

More Than My RA

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More Than My RA: A Randomized Trial Investigating Body Image Improvement Among Women With Rheumatoid Arthritis Using a Functionality-Focused Intervention Program

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Objective: Negative body image is prevalent in women with rheumatoid arthritis and can affect other areas of well-being. Patients have expressed desire for body image to be addressed in treatment. Yet, it is not routinely addressed and no experimental intervention research has been conducted, until now. This randomized trial evaluated a brief online body image intervention for women with rheumatoid arthritis, with a focus on *body functionality* (everything the body is capable of doing) as the primary technique. **Method:** Women with rheumatoid arthritis and who wanted to feel better about their body ($N = 84$; $M_{\text{age}} = 44.82$) were randomized to the Expand Your Horizon intervention (comprising 3 writing exercises focusing on body functionality) or a waitlist control group. Primary outcomes concerned body image and secondary outcomes related to rheumatoid arthritis; these outcomes were assessed at pretest, posttest, and at 1-week and 1-month follow-up. **Results:** Multilevel modeling analyses showed that, relative to control, participants in the intervention experienced improvements in various aspects of body image (functionality appreciation, body appreciation, body satisfaction, body–self alienation) and decreases in depression, with effects persisting at 1-week and 1-month follow-up. No intervention effects were found for body–self harmony, rheumatoid arthritis-specific disability, pain-related disability, and anxiety. **Conclusions:** Focusing on body functionality can improve body image and reduce depression in women with rheumatoid arthritis. The intervention technique is easy and affordable to deliver and could be a fruitful addition to extant treatments for rheumatoid arthritis.

What is the public health significance of this article?

Women with rheumatoid arthritis commonly report body concerns, but these concerns are not routinely addressed in treatment. This was the first controlled evaluation of an intervention technique for improving body image in women with rheumatoid arthritis: Focusing on body functionality led to improvements in body image and reductions in depression, with effects persisting at 1-week and 1-month follow-up. The intervention technique is easy and affordable to deliver, and could be a fruitful addition to extant treatments for rheumatoid arthritis, offering a way to more effectively meet patients' need to address their body concerns.

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Rheumatoid arthritis is the most common form of rheumatic disease and affects more than 690,000 adults in the United Kingdom alone, the majority of whom are women (Scott, 2014). Symptoms include pain, swelling, and stiffness in the muscles and joints, decreased range of motion, and fatigue (Scott, 2014). Rheumatoid arthritis and associated medications can also cause visible changes to the body, such as swelling and visible difference of the hands and feet, weight gain, change in posture, and hair loss (Collins, Wilkinson, Bosworth, & Jacklin, 2013; Plach, Stevens, & Moss, 2004). Thus, rheumatoid arthritis can impact both the functioning and physical appearance of the body. Despite this fact, research investigating body image within the context of rheumatoid arthritis is scarce, and has been restricted to correlational or qualitative methods.

Body image comprises cognitive, affective, behavioral, and perceptual components concerning one's body (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). Seventy-two percent of women report that their rheumatoid arthritis negatively affects how they feel about their body some or most of the time (Collins et al., 2013), and body image is worse among women with rheumatoid arthritis compared with healthy controls (Ben-Tovim & Walker, 1991; Jorge, Brumini, Jones, & Natour, 2010). In women with rheumatoid arthritis, poor body image has been associated with higher levels of depression, lower self-esteem, diminished quality of life, and decreased physical functioning (Jorge et al., 2010; MacSween, Brydson, & Fox, 2004; Monaghan et al., 2007). Body concerns can also encourage maladaptive behaviors such as abandoning the use of physical aids, concealing the body, or avoiding social situations (Goodacre & Goodacre, 2003; Jolly, 2011; Plach et al., 2004). These behaviors could reinforce body concerns and impact adjustment to, and management of, rheumatoid arthritis.

Given the high prevalence and potential negative impact of body concerns among women with rheumatoid arthritis, as well as the fact that psychological factors have been shown to influence adjustment to chronic pain more broadly (Morley, 2008), improving body image in women with rheumatic disease is likely to be a useful addition to existing treatment. To the best of our knowledge, techniques to improve body image have not been evaluated in women with rheumatoid arthritis and are not currently part of routine treatment—despite reports that patients wish that health care providers would address their body concerns (Collins et al., 2013; Jolly, 2011). Therefore, the aim of this study was to experimentally investigate a novel technique for improving body image in women with rheumatoid arthritis. Specifically, we propose that helping women with rheumatoid arthritis to focus on their body functionality could lead to improvements in body image.

Body functionality encompasses everything that the body is capable of doing, and includes functions related to internal processes (e.g., digestion, healing from a cold), bodily senses (e.g., sight, touch), physical capacities (e.g., walking, swimming), creative endeavors (e.g., painting, singing), communication with oth-

ers (e.g., body language, eye contact), and self-care (e.g., showering, sleeping; Alleva, Martijn, Van Breukelen, Jansen, & Karos, 2015). According to the objectification theory (Fredrickson & Roberts, 1997), women are socialized to habitually view and evaluate their own body based predominantly on its physical appearance, rather than its functionality. In turn, this tendency can contribute to a poor body image and other negative outcomes including anxiety and depression (see Moradi & Huang, 2008, for a review of the theory and literature). Alleva and colleagues (Alleva, Martijn, Jansen, & Nederkoorn, 2014; Alleva et al., 2015) therefore reasoned that helping women to focus on their body functionality could counteract the potentially harmful tendency to overemphasize their physical appearance, thereby contributing to a healthier body image and reducing anxiety and depression. To train women to focus on their body functionality, Alleva and colleagues (2015) developed the Expand Your Horizon program. The program consists of three brief online writing exercises, wherein participants describe the functions of their body and why they are personally meaningful. Relative to an active control, Expand Your Horizon has improved body image (e.g., body appreciation and satisfaction) in women, with effects persisting at 1-week and 1-month follow-up (Alleva et al., 2015, 2018). In support of the objectification theory, the program has also led to reductions in the tendency to view and evaluate one's own body based predominantly on its physical appearance rather than its functionality (Alleva et al., 2015).

