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RESEARCH ARTICLE

Effect of Aggression Regulation on Eating Disorder Pathology: RCT of a Brief Body and Movement Oriented Intervention

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Abstract

Objective: The objective of the study is to evaluate the effect of a brief body and movement oriented intervention on aggression regulation and eating disorder pathology for individuals with eating disorders.

Method: In a first randomized controlled trial, 40 women were allocated to either the aggression regulation intervention plus supportive contact or a control condition of supportive contact only. The intervention was delivered by a psychomotor therapist. Participants completed questionnaires on anger coping and eating disorder pathology. Independent samples *t*-tests were performed on the difference between pre-treatment and post-treatment scores.

Results: Twenty-nine participants completed questionnaires at pre-intervention and post-intervention. The intervention resulted in a significantly greater improvement of anger coping, as well as of eating disorder pathology.

Discussion: Results indicate that body and movement-oriented aggression regulation may be a viable add-on for treating eating disorders. It tackles a difficult to treat emotion which may have a role in blocking the entire process of treating eating disorders. Copyright © 2015 John Wiley & Sons, Ltd and Eating Disorders Association.

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Keywords

eating disorder; body oriented treatment; psychomotor therapy; anger; aggression

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Anger and aggressiveness are associated with several eating disorder (ED) subtypes, severity of ED symptoms and poorer treatment outcome (Krug et al., 2008). In ED, aggressiveness is mostly directed at the self in an attempt to control the body and regulate emotions, and as a means to confirm one's own fragile identity (Truglia et al., 2006). ED behaviours can be seen as self-destructive behaviours related to a great extent to inhibited anger expression (Truglia et al., 2006). Research findings indicate that anger is a significant underlying emotion contributing to disordered eating (Engel et al., 2007; Fox & Power, 2009; Harrison, Sullivan, Tchanturia, & Treasure, 2010; Ioannou & Fox, 2009; Quinton & Wagner, 2005). Patients with bulimia often feel anger and may impulsively direct it toward others or toward objects (Truglia et al., 2006). Patients suffering from anorexia nervosa can feel anger as a terrifying emotion that needs to be avoided (by concentration on food, body and weight), needs to be suppressed, for example by physical activity, and released by anorectic self-control or self-harm (Espeset, Gulliksen, Nordbø, Skårderud, & Holte, 2012). They tend to show less facial anger expression than they feel, which may lead to problems in social communication

(Claes et al., 2012; Joos et al., 2012). It is suggested that treatment of non-suicidal self-injury in ED should focus on stabilizing affective states rather than on reducing affects like anger (Vansteelandt et al., 2013). Despite such findings, there is a lack of research on how to approach anger and aggression in the treatment of ED (Fassino, Daga, Piero, & Rovera, 2002; Krug et al., 2008; Miotto et al., 2003; Truglia et al., 2006).

A specific evidence-based intervention protocol targeted at aggression is missing. In this respect, psychomotor therapy (PMT) – a body and movement oriented therapy frequently used in mental health care in the Netherlands and Belgium (Probst, Knapen, Poot, & Vancampfort, 2010) – may prove useful. PMT is characterized by using body awareness and physical activities to help patients to improve their understanding of emotions and their expression skills. It is an eclectic experiential therapy integrating elements of psychodynamic, client-centred, as well as cognitive-behavioural approaches. In the PMT intervention under study, a body and movement oriented approach for aggression regulation was used to help patients better comprehend and cope with their multifaceted anger and

aggression issues. Patients learn to see anger as a positive, relational, body-felt experience, and to use the power of anger against the destructive influence of the ED. Non-verbal intervention techniques are combined in a semi-structured protocol of six weekly one-hour sessions to target anger-related issues, for instance, critical inner voices toward the body, giving in to purging behaviours, guilt, shame or painful memories. In a previous article, we elaborated on the content of the aggression regulation module (Boerhout, van Busschbach, Wiersma, & Hoek, 2013).

