continues vigorously attempting to identify key mechanisms (cf. special issue edited by Smyth & Pennebaker, 2008). However, essentially all such research has been conducted with adults, and it is unknown whether similar processes operate across development. Research into understanding mechanisms underlying any positive effects of WSD in children and adolescents is therefore warranted.

Despite this study enrolling the largest sample of paediatric patients thus far in evaluating WSD, our sample size still did not provide sufficient power to conduct subgroup analysis, such as by age. Although our sample spanned the age range of 11 to 18, it was constituted 70% by young adolescents through age 14. Prior research on healthy youth of predominantly younger ages than of focus here has reported mixed results (Horn, Possel, Hautzinger, & Traue, 2003; Reynolds, Brewin, & Saxton, 2000; Soliday, Garofalo, & Rogers, 2004; Springer & Pennebaker, 1995). However, WSD was administered in a different format (e.g., group administration) from the standard one in these studies, which could contribute to the lack of effects. The question of differential effects by age needs to be addressed in larger samples. In addition, the predominance of Caucasian participants in the current sample limits our ability to generalize findings to other racial or ethnic groups.

Whereas allocation was concealed, we were not able to implement the trial procedures where research staff was blinded to which condition youths were assigned, as only one research associate had to manage the procedures. This limitation is mitigated to some extent by the fact that the WSD intervention consists of standardized instructions read verbatim

from a script (see Schwartz & Drotar, 2004; Warner et al., 2006 for text) each time it is administered. Moreover, all assessments consisted of paper-and-pencil questionnaires, where the baseline assessment was administered prior to allocation to conditions and the follow-up assessments were administered by mail. However, the possibility of some subtle differentiation in the communication by the research associate with participants in the two conditions cannot be completely ruled out.

Our choice of a research design evaluating the addition of WSD to SMC was guided by the desire to provide information on the comparative clinical effectiveness of WSD with relevance to the “real world” of health care practiced in paediatric GI clinics. However, because we did not incorporate or a control condition for non-specific effects (e.g., attention, expectancies), other than passage of time, we cannot infer that the process of writing about emotionally upsetting experiences led to the observed improvements. Rather we are limited to concluding that some aspect of the additional time spent in some structured activity, special attention, positive expectancies, writing activity, and/or other factors inherent in the WSD condition, including of course the possibility that mechanisms solely attributable to WSD as defined, led to the additional improvement. Future research that includes a control condition of non-disclosure writing will provide a more rigorous control for several of these alternative explanations for the effects observed herein.

These limitations notwithstanding, the current study may have implications for paediatric health care for RAP. Relatively few eligible youth (and parents) refused participation and a very high portion completed the protocol fully, suggesting that WSD is well-received by this population, as has been found for adult participants (Frattaroli, 2006). The procedure was easily integrated in a specialty clinic, requiring few special arrangements, and could be completed partially through phone administration at relatively low cost. Moreover, implementation of WSD requires little training. It is likely that WSD can be implemented by non-psychologists, such as nurses and social workers, as long as risk management and clinical referral procedures are well established.

In turn, WSD may improve the symptoms and health care seeking behaviours of adolescents with functional RAP. We judge that about 40% of the disclosure writers, compared to 15% or less of those just receiving SMC, showed clinically meaningful improvement. While WSD may thus add benefits to traditional management of RAP for some youth, it is yet premature in our opinion to incorporate it in clinical paediatric GI care. In light of the limitations of the design implemented in this research, future research that includes a control condition of non-disclosure writing will provide a more rigorous control for several alternative explanations for the positive effects observed herein. Holding off on clinical implementation is further indicated by the findings that the majority of youth who engaged in disclosure writing did not manifest clinically meaningful improvement, and improvements were not uniformly observed across all measures of health. It is conceivable that comprehensive behavioural interventions will be beneficial to more youth with RAP than any single technique, but such may well be enhanced with the inclusion of WSD if the current findings are supported in further research. For example, cognitive-behavioural family intervention has been found effective in reducing GI pain in youth ages 6–16 (Robins, Smith, Glutting, & Bishop 2005). Thus, evaluating the effects of disclosure when integrated into more comprehensive interventions is another line of research that may be fruitful.

Acknowledgments

This research was supported in part by grant 1 R03 DK61481-01A1 from the NIDDK/NIH. Appreciation is expressed to Jamie Swinny for directing this study on a day-to-day basis as well as to the staff of the GI clinic at the Children's Hospital of Alabama and to the research participants and their families for their support.