Focusing on body functionality could also encourage women with rheumatoid arthritis to view and evaluate their own body based less on its physical appearance and more on its functionality, akin to research among nonclinical samples of women and in line with the objectification theory (Alleva et al., 2014, 2015, 2018; Fredrickson & Roberts, 1997; Moradi & Huang, 2008). Yet, focusing on body functionality could also improve body image among women with rheumatoid arthritis in additional ways that are specific to their experience of the illness. Namely, rheumatoid arthritis can take women's bodies further from the narrow societal beauty ideal, encompassing a fit and able body (Collins et al., 2013; Plach et al., 2004). Rheumatoid arthritis limits women's range of physical capacities, for example due to pain and swelling in the joints and muscles, leading them to feeling frustrated and unsatisfied with their body (Collins et al., 2013; Scott, 2014). Focusing on body functionality might improve body image in women with rheumatoid arthritis by helping them to conceptualize their body functionality more holistically (i.e., not limited to physical capacities) and to raise awareness about the functions that their body is able to perform despite experiencing symptoms. Similar approaches have been effective for improving adjustment to chronic pain, for example by helping people to focus on how they can pursue a values-driven life despite experiencing chronic pain (Peters et al., 2017). Further, women with rheumatoid arthritis may experience their body as a "separate adversary," preventing them from doing what they want or being "who they really are" (Bode,

van der Heij, Taal, & van de Laar, 2010; Collins et al., 2013). In fact, the extent to which the body is experienced as separate and alienated from the self, rather than in harmony with the self, has been associated with greater maladjustment to pain, functional impairment, and pain intensity (Bode et al., 2010; Sutherland & Morley, 2008). Focusing on body functionality might help women with rheumatoid arthritis to appreciate how their body still carries out valued functions and is an integral, positive part of their identity, thereby reducing body–self alienation and enhancing body–self harmony.

Finally, when investigating intervention techniques for improving body image, it is also valuable to explore potential additional benefits that they might have for well-being. This information would be meaningful to scholars, but also to various stakeholders, including individuals with rheumatoid arthritis themselves and their health care providers. Prior research has demonstrated the close relationships between body image and physical and psychological health both within the context of rheumatoid arthritis (Jorge et al., 2010; MacSween et al., 2004) and more broadly (Grogan, 2006). Therefore, should focusing on body functionality improve body image among women with rheumatoid arthritis, these improvements might be accompanied by reductions in physical disability, anxiety, and depression, as well. Although this notion has not been investigated before, research on the objectification theory has shown that focusing predominantly on the physical appearance of one's body, rather than its functionality, can contribute to poorer physical and psychological health, including anxiety and depression (see Moradi & Huang, 2008, for a review).

This study investigated whether focusing on body functionality can improve body image in women with rheumatoid arthritis. We hypothesized that, relative to the control group, participants in the Expand Your Horizon program would experience improvements on the primary outcome of body image at posttest and at follow-up. In addition, we explored the potential relationship between focusing on body functionality and improvements on secondary outcomes related to rheumatoid arthritis, including levels of disability, anxiety, and depression. We expected that participants in the Expand Your Horizon program would also experience improvements on these secondary outcomes at posttest and at follow-up.

Method

Participants

Sample size calculations indicated that 58 participants would be needed, assuming a medium to large effect size for the primary outcome (Alleva et al., 2015), a two-sided 5% significance level, 80% power, and a repeated-measures design. This sample size is considered sufficient for reliable estimation of multilevel models (Maas & Hox, 2005) as per our planned statistical analyses (see below). Figure 1 shows participant flow through the study. Participants were 84 women with rheumatoid arthritis between 22 and 70 years ($M_{\text{age}} = 44.82$, $SD = 12.50$). They received their diagnosis 11.32 years ago ($SD = 10.92$), by a rheumatologist (88.9%), general practitioner (7.4%), or other practitioner (3.7%).¹ Their average body mass index (BMI) was 27.02 ($SD = 6.88$) and they identified as White ($n = 80$), Asian ($n = 1$), multiracial ($n = 1$), or did not respond ($n = 2$). Highest education levels were high school or equivalency certificate ($n = 10$), associate degree ($n =$

1), some college ($n = 30$), bachelor degree ($n = 18$), master degree ($n = 8$), graduate degree ($n = 9$), or they did not complete high school ($n = 1$) or had a different background ($n = 7$). They identified as heterosexual ($n = 80$), bisexual ($n = 1$), or did not respond ($n = 3$).

Measures

Table 1 shows participants' scores on the measures and Cronbach's alphas.

Functionality Appreciation Scale (FAS; Alleva, Tylka, & Kroon Van Diest, 2017). The FAS comprises seven items (e.g., "I appreciate my body for what it is capable of doing"), rated from 1 (*strongly disagree*) to 5 (*strongly agree*). Item scores are averaged; higher scores reflect higher levels of functionality appreciation. FAS scores have demonstrated internal consistency, 3-week test–retest reliability, and construct validity in U.S. community women (Alleva et al., 2017).