The evidence base for the effectiveness of body psychotherapy has improved much over the last decade (Röhricht, 2015). Practice-based clinical evidence and a few empirical studies point toward good efficacy of non-verbal interventions regarding emotional processing, movement behaviour and body experience. This applies in particular to body-related psychopathology and mental disorders with limited treatment response to traditional therapies, for example somatoform disorders, anorexia nervosa (Röhricht, 2009). However, while there are randomized controlled trials (RCTs) and systematic reviews of specific physical therapy interventions, like aerobic exercise, massage, yoga, for patients with binge eating disorder (BED; Vancampfort et al., 2013), anorexia nervosa and bulimia nervosa (Vancampfort et al., 2014), there are no controlled studies of PMT for ED yet. PMT represents not one specific physical intervention but combines a wide scope of intervention techniques. The focus lies on specific emotional issues related to the disorder with personal meaning for the patient, which are then translated into fitting body and movement oriented therapy interventions to evoke new body-felt experiences. These experiences function as a source for insight and/or behaviour modification (Boerhout et al., 2013).

Based on promising clinical experiences in an inpatient treatment facility with one unit for patients with ED and one for patients with personality disorders, a pilot study was conducted to investigate the effect of the intervention on aggression regulation in a small sample of these patients (Boerhout & Van der Weele, 2007). The results of this study indicated a rapid and significant decrease of anger internalization and increase of anger externalization in the group of internalizing patients during the intervention period, with no significant change during the pre-treatment waiting period. The internalization of anger refers to the frequency of experienced feelings of anger, which are internalized or directed inwardly. The externalization of anger refers to the frequency of experienced feelings of anger, which are externalized or directed outwardly (Van Elderen, Maes, Komproue, & Van Der Kamp, 1997).

The findings of our pilot study showed that the intervention may have the potential to contribute to tackling the persistent problem of anger inhibition (Boerhout & Van der Weele, 2007). We then decided to conduct an RCT on the effectiveness of the intervention in an outpatient setting for individuals with an ED. The results are presented in this paper. Main outcome variables were anger expression and eating pathology. We expected the intervention to decrease internalization of anger and increased externalization of anger. Because the participants were at the beginning of a process of experiencing and practicing aggression regulation, we expected no significant change in control over internalization or externalization of anger. Based on the assumption that aggression dysregulation is an important underlying feature

of ED, our hypothesis was also that the intervention would lead to a decrease of Eating Disorder Pathology.

Method

Study design and participants

This study was a two-arm RCT (trial registration: NTR 3382). The trial received ethical approval from the regional medical-ethical review board (CCMO nr. NL28665.097.09). Participants were recruited from the outpatient department for ED of Lentis Psychiatric Institute Groningen, the Netherlands, between December 2010 and February 2013. Eligible participants met DSM-IV criteria for anorexia nervosa, bulimia nervosa or ED not otherwise specified, including BED, according to the clinician assessing the patient. The classification of the DSM-IV diagnoses of ED and possible comorbid diagnoses were discussed and confirmed in regular diagnostic meetings of the clinical team. The DSM-IV criteria were still in use during the inclusion period. For the research data analysis, however, the ED not otherwise specified diagnoses were – based on the medical records and extensive narratives about the patients – reclassified according to DSM-5 criteria for anorexia nervosa, bulimia nervosa, BED and OSFED (other specified feeding and eating disorder) during case conferences with two psychiatrists, both ED experts (including senior author HWH; Attia et al., 2013). Exclusion criteria were a BMI > 30, mental retardation (IQ < 70), acute psychosis and current substance dependence.

The power calculation for the present study has been derived from the findings in the pilot study with a sample of patients in inpatient care. In this non-controlled study, a significant large effect was found on anger internalization during the intervention period (Cohens $d = 1.5$, $p < 0.05$) with a small effect during the waiting period (Cohens $d = 0.4$). On anger externalization, a medium effect was found in the intervention period (Cohens $d = 0.6$, $p < 0.05$) and no effect during the pretreatment waiting period. The power calculation for the present study has been based on the assumption of a large difference in effect ($d > 0.8$) on anger internalization between intervention and control group. When alpha is set on 0.05 and the sample size on 34 participants in both arms, the present study would have a power of 90% to detect an effect of this size. With a sample size of 26 participants in both arms, the power is 80%.

Consecutive referrals who met the inclusion criteria were invited to participate in the trial. Patients who were willing to participate were asked for written consent and then completed baseline assessments prior to randomization by filling out questionnaires on demographics and clinical characteristics, therapy motivation and aggression regulation (T1). Following baseline assessment, patients were randomized to the intervention or control group. Randomization was carried out in blocks of four, and the assignment of the condition was conducted by an external office manager. As the intervention was given in dyads, the psychomotor therapist contacted the patient to start the therapy when two patients were randomized in the intervention group. The research assistant who contacted the participants was not part of the research team that analyzed the data. At the end of the intervention period, the research assistant invited participants of both groups to complete assessment (T2); if necessary, several reminders were sent.