References

- Aiken, LS.; West, SG. Multiple regression: Testing and Interpreting Interactions. Newbury Park, CA: Sage; 1991.
- Apley, J. The child with abdominal pains. Oxford, England: Basil Blackwell; 1975.
- Banez, GA.; Cunningham, C. Paediatric gastrointestinal disorders: Recurrent abdominal pain, inflammatory bowel disease, and rumination disorder/cyclic vomiting. In: Roberts, M., editor. Handbook of paediatric psychology. 3. New York: Guilford Press; 2003. p. 462-478.
- Barr RG. Abdominal pain in the female adolescent. *Pediatrics in Review*. 1983; 4:281–289.
- Beckwith KM, Greenberg MA, Gevirtz R. Autonomic effects of expressive writing in individuals with elevated blood pressure. *Journal of Health Psychology*. 2005; 10:197–209. [PubMed: 15723890]
- Finney JW, Riley AW, Cataldo MF. Psychology in primary health care: Effects of brief targeted therapy on children's medical care utilization. *Journal of Paediatric Psychology*. 1991; 16:447–461.
- Frazer, CH.; Rappaport, LA. Recurrent pains. In: Levine, MD.; Carey, WB.; Crocker, AC., editors. Developmental-Behavioural Pediatrics. 3. Philadelphia: W.B. Saunders; 1999. p. 93-116.
- Frattaroli J. Experimental disclosure and its moderators: A meta-analysis. *Psychological Bulletin*. 2006; 132:823–863. [PubMed: 17073523]
- Janicke DM, Finney JW. Empirically supported treatments in paediatric psychology: Recurrent abdominal pain. *Journal of Paediatric Psychology*. 1999; 24:115–127.
- Junghaenel DU, Schwartz JE, Broderick JE. Differential efficacy of written emotional disclosure for subgroups of fibromyalgia patients. *British Journal of Health Psychology*. 2008; 13:57–60. [PubMed: 18230233]
- Harber, KD.; Pennebaker, JW. Overcoming traumatic memories. In: Christianson, S-Å., editor. The handbook of emotion and memory: Research and theory. Hillsdale, NJ, England: Lawrence Erlbaum Associates; 1992. p. 359-387.
- Horn, AB.; Possel, P.; Hautzinger, M.; Traue, HC. Ambivalence over emotional expression as a mediator of expressive writing: Results of an adolescent sample. Paper presented at the Third International Meeting on The (Non) Expression of Emotions in Health and Disease Conference; Tilberg, The Netherlands. 2003.
- Kazdin AE. Developing a research agenda for child and adolescent psychotherapy. *Archives of General Psychiatry*. 2000; 57:829–835. [PubMed: 10986544]
- Kraft CA, Lumley MA, D'Souza PJ, Dooley JA. Emotional approach coping and self-efficacy moderate the effects of written emotional disclosure and relaxation training for people with migraine headaches. *British Journal of Health Psychology*. 2008; 13:67–71. [PubMed: 18230235]
- Pennebaker, J. Self-expressive writing: Implications for health, education, and welfare. In: Belanoff, F.; Elbow, P.; Fontaine, S., editors. Nothing Begins With N: New Investigations of Freewriting. Edwardsville, Illinois: Southern Illinois University Press; 1991. p. 157-170.
- Pennebaker JW. Theories, therapies, and taxpayers: On the complexities of the expressive writing paradigm. *Clinical Psychology: Science and Practice*. 2004; 11:138–142.
- Pennebaker, JW.; Chung, CK. Expressive writing, emotional upheavals, and health. In: Friedman, HS.; Silver, RC., editors. Foundations of health psychology. New York: Oxford University Press; 2007. p. 263-284.
- Petrie KJ, Fontanilla I, Thomas MG, Booth RJ, Pennebaker JW. Effect of written emotional expression on immune function in patients with human immunodeficiency virus infection: A randomized trial. *Psychosomatic Medicine*. 2004; 66:272–275. [PubMed: 15039514]
- Reynolds M, Brewin CR, Saxton M. Emotional disclosure in school children. *Journal of Child Psychology and Psychiatry and Allied Disciplines*. 2000; 41:151–159.
- Robins PM, Smith SM, Glutting JJ, Bishop CT. A randomized controlled trial of a cognitive-behavioural family intervention for paediatric recurrent abdominal pain. *Journal of Paediatric Psychology*. 2005; 30:397–408.
- Sabin AC, Lepri AC, Phillips AN. A practical guide to applying intention-to-treat principles to clinical trials in HIV infection. *HIV Clinical Trials*. 2000; 1:31–38. [PubMed: 11590497]
- Schwartz L, Drotar D. Effects of written emotional disclosure on caregivers of children and adolescents with chronic illness. *Journal of Paediatric Psychology*. 2004; 29:105–118.