Body Appreciation Scale-2 (BAS-2; Tylka & Wood-Barcalow, 2015a). The BAS-2 comprises 10 items (e.g., "I respect my body"), rated from 1 (*never*) to 5 (*always*). Item scores are averaged; higher scores demonstrate higher levels of body appreciation. BAS-2 scores have demonstrated internal consistency, construct validity, and 21-day test–retest reliability in U.S. undergraduate and community women (Tylka & Wood-Barcalow, 2015a).

Multidimensional Body–Self Relations Questionnaire (Brown, Cash, & Mikulka, 1990; Cash, 2000)—Body Areas Satisfaction Subscale (BASS). The BASS comprises nine items assessing satisfaction with various body areas (e.g., "face" [i.e., facial features, complexion]) from 1 (*very dissatisfied*) to 5 (*very satisfied*). Item scores are averaged; higher scores demonstrate higher body satisfaction. Scores on this subscale have demonstrated internal validity, 1-month test–retest reliability, and construct validity in U.S. community women (Cash, 2000). In consultation with rheumatology experts, two items were added relevant to the present sample: (a) "extremities (i.e., hands, feet)" and (b) "overall posture/gait." Scores on these two items were averaged with the other BASS items.

Body Experience Questionnaire (BEQ; Bode et al., 2010). The BEQ comprises 10 items that represent more (e.g., "My body feels familiar to me") or less (e.g., "My body is a burden to me") unity between the body and self, rated from 1 (*strongly disagree*) to 4 (*strongly agree*). Items are divided into Harmony (four items) and Alienation (six items) Subscales. Item scores within each subscale are summed; higher scores demonstrate greater body–self harmony (range = 4–16) or alienation (range = 6–24), respectively. Subscale scores have shown adequate internal consistency and construct validity in women with rheumatic diseases (Bode et al., 2010).

Health Assessment Questionnaire (Fries, Spitz, Kraines, & Holman, 1980)—Disability Index. The Disability Index comprises 20 items concerning the extent to which participants expe-

¹ Due to a technical error in the research system, these data were not saved at Pretest. An email was thus sent to participants at the end of data collection to complete these questions again; 54 participants responded to this request ($n_{\text{functionality}} = 28$, $n_{\text{control}} = 26$) and these data are based on the responses of only these participants.

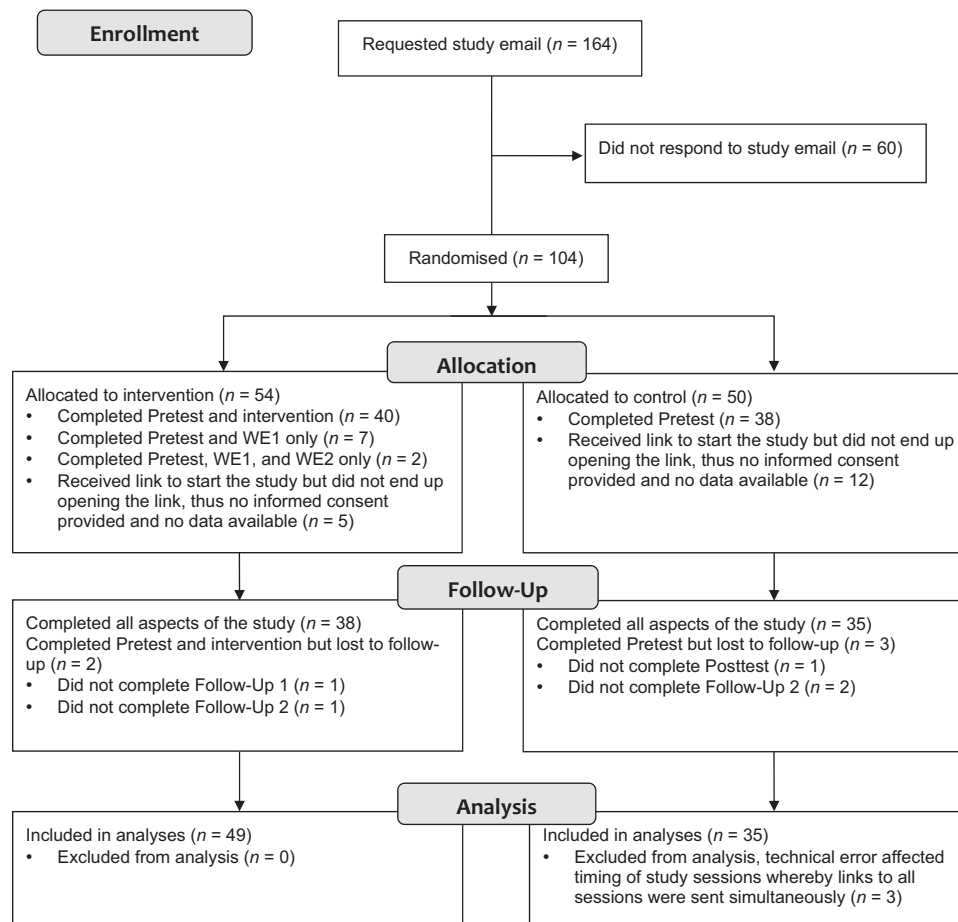


Figure 1. Participant flow throughout the study. WE = Writing Exercise.

rienced difficulty performing various activities (e.g., “Shampoo your hair?”) over the last week (0 = *without any difficulty* to 3 = *unable to do*). Items are divided into eight sections, each with two or three items: dressing, arising, eating, walking, hygiene, reach, grip, and activities. Participants indicate whether they needed to use aids or help from another person to perform the activities described. Each section is given a score according to the worst score on the items in that section (e.g., if items within a section are scored 0 and 2, then a score of 2 is given for that section). If aid or help is needed to perform the activities described, then the minimum score for that section is 2. Sections that already have a score of 2 or 3 are not changed. Last, the scores for the eight sections are averaged; higher scores reflect greater disability specific to rheumatoid arthritis (range = 0–3). Scores on the Disability Index have demonstrated internal consistency and construct validity in women with rheumatic disease (Maska, Anderson, & Michaud, 2011).