During the first 2–3 months period after intake, patients of both groups received tailored supportive contact to restructure eating patterns without active psychotherapeutic treatment yet. This was according to the regular clinical procedure of the department with the aggression regulation intervention as the only protocolized treatment in this first period. In the study, the intervention in combination with supportive contact was compared to supportive contact only.

Primary outcome of the study was the change between T1 and T2 of internalizing and externalizing anger and Eating Disorder Pathology to indicate the post-treatment effect.

Therapies

Intervention

The intervention protocol was semi-structured and involved six one-hour sessions. The purpose of the intervention was to re-appraise aggression as a positive and body-felt phenomenon. The target was not only to cope with anger in an open way but to use anger itself as a useful coping strategy in stressful situations. A range of body and movement oriented strategies were applied to de-inhibit functional anger expression, deal with old frustrations and feel new power. The body-felt 'urge to act' inherent in aggression was given an outlet in non-verbal exercises with the use of props such as boxing gloves, sticks, baseball bats, balls, ropes, pillows and drums. These props could have symbolic meaning in relation to therapeutic objectives, for instance, the boxing bag became the external representation of a bully at school, a nosy parent, and eventually the ED itself. Aggression was revalued as a potential constructive force and redirected against destructive thoughts and behaviours belonging to the ED, projected onto the bag. The exercises were enabling hidden needs, feelings or skills to be uncovered and verbalized. Patients had the opportunity to practice verbal and non-verbal expression with proper timing and intensity. So, PMT offered a playground to safely experience with different forms of constructive aggressive behaviour. Patients started developing a personal expression repertoire using body language. The content of the intervention has been described in detail elsewhere (Boerhout et al., 2013). The psychomotor therapist who delivered the intervention was trained by a senior psychomotor therapist (CB, first author). Before applying the aggression regulation module in the context of this trial, she completed a treatment pilot with two patients. Treatment fidelity was monitored by the first author through a check of the session reports and interviews with the therapists twice a year. Extra trainings sessions with the first author were set out when questions would arise around the protocol.

Supportive contact

During the intervention period, patients of both groups received supportive contact by consulting a psychiatrist, psychotherapist, specialized nurse practitioner or dietician, once in 1 or 2 weeks. If required, additional contact was offered by email. Supportive contact included prescription of medication, psycho-education, reassurance, advice and diet management (focused on nutritional status, dietary patterns and restoration of weight).

Measures

Self-expression and control scale

The self-expression and control scale (SECS), a Dutch scale derived from the widely used state trait anger expression inventory (STAXI), was used as a measure for coping strategies of anger expression (Van Elderen et al., 1994, 1997). The SECS consists of 40 items divided over four subscales. A four-point scale is used (rating from almost never to almost always). The subscale 'Anger In' assesses efforts to hide anger (internalization of anger, e.g. 'Inside I see the without showing it'); 'Anger Out' assesses outwardly directed anger (externalization of anger, e.g. 'I say nasty things'); 'Control Anger In' assesses inwardly directed control of anger (control over the internalization of anger, e.g. 'I try to relax'); 'Control Anger Out' assesses outwardly directed control of anger (control over the externalization of anger, e.g. 'I keep my anger in restraint'). Internal reliability is high ($\alpha = 0.87$ for Anger In) as are test-retest correlations (0.65 for Anger In). Construct validity has been demonstrated on samples of psychiatric patients (Van Elderen, Verkes, Arkesteijn, & Komproue, 1996). For the purpose of this study, we were interested in the 'Anger In' and 'Anger Out' subscales based on the outcome of our pilot study (Boerhout & Van der Weele, 2007). In the pilot study, no changes were found on subscales regarding 'control over' internalization and externalization. The SECS was part of the assessment by the research assistant.