- Sloan DM, Marx BP. Taking pen to hand: Evaluating theories underlying the written disclosure paradigm. *Clinical Psychology: Science and Practice*. 2004; 11:121–137.
- Smyth, JM.; Pennebaker, J., editors. *British Journal of Health Psychology*. Vol. 13. 2008. Exploring boundary conditions of expressive writing [Special issue].
- Soliday E, Garofalo JP, Rogers D. Expressive writing intervention for adolescents' somatic symptoms and mood. *Journal of Clinical Child and Adolescent Psychology*. 2004; 33(4):792–801. [PubMed: 15498746]
- Spera S, Buhrfeind E, Pennebaker J. Expressive writing and coping with job loss. *Academy of Management Journal*. 1994; 37:722–733.
- Springer, K.; Pennebaker, JW. Written disclosure as a means of stress reduction in children. 1995. Unpublished manuscript
- Taylor LA, Wallander JL, Anderson D, Beasley P, Brown RT. Improving health care utilization, improving chronic disease utilization, health status, and adjustment in adolescents and young adults with cystic fibrosis: A preliminary report. *Journal of Clinical Psychology in Medical Settings*. 2003; 10:9–16.
- Varni JW, Burwinkle TM, Seid M, Skarr D. The PedsQL™ 4.0 as a paediatric population health measure: Feasibility, reliability, and validity. *Ambulatory Pediatrics*. 2003; 3:329–341. [PubMed: 14616041]
- Walker, LS.; Greene, JW. The functional disability inventory: Measuring a neglected dimension of child health status; *Journal of Paediatric Psychology*. 1991. p. 39-58.<http://jpepsy.oxfordjournals.org/cgi/ijlink?linkType=ABST&journalCode=jpepsy&resid=16/1/39>
- Walker LS, Garber J, Greene JW. Somatisation symptoms in paediatric abdominal pain patients: Relation to chronicity of abdominal pain and parent somatisation. *Journal of Abnormal Child Psychology*. 1991; 19:379–394. [PubMed: 1757708]
- Walker LS, Garber J, Greene JW. Psychosocial correlates of recurrent childhood pain: A comparison of paediatric patients with recurrent abdominal pain, organic illness, and psychiatric disorders. *Journal of Abnormal Psychology*. 1993; 102:248–258. [PubMed: 8315137]
- Walker LS, Garber J, Van Slyke DA, Greene JW. Long-term health outcomes in patients with recurrent abdominal pain. *Journal of Paediatric Psychology*. 1995; 20:233–245.
- Warner LJ, Lumley MA, Casey RJ, Pierantoni W, Salazar R, Zoratti EM, Enberg R, Simon MR. Health effects of written emotional disclosure in adolescents with asthma: A randomized, controlled trial. *Journal of Paediatric Psychology*. 2006; 31:557–668.
- Weydert JA, Ball TM, Davis MF. Systematic reviews of treatments for recurrent abdominal pain. *Pediatrics*. 2003; 111:e1–11. [PubMed: 12509588]

Figure 1.
CONSORT Flowchart (WSD = Written Self-Disclosure; SMC = Standard Medical Care)

Figure 2.
GI clinic contacts (outpatient visits + phone consultations) in WSD+SMC and SMC groups for the periods 6 months pre- and post-Baseline

Table 1

Sample characteristics

	<i>M/Mdn (SD)</i>	Range	%
Child age <i>M</i>	13.62 (1.88)	11–18	
11–12			33
13–14			37
15–16			24
17–18			6
Child grade <i>Mdn</i>	7 th	5 th – 11 th	
Child sex = female			70
Child race			
Caucasian			84
African American			16
Native American			3
Parent age <i>M</i>	41.35 (6.25)	28–53	
Parent = mother			95
Parent education			
< H.S. graduate			8
H.S. graduate			21
Some post H.S. education			48
Bachelors degree			16
Graduate education			8
Household income			
<\$20,000			26
\$20,000 – 39,999			18
\$40,000 – 59,999			24
\$60,000 – 79,999			15
≥\$80,000			18
Two-parent family			68
Number of children in family			
1			20
2			45
≥3			36

Table 2

Group Means for Outcome Measures at Each Assessment

Measure		Baseline		3-months follow-up		6-months follow-up		Cohen's <i>d</i>
		WSD+SMC	SMC	WSD+SMC	SMC	WSD+SMC	SMC	
GI pain frequency	<i>M</i>	1.93	2.03	1.54	1.96	1.35 ^a	2.32	.61
	(<i>SD</i>)	(1.69)	(1.74)	(1.40)	(1.51)	(1.39)	(1.72)	
Somatization	<i>M</i>	13.67	16.10	16.85	17.64	14.14	15.42	.15
	(<i>SD</i>)	(7.38)	(10.88)	(10.83)	(10.07)	(9.06)	(8.59)	
Physical QOL	<i>M</i>	24.36	24.32	23.96	23.75	26.32 ^b	23.81	.46
	(<i>SD</i>)	(5.10)	(5.69)	(4.38)	(5.83)	(4.69)	(6.11)	
Psychosocial QOL	<i>M</i>	40.94	39.82	36.12	40.39 ^b	43.29	41.38	.21
	(<i>SD</i>)	(8.96)	(9.03)	(10.69)	(8.59)	(9.20)	(8.87)	
GI clinic contacts ^c	<i>M</i>	2.83	3.25			1.00 ^a	2.36	.59
	(<i>SD</i>)	(1.27)	(1.60)			(2.36)	(2.21)	

Note: WSD = written self-disclosure group, SMC = standard medical care; GI = gastrointestinal, QOL = quality of life

^a $p < .05$ and^b $p < .10$ for the ANCOVA group comparison at that time point, with better outcome for the indicated group.^c Electronic medical record review for the period 6 months prior (Baseline) and following (6-mos follow-up) Baseline.