Pain Disability Index (PDI; Pollard, 1984). The PDI comprises seven items, each capturing a life category (e.g., “family/home responsibilities”). Participants indicate “how much your pain is preventing you from doing what you would normally do or from doing it as well as you normally would.” Items are rated from 1 (*no disability*) to 11 (*worst disability*). Item scores are summed, with

higher scores showing greater pain disability (range = 7–77). Scores on the PDI have demonstrated adequate internal consistency, 2-month test–retest reliability, and construct validity in adults with chronic pain (Tait, Chibnall, & Krause, 1990).

Patient-Reported Outcomes Measurement Information System (PROMIS)—Depression and Anxiety Short Forms. The Anxiety and Depression Short Forms each comprise four items (e.g., “I felt fearful” and “I felt worthless”) concerning the last week, rated from 1 (*never*) to 5 (*always*). Item scores on each subscale are averaged, with higher scores reflecting higher levels of anxiety and depression, respectively. The Anxiety and Depression Short Forms were developed and validated in U.S. community and clinical samples and have demonstrated adequate psychometric properties (see <http://www.healthmeasures.net> for details).

Intervention Materials

The intervention was based on the Expand Your Horizon materials from Alleva et al. (2015). The program begins with an introduction to the concept of body functionality and an extensive list of body functions categorized per domain. Participants then complete their first writing exercise, wherein they describe the functions that their body can perform with regard to (a) bodily

Table 1
Pretest, Posttest, and Follow-Up Scores for the Intervention and Control Groups

Variable	α	Intervention group					Control group				
		<i>N</i>	<i>M</i>	<i>SD</i>	Min	max	<i>N</i>	<i>M</i>	<i>SD</i>	min	max
Functionality appreciation (FAS)											
Pretest	.90	49	3.17	.89	1.57	5.00	35	3.30	.96	1.43	5.00
Posttest	.91	40	3.98	.59	2.57	5.00	34	3.40	.85	2.00	5.00
Follow-Up 1	.93	39	3.66	.75	1.34	4.71	34	3.29	.99	1.00	5.00
Follow-Up 2	.94	38	3.77	.78	1.36	5.00	32	3.41	.93	1.29	5.00
Body appreciation (BAS-2)											
Pretest	.95	49	2.60	.79	1.00	4.90	35	2.58	.96	1.20	4.40
Posttest	.95	40	3.16	.77	1.80	4.90	34	2.68	.83	1.30	4.50
Follow-Up 1	.96	39	3.07	.85	1.60	4.90	34	2.65	.96	1.00	4.40
Follow-Up 2	.95	38	3.12	.80	1.70	4.90	32	2.72	.90	1.10	4.50
Appearance satisfaction (BASS)											
Pretest	.89	49	2.52	.78	1.27	4.55	35	2.58	.76	1.27	4.27
Posttest	.90	40	2.90	.82	1.36	5.00	34	2.60	.75	1.27	4.27
Follow-Up 1	.90	39	2.90	.77	1.73	4.82	34	2.61	.76	1.00	4.36
Follow-Up 2	.91	38	2.86	.87	1.18	4.82	32	2.64	.70	1.27	4.00
Body-self harmony (BEQ-H)											
Pretest	.62	49	10.73	2.45	4.00	15.00	35	10.29	2.09	6.00	14.00
Posttest	.73	40	11.48	2.73	4.00	16.00	34	10.34	2.10	4.11	15.00
Follow-Up 1	.73	39	11.23	2.72	5.00	16.00	34	10.47	1.89	6.00	14.00
Follow-Up 2	.73	38	11.34	2.12	8.00	15.00	32	10.34	2.52	4.00	15.00
Body-self alienation (BEQ-A)											
Pretest	.87	49	18.10	4.43	8.00	24.00	35	17.37	4.62	8.00	24.00
Posttest	.87	40	15.58	4.70	6.00	24.00	34	16.77	4.24	7.00	24.00
Follow-Up 1	.87	39	15.54	4.16	6.00	22.00	34	16.65	4.72	8.00	24.00
Follow-Up 2	.86	38	15.24	4.02	8.00	23.00	32	16.78	4.70	7.00	24.00
Rheumatoid arthritis-specific disability (HAQ-DI) ^a											
Pretest	.97	49	1.63	.68	.00	3.00	35	1.29	.65	.00	2.88
Posttest	.96	40	1.65	.67	.00	3.00	34	1.35	.66	.00	2.75
Follow-Up 1	.97	39	1.56	.68	.00	3.00	34	1.30	.64	.00	2.75
Follow-Up 2	.97	38	1.63	.63	.00	3.00	32	1.26	.67	.00	2.50
Pain-related disability (PDI)											
Pretest	.93	49	49.31	15.65	12.00	73.00	35	43.11	15.30	15.00	71.00
Posttest	.93	40	45.10	15.86	8.00	70.00	34	41.47	16.44	13.00	71.00
Follow-Up 1	.94	39	44.05	16.35	9.00	67.00	34	39.85	17.55	12.00	70.00
Follow-Up 2	.94	38	43.05	17.01	8.00	71.00	32	36.34	17.41	9.00	70.00
Anxiety (PROMIS-A)											
Pretest	.93	49	2.88	1.00	1.00	4.75	35	2.89	1.00	1.00	4.50
Posttest	.92	40	2.39	.97	1.00	4.25	34	2.65	.92	1.00	4.25
Follow-Up 1	.94	39	2.30	.99	1.00	4.00	34	2.64	1.06	1.00	4.25
Follow-Up 2	.94	38	2.28	1.03	1.00	4.25	32	2.42	.92	1.00	4.00
Depression (PROMIS-D)											
Pretest	.94	49	2.82	1.14	1.00	5.00	35	3.02	1.12	1.00	5.00
Posttest	.93	40	2.25	.96	1.00	4.50	34	2.86	1.04	1.00	5.00
Follow-Up 1	.95	39	2.29	1.04	1.00	4.75	34	2.72	1.19	1.00	5.00
Follow-Up 2	.93	38	2.26	1.05	1.00	4.50	32	2.58	1.12	1.00	5.00