Eating disorder examination-self-report questionnaire

The eating disorder examination-self-report questionnaire (EDE-Q; Fairburn & Beglin, 1994; Dutch translation; Nauta, Hospers, Kok & Jansen, Maastricht University, the Netherlands, 2000) was used to assess the key behavioural features and associated psychopathology of the ED. The EDE-Q consists of 36 items, uses the time frame of the past 28 days and has four subscales: Restraint [e.g. 'Have you gone for long periods of time (8 h or more) without eating anything in order to influence your shape or weight?'], eating concern (e.g. 'Has thinking about food or its caloric content made it much more difficult to concentrate on things you are interested in, for example, reading, watching TV, or following a conversation?'), weight concern and shape concern [e.g. 'Has your shape/weight influenced how you think about (judge) yourself as a person?']. Frequency ratings of key behaviours such as binge eating, vomiting and laxative misuse are included in the questionnaire. Internal consistency for the EDE-Q is acceptable for the total score ($\alpha = 0.90$; Peterson et al., 2007). Current research provides support for the reliability and validity of the EDE-Q (Berg, Peterson, Frazier, & Crow, 2012). The EDE-Q was part of the standard assessment procedure for all patients at the ED unit of the institute, independent of participation in the study, and was conducted by email.

Patient satisfaction

At T2, patients in the intervention group received a questionnaire measuring satisfaction with the module on a Likert scale (1 = absolutely not, 10 = very much satisfied). The following questions were posed: which part of the module may or may not have been satisfactory (open question), and would you recommend the module to others if you were asked for (1 = definitely not, 3 = do not know, 5 = definitely yes).

Comorbid stress disorders, depressive disorders and motivation for the intervention were considered potential confounders. Regarding stress or depressive disorders, it was checked at baseline whether these DSM-IV Axis I disorders were diagnosed by the clinician, who saw the patient after referral to the department of ED. Motivation for treatment was assessed by adding questions on motivation (level of motivation; and for which reasons) prior to completing the other questionnaires.

Data were gathered on the number of additional supportive contacts during the intervention period and on the attendance at therapy sessions for those in the intervention group.

Statistical analysis

Statistical analyses comparing the two groups were performed in SPSS (version 20). Independent samples *t*-tests and chi-square tests were used to assess differences between the intervention group and the control group at baseline and between those who did or did not complete all measures.

An intention to treat analysis was used to test the effectiveness of the intervention. Independent samples *t*-tests were performed with group (intervention/control) as independent variables and the difference between T1 (pre-intervention) and T2 (post-intervention) on SECS subscales and EDEQ total as dependent variables.

To assess clinical significance of outcomes, the between-groups effect size (Cohens *d*) was calculated by dividing the mean differences of both groups by the pooled standard deviation of the intervention and control group at baseline (Cumming, 2012). Confidence intervals indicate the likely range of the magnitude of any differences in the performance of the two groups. The available norm scores of the SECS (Van Elderen et al., 1994) were used as frame of reference for the scores of the trial participants.

Results

Participants

In this study, a total of 54 female patients were assessed for eligibility, of which 40 agreed to participate, and were randomized and allocated to either the intervention condition (20) or the control condition (20; Figure 1). Twenty-nine women completed questionnaires at T2: 12 in the control group and 17 in the intervention group. Of these, 20 women also completed the EDE-Q in the independent assessment procedure for all ED patients of the institute: nine in the control group and 11 in the intervention group. Four of the 20 women randomized to the intervention group did not start with the intervention. Two of them did complete T2 (for intention to treat analysis). One woman started the intervention but did not complete T2. So, in the end, 17 women with complete data (85%) could be analyzed in the intervention group. Out of 15 of these women who started the intervention, nine attended all six sessions of the module, five attended five sessions and one attended four sessions.

Baseline measures

Dropout analysis at baseline showed that those with post-treatment (T2) data (SECS 29, EDE-Q 20) did not significantly differ at baseline from those for whom T2 data were missing on SECS Anger In [$t(38) = 1.12, p = 0.27$], SECS Anger Out [$t(38) = -1.01, p = 0.32$],

EDEQ total score [$t(31) = -0.87, p = 0.39$], age [$t(38) = -0.83, p = 0.41$], duration of previous treatment [$t(37) = -0.78, p = 0.44$].

In the groups with both pre-treatment and post-treatment data (SECS: $n = 17$ intervention/ 12 control and EDE-Q: $n = 11$ intervention/ nine control), there were no differences at baseline on the SECS Anger In scale [$t(27) = 0.81, p = 0.43$], the Anger Out scale [$t(15.43) = -1.39, p = 0.18$] and EDEQ total score [$t(11.19) = -1.25, p = 0.24$].