Note. FAS = Functionality Appreciation Scale; BAS-2 = Body Appreciation Scale-2; BEQ-H = Body Experience Questionnaire–Harmony Subscale; BEQ-A = Body Experience Questionnaire–Alienation Subscale; HAQ-DI = Health Assessment Questionnaire–Disability Index; PDI = Pain Disability Index; PROMIS-A = Patient-Reported Outcomes Measurement Information System–Anxiety Short Form; PROMIS-D = Patient-Reported Outcomes Measurement Information System–Depression Short Form.

^aFor the HAQ-DI, Cronbach's alpha is calculated excluding the items concerning the use of aids or help from another person.

senses and (b) physical capacities, and why they are personally meaningful. They are asked to write for at least 15 min. The instructions are identical for the second and third exercises, but the second focuses on (a) internal processes and (b) creative endeavors, and the third focuses on (c) communication and (d) self-care. For all writing exercises, participants can reopen the list of body functions, for inspiration.

The first author tailored these materials from Alleva et al. (2015) for women with rheumatoid arthritis. Namely, the introduction and writing exercises stressed that participants should aim to see their

body functionality *holistically* (e.g., not limited to one or two functions) and to focus on the functions that their body can perform despite experiencing symptoms. The list of body functions was modified to remove certain examples that may be less relevant for individuals with rheumatoid arthritis (e.g., playing soccer). Further, participants were told that they could take a 5-min break from writing, if needed. Last, after completing the final writing exercise, participants received a list of ideas to help them to continue focusing on their body functionality and thinking of their body in a more positive way (e.g., “paste a note on your mirror

reminding you to think about what you've learned"). To enhance intentions (Gollwitzer & Sheeran, 2006), they were also asked to describe two of their own ideas. These revised materials were reviewed by the fourth (expert in chronic pain), fifth (expert in rheumatology), and last (expert in visible differences) authors, the Chief Executive of the National Rheumatoid Arthritis Society (NRAS), and one woman with rheumatoid arthritis. These revised materials can be found in the [online supplemental material](#).

Procedure

This study was approved by the ethics committee at the University of the West of England. Participants were recruited via the website, mailing list, and social media of the NRAS ($n = 62$), or other relevant media ($n = 22$) such as private Facebook groups for individuals with rheumatoid arthritis, and other related charities. The inclusion criteria were that participants must be women, based in the United Kingdom, at least 18 years old, have been diagnosed with rheumatoid arthritis, and want to improve how they feel about their body. Recruitment occurred in April and May 2017, after which time at least 58 participants had completed the study.

Women interested in the study received a detailed information sheet, stating that we were testing a new body image program and that they would be randomized to either the intervention group or the comparison group. The information sheet provided details about the procedure of the study, but did not contain any information about the content of the intervention program. If they indicated that they would like to participate, the first author added their e-mail address to Maastricht University's online research system. Thereafter, all communication was managed by the research system alone, so that participants did not have any further contact with the experimenters. The research system then automatically randomized participants to group with a 1:1 allocation ratio, independent of prior randomizations (i.e., each participant had a 50% chance of being in either group). Experimenters were blind to group. At this point, the research system sent the participants a standardized e-mail containing a link to start the study (the e-mail did not contain any information about participants' assigned group). After clicking on this link, participants read and signed an electronic informed consent sheet. Then, they completed the Pretest measures, provided demographic information, and indicated how many years ago they received their diagnosis and by whom. Participants were then notified whether they had been randomized to the intervention group or comparison group. Immediately afterward, participants in the intervention group proceeded to the first writing exercise. Two days later they completed the second exercise. Two days afterward they completed the third exercise and the posttest measures. Participants completed the measures again at 1-week and 1-month follow-up. Participants in the control group completed the measures only. After completing the 1-month follow-up, they could choose to complete the intervention (they were not asked to fill in any further measures).

All of the measures were completed at all time points. Participation in the study was free, and participants received a \$13 gift voucher after completing the study. Participants did not have any contact with the experimenters during the study, and did not receive any feedback concerning their responses to the writing exercises or their questionnaire scores.

Statistical Analyses

As the data comprised repeated measures within individuals, longitudinal multilevel models were used to analyze the effect of the intervention for each outcome. A set of preliminary analyses was conducted to establish for each outcome the appropriate longitudinal model. Specifically, we investigated whether a model including random slopes for time was significantly better than a model with only random intercepts, and whether time should be modeled as a linear or quadratic effect (i.e., $time^2$). The final model specification for each outcome included the predictors time (and $time^2$, where appropriate), group, and their interaction, as well as the relevant Pretest measure as a grand-mean centered covariate. Data analysis was conducted in R (R Core Team, 2017). Multilevel modeling analyses were conducted using the package `lme4` (Bates, Mächler, Bolker, & Walker, 2015). Missing data imputation was done using the packages `mitml` (Grund, Robitzsch, & Lüdtke, 2017) and `pan` (Zhao & Schafer, 2016). For missing data imputation, 100 imputed data sets were used, and the models for data imputation used all variables included in the analyses.

Results

Pretest Scores, Missing Data, and Attrition

No significant group differences were found at Pretest (see Table 1), except for rheumatoid arthritis-specific disability ($p = .023$), where participants in the intervention group experienced significantly higher levels than those in the control group (for the correlations between participants' scores on the pretest measures, see the [online supplemental material](#)).² No missing data were observed at pretest. Attrition at posttest was 10.71% ($n = 9$), which increased to 13.10% ($n = 11$) and 16.67% ($n = 14$) for the 1-week and 1-month follow-up, respectively. Inspection of missing data patterns revealed that more missing data were observed in the intervention ($n_{missing} = 11$) than control ($n_{missing} = 3$) group. However, t tests comparing pretest scores in the intervention group of those with missing data to those with complete data did not reveal any significant differences ($ps > .05$). Logistic regressions further revealed that for none of the variables did the scores on one time point predict missing data on later time points. As a final measure we ran Little's missing completely at random test, which was nonsignificant ($p = .271$). On the basis of the results of these tests combined, we considered there was no evidence to assume that data were missing not at random, and as such deemed it appropriate to impute missing data using multiple imputation.

Intervention Effects on Body Image and Secondary Outcomes

Preliminary analyses revealed that for all outcomes, models including random slopes for time were not significantly better than random intercept models, so all further analyses were conducted using random

² Adjusting the analyses for levels of rheumatoid arthritis-specific disability at Pretest does not change the patterns of results observed. Similarly, adjusting the analyses for BMI does not change the pattern of results observed, either. BMI also does not predict any of the outcomes, and does not differ between groups at Pretest.

intercepts only. Time² was a significant predictor of functionality appreciation only ($\beta = 0.001$, 95% C.I. [0.001, 0.002], $p = .001$) and was therefore included in the final model for this outcome.

Final model results for the body image outcomes are reported in Table 2. Time was not a significant predictor for any of the body image outcomes, nor was the Time \times Group interaction. This indicates that scores on the body image outcomes did not significantly vary between posttest, 1-week follow-up, and 1-month follow-up, irrespective of group. Note that this also held for functionality appreciation, and upon including the remaining variables in the model, the previously observed effect of time² on functionality appreciation was no longer significant. For all body image outcomes except body-self harmony, a significant effect of group was found. Adding group to the model reduced the variance observed on participant level between 14% and 20%, and the direction of the effect showed that the intervention positively affected how participants perceived their body. The lack of a significant effect of time further indicated that this difference persisted over time.

Concerning the secondary outcomes (see Table 3), for depression, significant effects for time and group were found. Adding group to the model reduced the variance on participant level by 4%. The model results indicate an overall minor decline of depression, and that participants in the intervention group reported lower depression than the control group. Similarly, for pain-related disability, a significant effect of time was found, showing that pain-related disability decreased over time, irrespective of group.

Discussion

This study investigated a novel technique for improving body image in women with rheumatoid arthritis, namely by training them to focus on their body functionality and why it is personally meaningful. Women were encouraged to think of their body functionality holistically and reflect on the functions that their body can perform despite experiencing symptoms. As hypothesized, women who completed Expand Your Horizon experi-

enced improvements in various aspects of body image. The observed reduction in variance as a result of the intervention program was substantial and persisted 1 week and 1 month after program completion. These findings are promising because they show that women's relationships with their bodies can be improved—despite the unique physical and aesthetic challenges that rheumatoid arthritis can pose (Collins et al., 2013; Plach et al., 2004; Scott, 2014). Further, it is noteworthy that the program both reduced aspects of a negative body image (e.g., body-self alienation) and enhanced aspects of a positive body image (e.g., functionality appreciation). This is an important finding as recent research suggests that both reducing negative body image and enhancing positive body image are necessary to achieve well-being (Tylka & Wood-Barcalow, 2015b). More broadly, the present findings confirm the beneficial impact of focusing on one's body functionality (Alleva et al., 2014, 2015, 2018) and also support the objectification theory, which proposes that viewing and evaluating one's own body based predominantly on its physical appearance rather than its functioning can contribute to poorer body image and ill-being (Fredrickson & Roberts, 1997; Moradi & Huang, 2008). As a next step in progressing research on body image improvement among women with rheumatoid arthritis, it will be valuable to analyze participants' written responses to the Expand Your Horizon exercises to identify emerging themes concerning, for example, the aspects of body functionality that women with rheumatoid arthritis especially value. The insight gleaned from these qualitative data could help to further tailor the program for women with rheumatoid arthritis and enhance its effects on body image.

In addition to testing the effects of Expand Your Horizon on women's body image, we also explored whether the program affected other outcomes related to rheumatoid arthritis. The findings showed that women in the intervention group experienced greater decreases in depression compared with the control group.