Although there were differences between intervention and control group with regard to the mean age of participants, variation in diagnosis and duration of previous treatment, these differences did not reach significance (Table 1). In neither group stress disorder or depressive disorder was diagnosed as a DSM-IV Axis I disorder. There were no differences in motivation between groups. The frequency of supportive contacts during the intervention period, apart from those with the psychomotor therapist, did not differ significantly between both groups. The same holds true for the total sum of contacts in both groups: the difference between both groups due to the extra contacts of patients in the intervention group with their psychomotor therapist did not reach significance. No difference between groups was found for the treatment length (number of weeks) between baseline assessment (T1) at the beginning of the intervention period and the post treatment assessment at the end of the intervention period (T2).

Primary outcome measures

The main outcome measures are presented in Table 2. The intention to treat analysis showed a significant change in SECS Anger In score for participants in the intervention group with lower scores on T2 than on T1 [$M(\text{post-treatment} - \text{pre-treatment}) = -2.59, SE = 1.76$] when compared with those in the control group, who scored higher on T2 than on T1 [$M(\text{post-treatment} - \text{pre-treatment}) = 2.75, SE = 1.19$]. This difference ($M = 5.34, 95\% CI = 0.55-10.13$) was significant [$t(27) = 2.29, p = 0.03$]. The subscale for Anger Out of the SECS showed no significant differences between groups [$t(27) = -1.28, p = 0.21$].

The decrease in EDE-Q total score was greater for the participants in the intervention group [$M(\text{post-treatment} - \text{pre-treatment}) = -0.97, SE = 0.29$] than for those in the control group [$M(\text{post-treatment} - \text{pre-treatment}) = -0.06, SE = 0.19$]; this difference between groups ($M = 0.91, 95\% CI = 0.14-1.67$) was significant [$t(18) = 2.50, p = 0.022$].

The results on Anger In and EDE-Q total showed high effect sizes (Cohens *d*), 0.78 and 0.76, respectively.

Patient satisfaction

All 15 patients who received the intervention filled in the 10 point Likert Scale on satisfaction. Mean score was 7.80 (SD = 1.21). Individuals appreciated the relational qualities of the therapist (seven times) and the support of co-participants (five times). The following topics were mentioned more than once: Satisfied; exercises to practice expression (eight times), awareness or recognition of body tension or emotion (six times); not satisfied, not enough sessions (four times), duration of individual sessions too short (four times), no match (two times).

Twelve out of 15 participants replied that they would recommend others strongly to participate in the module, two thought they possibly would and one was in doubt.