Table 2
Effects of Group on the Body Image Outcome Variables Across Time

Predictor	Functionality appreciation		Body appreciation		Appearance satisfaction		Body-self harmony		Body-self alienation		
	β	SE	β	SE	β	SE	β	SE	β	SE	
Intercept	3.36***	.11	2.67***	.07	2.58***	.06	10.55***	.29	17.07***	.44	
Pretest (centered)	.56***	.07	.80***	.06	.86***	.05	.58***	.07	.75***	.06	
Time	-.02	.02	.00	.00	.00	.00	-.01	.01	.02	.02	
Time ²	.00	.00									
Group	.63***	.15	.41***	.10	.31***	.09	.78	.40	-1.65**	.61	
Time \times Group	-.03	.02	.00	.00	.00	.00	.00	.02	-.03	.02	
Time ² \times Group	.00	.00									
Variances		Baseline	Full	Baseline	Full	Baseline	Full	Baseline	Full	Baseline	Full
Participant level		.30	.24	.18	.14	.13	.12	1.52	1.37	5.52	4.60
Residual		.16	.16	.08	.08	.05	.04	2.44	2.45	3.45	3.42
% variance reduction participant level		20.00%		20.00%		14.00%		10.00%		17.00%	

Note. Baseline variance refers to the estimated variance in the outcome variable of the statistical model solely including pretest and time (and time², where appropriate). Full variance refers to the estimated variance in the complete model, including group and its interaction with time (and time², where appropriate). These variances are used to compute the percentage variance reduction on participant level, revealing the reduction in variance that is attributable to the effects of group.

*** $p < .001$.

Table 3
Effects of Group on the Secondary Outcome Variables Across Time

Predictor	Rheumatoid arthritis-specific disability		Pain-related disability		Anxiety		Depression			
	β	SE	β	SE	β	SE	β	SE		
Intercept	1.50***	.05	45.00***	1.27	2.69***	.10	2.76***	.10		
Pretest (centered)	.88***	.04	.94***	.05	.72***	.06	.74***	.06		
Time	.00	.00	-.13**	.04	-.01	.00	-.01*	.00		
Group	-.04	.07	-1.44	1.73	-.21	.14	-.32*	.14		
Time \times Group	.00	.00	.05	.06	.00	.01	.01	.01		
	Variances		Baseline	Full	Baseline	Full	Baseline	Full		
Participant level			.04	.04	35.08	35.38	.22	.21	.25	.24
Residual			.04	.04	27.09	27.10	.21	.21	.18	.18
% variance reduction participant level			.00%		-1.00%		2.00%		4.00%	

Note. Baseline variance refers to the estimated variance in the outcome variable of the statistical model solely including pretest and time. Full variance refers to the estimated variance in the complete model, including group and its interaction with time. These variances are used to compute the percentage variance reduction on participant level, revealing the reduction in variance that is attributable to the effects of group.

* $p < .05$. ** $p < .01$. *** $p < .001$.

These findings are noteworthy considering that individuals with rheumatoid arthritis are twice as likely to experience depression compared with the general population, and that depression can increase the burden of rheumatoid arthritis on the individual and society (Dickens & Creed, 2001). Further, these findings support prior research showing that body concerns impact depression levels in individuals with rheumatoid arthritis, independent of disability level (Monaghan et al., 2007). For future research, it will be worthwhile to determine whether the impact of the intervention program on depression is mediated by changes in how women think and feel about their body, as would be predicted by the objectification theory (Fredrickson & Roberts, 1997).

It is surprising that no intervention effects were found for rheumatoid arthritis-specific disability, pain-related disability, and anxiety, considering the close relationship between body image and various indices of ill-being and well-being both within the context of rheumatoid arthritis (Jorge et al., 2010; MacSween et al., 2004) and more broadly (Grogan, 2006). The intervention might be better geared to enhance aspects of well-being rather than reduce aspects of ill-being, akin to what has been found for other strengths-based interventions (e.g., Peters et al., 2017). Further, the intervention might reduce distress about disability, without reducing disability itself (Peters et al., 2017). Future research could include additional measures to investigate these possibilities. It will also be valuable to test whether improvements in body image translate to reductions in maladaptive behaviors (e.g., abandoning the use of physical aids) and increases in adaptive behaviors (e.g., engagement in social activities) that can impact adjustment to and management of rheumatoid arthritis (Goodacre & Goodacre, 2003; Jolly, 2011).

Last, it is also interesting to consider women's scores on the measures of body image at Pretest. Compared with three recent studies investigating functionality appreciation and other aspects of body image among nonclinical community samples of U.S. women and men (Alleva et al., 2017), scores in the present sample were lower for functionality appreciation, body appreciation, and body satisfaction (body-self harmony and body-self alienation were not assessed in Alleva et al., 2017). In fact,

in the present sample, mean scores for functionality appreciation, body appreciation, and body satisfaction fell between the neutral answer options (i.e., *neither agree nor disagree*, *sometimes*, and *neither satisfied nor dissatisfied*) and negative answer options (i.e., *disagree*, *seldom*, and *dissatisfied*) for the scales assessing these constructs. In contrast, mean scores on these constructs among the nonclinical community samples tended to fall more toward the positive answer options for these scales (e.g., *agree* and *strongly agree*). Although these differences cannot be tested for statistical significance, they do support prior research showing that women with rheumatoid arthritis experience a poorer body image than 'healthy' controls (Jorge et al., 2010; Ben-Tovim & Walker, 1991). Interestingly, compared with prior research investigating body-self harmony and body-self alienation in individuals with rheumatoid arthritis (Bode et al., 2010), the present sample experienced lower levels of body-self harmony and higher levels of body-self alienation, as well as higher levels of rheumatoid arthritis-specific disability (though scores in both samples reflect functional impairment; Maska et al., 2011). One explanation for these differences is that the present sample comprised women who wanted to improve their relationship with their body, whereas the prior research by Bode et al. (2010) did not concern an intervention (participants filled in a series of questionnaires). Thus, the current sample may represent a subgroup of women with rheumatoid arthritis who especially struggle with body concerns, perhaps due in part to a greater severity of rheumatoid arthritis-specific disability.

As described earlier, individuals with rheumatoid arthritis wish that health care providers would address their body concerns (Collins et al., 2013; Jolly, 2011; MacSween et al., 2004). For example, they have expressed that "doctors care for your body but don't care how you feel about your body" (Jolly, 2011, p. 356). The present findings are important because they point toward one effective strategy for improving body image among women with rheumatoid arthritis. Moreover, the present intervention program is easy and affordable to deliver (e.g., provided online, without an interventionist), and could thus be easily incorporated into existing

treatments for rheumatoid arthritis. It is an open question, however, how the program should best be incorporated into treatment, and at what level body concerns should best be addressed and by whom (e.g., rheumatologists, general practitioners). Future research might also investigate for whom the program is most beneficial. Given that the program trains individuals to focus on their body functionality in a holistic manner and to focus on what their body is able to do despite symptoms, it should not exclude any subgroups of individuals with rheumatoid arthritis (e.g., those with greater symptom severity or higher BMI). Yet, akin to body image interventions more broadly (Alleva, Sheeran, Webb, Martijn, & Miles, 2015), the program is likely to be more effective among women who have a poorer body image to begin with, as they might be more motivated to feel better about their body and have more 'room' to improve. Relatedly, body concerns are also prevalent among *men* with rheumatoid arthritis, with 48% reporting that rheumatoid arthritis negatively affects how they feel about their body some or most of the time (Collins et al., 2013). Future research should investigate whether the Expand Your Horizon materials need to be tailored to address the potential gender-specific body concerns of men with rheumatoid arthritis (e.g., perceived loss of masculinity; Collins et al., 2013). Similarly, it is important to underscore that body concerns are prevalent among individuals with other forms of rheumatic diseases (e.g., systemic lupus erythematosus, systemic sclerosis; Jolly, 2011), as well as among other clinical populations (e.g., individuals diagnosed with cancer or a gynaecological disorder; Skouteris, 2011; White & Hood, 2011). Body image research among clinical populations has mainly concerned individuals with an eating disorder, and the scarcity of research among other clinical populations is considered a key limitation to the field (Cash & Smolak, 2011). The present research thus represents an important step in addressing body image and body image improvement among underresearched clinical populations. Further investigations of the impact of focusing on body functionality among individuals with rheumatoid arthritis, as well as among other clinical populations with body concerns, will be valuable.

Limitations

The following key limitations to the present research must be mentioned. First, Expand Your Horizon was tested against a waitlist control group, so the present effects could be due to nonspecific aspects of treatment. However, prior research has demonstrated that Expand Your Horizon is more effective than an active control program (Alleva et al., 2015, 2018). Further, participants did not have any personal contact with the experimenters as all communication was managed by the research system alone. As such, the effects of contact with a supportive other should have been minimized. Nonetheless, future research in individuals with rheumatoid arthritis should include active control programs to help rule out the impact of nonspecific treatment effects. Second, the present sample comprised mainly White, highly educated women—perhaps because these characteristics are typical of service users of the NRAS, where most participants (74%) were recruited. Future research should therefore include individuals of various social identities (e.g., concerning educational level, ethnicity), employing additional strategies to recruit more diverse samples. Third, slightly higher levels of dropout were found for the inter-

vention group (although dropout levels were low compared with other online/body image interventions; e.g., Albertson, Neff, & Dill-Schackelford, 2015). One explanation is that the intervention was time-consuming and thus posed a greater burden to these participants. Another possible explanation concerns the format of Expand Your Horizon, where participants typed their responses to the exercises. Participants experiencing symptom flare-ups may have been less able to complete the study, although no differences were found when comparing Pretest scores of rheumatoid arthritis-specific or pain-related disability between intervention participants who completed the study versus those who dropped out. Nevertheless, to overcome this potential obstacle, future research could explore alternative strategies for program completion, such as recording spoken responses to the exercises.

A fourth limitation of this research is that diagnosis of rheumatoid arthritis was determined via self-report. Considering that most participants were recruited via the NRAS, it is probable that they had indeed been diagnosed with rheumatoid arthritis. The remaining participants were recruited from rheumatoid arthritis-specific outlets, such as via private Facebook groups for individuals with rheumatoid arthritis and the social media of relevant charities. This recruitment strategy should have reduced the exposure of the study advertisements to individuals without rheumatoid arthritis. Nevertheless, we cannot be entirely certain that all participants indeed had been diagnosed with rheumatoid arthritis, and this is a limitation inherent to the online nature of the program. Last, despite random allocation, higher levels of rheumatoid arthritis-specific disability were found in the intervention group at Pretest. Participants were not informed of their assigned group until after completion of Pretest, so knowledge of group could not have caused this difference. Adjusting the analyses for levels of rheumatoid arthritis-specific disability at Pretest did not change the pattern of results observed.

Conclusion

Negative body image is prevalent in women with rheumatoid arthritis, can affect other areas of well-being, and patients wish that their body concerns would be addressed in treatment (Collins et al., 2013; Jolly, 2011; MacSween et al., 2004). This study is valuable because it is the first to experimentally test an intervention technique for improving body image in women with rheumatoid arthritis. The findings are promising and show that Expand Your Horizon improves women's body image and also reduces levels of depression, with effects persisting one month after program completion. The program could be a fruitful addition to existing treatment for rheumatoid arthritis—especially considering that it is easy and affordable to deliver—thereby meeting patients' needs for addressing their body concerns (Collins et al., 2013; Jolly, 2011). It is hoped that there will be continued investigation of body image and body image improvement among individuals with rheumatoid arthritis, as well as among those with other rheumatic diseases and from other underresearched clinical populations (Cash & Smolak, 2011).

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