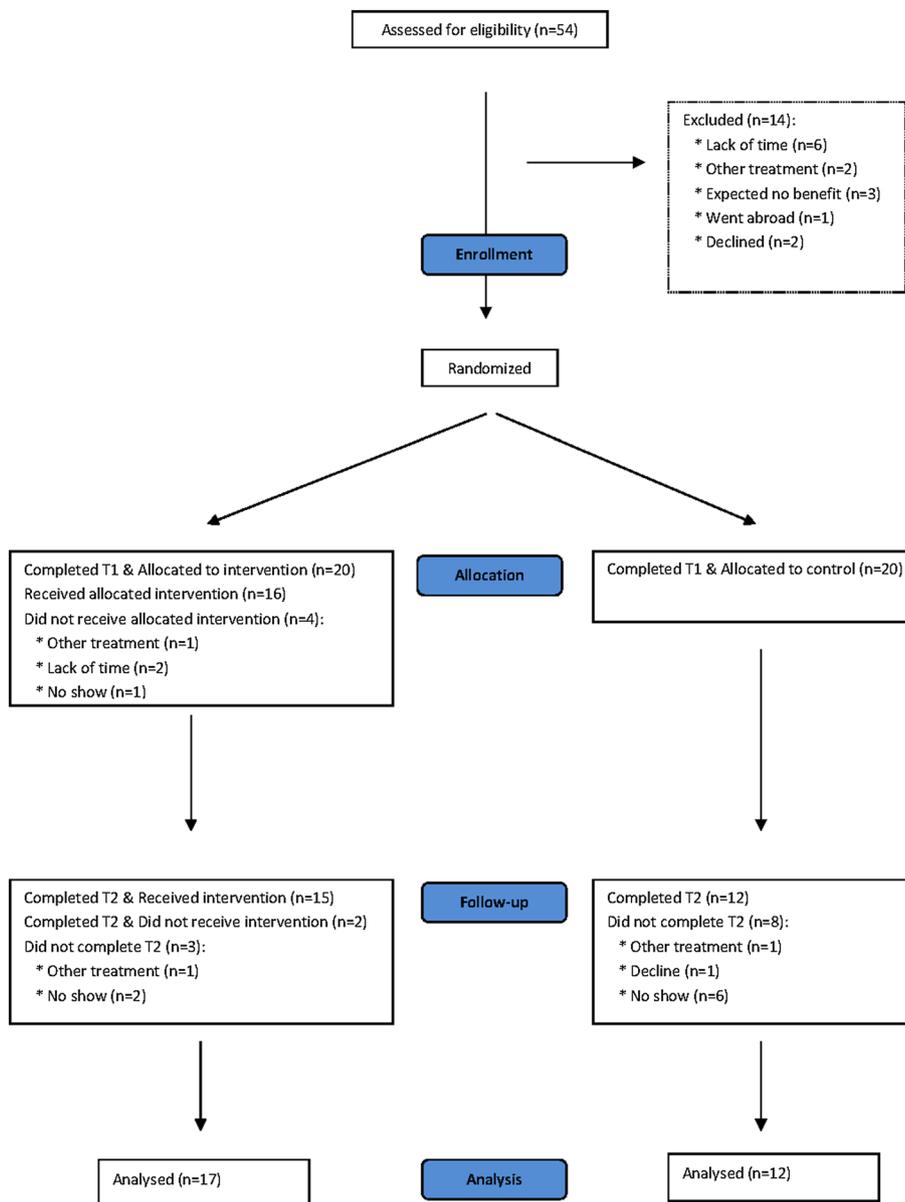


Figure 1. Flow diagram of participants

Discussion

This study is the first RCT to evaluate a targeted treatment of aggression dysregulation in patients with an ED. A relatively brief therapy intervention with a body and movement oriented approach of aggression regulation yielded an immediate effect. Compared with supportive contact only, the intervention in combination with supportive contact led to the proposed effect: a decrease of anger internalization. Moreover, the intervention resulted in a significantly greater reduction in ED-related psychopathology compared with supportive therapy only.

The main limitation of this RCT was the relatively small sample size. Especially where the changes in ED are concerned, the study was presumably underpowered. Nevertheless, significant results

were obtained, which may stand for robust findings. Changes in differences between groups, however, should be interpreted with caution. Comparison of the participants in intervention and control group revealed no significant differences, but the intervention group did contain relatively more young patients with a shorter history of previous treatment and more patients with bulimia. This over-representation of participants who are potentially more susceptible to treatment could possibly have influenced results. The trial was conducted in a clinical practice setting with various organizational changes challenging the continuity of our programme. This had a negative impact on the long term follow-up and resulted in insufficient data to assess changes over a longer follow-up period of time. Especially the implementation of a new assessment procedure to obtain routine EDE-Q measurements by

Table 1 Differences between analyzed groups: participant age, diagnosis, duration of previous treatment, motivation at baseline, frequency of contacts during intervention period, and treatment length

	Intervention (<i>n</i> = 17)	Control (<i>n</i> = 12)	<i>p</i>
Age (mean)	25.12 (SD = 6.60)	30.75 (SD = 11.04)	0.09 [†]
Diagnosis (n, AN;BN;BED)	3;11;3	6;5;1	0.17 [‡]
Duration of previous treatment (years)	4.94 (SD = 4.93)	8.17 (SD = 7.31)	0.17 [†]
Motivation for intervention (n, motivated;neutral;not motivated)	14;3;0	8;4;0	0.33 [‡]
Frequency of supportive contacts	6.29 (SD = 5.89)	8.75 (SD = 5.71)	0.17 [§]
Frequency of contacts in intervention	4.88 (SD = 1.93) [¶]	Not applicable	
Sum of contacts	11.17 (SD = 6.09)	8.75 (SD = 5.71)	0.29 [†]
Treatment length (weeks)	11.76 (SD = 3.96)	13.08 (SD = 3.20)	0.35 [†]

[†]*T*-test.

[‡]Chi-square.

[§]Mann-Whitney.

[¶]For those who started the intervention (*n* = 15) 5.53 (SD = 0.64).

AN, anorexia nervosa; BN, bulimia nervosa; and BED, binge eating disorder.

email resulted in higher non-response for this measure. However, an advantage of the assessment by the institutional routine outcome measurement was that the ED pathology assessment was completely independent from the study. Still the number of participants who could be analyzed was too small to allow for multiple testing necessary for extra analyses to differentiate between subscales of the EDE-Q.

Another limitation was that the use of self-report measures in this trial could have resulted in bias, for example, the aforementioned social desirability. Negative connotations about aggression may lead to underreporting anger problems out of shame, guilt, fear or taboo, or a tendency to please others. We tried to limit consequences of possible bias by applying randomization and a separate assessor.

Although the research dropout was relatively high, possibly partly due to the organizational factors mentioned previously, it was a strength of our study that there was no treatment dropout, despite literature showing that dropout is common in the treatment of ED, especially in an outpatient facility (Fassino, Pierò, Tomba, & Abbate-Daga, 2009). The role of anger in emotional dysregulation might be a factor associated with dropout. Research showed that bulimic patients that drop out from brief psychotherapy seem to be more predisposed to anger and less cooperative (Fassino, Abbate-Daga, Piero, Leombruni, & Rovera, 2003). Our preliminary proposition is that acknowledging the role of anger

in the ED and lowering the threshold for body-felt anger expression contributed to therapy adherence and cooperation, and at the same time, may have contributed to the improvement of Eating Disorder Pathology.

In our approach, instead of being a barrier for treatment, self-directed anger was a target of treatment and considered to be directly related to the ED. This probably added to our result showing an improvement of Eating Disorder Pathology, which indeed is in line with the results of a number of studies indicating a relationship between anger and ED (Engel et al., 2007; Fox & Power, 2009; Harrison et al., 2010; Ioannou & Fox, 2009; Quinton & Wagner, 2005). Reduced emotional expression in ED is found to be strongly correlated with perception of threat from anger (Ioannou & Fox, 2009). Unhealthy core beliefs have impact on eating pathology by means of increasing the tendency to suppress anger (Waller et al., 2003). Starting point of the intervention was to reappraise and redirect aggression. The effect on anger internalization corresponds with our clinical experiences over the past 15 years and confirms the trend in the pilot study prior to this trial. The positive result on eating pathology makes sense from a clinical point of view. Patients made a start in overcoming anger internalization by experiencing anger expression redirected against (parts of) the ED in a body and movement oriented way (Boerhout et al., 2013). It has been suggested in the literature that

Table 2 Mean scores on outcome measures and the results of the *t*-tests on differences in change between pre and post treatment

Outcome measure	Pre-assessment (T1)				Post-assessment (T2)				Post – Pre-assessment			ES
	Intervention		Control		Intervention		Control		Mean differences between intervention and control			
	M	SD	M	SD	M	SD	M	SD	M	<i>p</i> [†]	95% CI	<i>d</i>
SECS Anger In	26.82	6.66	24.75	7.05	24.24	5.72	27.50	7.50	5.34	0.03	0.55–10.13	0.78
SECS Anger Out	18.29	4.19	21.75	7.86	18.76	3.33	20.08	6.08	−2.14	0.21	−5.57–1.29	0.34
EDE-Q total	3.82	0.23	3.13	0.50	2.85	0.36	3.07	0.41	0.91	0.02	0.14–1.67	0.76

[†]*T*-test of mean differences

Sample sizes for the intervention group: SECS *n* = 17, EDE-Q *n* = 11; and for the control group: SECS *n* = 12, EDE-Q *n* = 9.

ES, effect size; SECS, self-expression and control scale; and EDE-Q, eating disorder examination-self-report questionnaire.

by helping girls to develop expression skills they may begin to feel more confident about themselves and their bodies and may thus engage in less disordered eating behaviour (Norwood et al., 2011). An indirect aim of the intervention is to empower self-esteem by helping overcome avoidance behaviour. For example, patients with anorexia nervosa must learn to cope with stress by focusing on problem solving instead of focusing on avoiding emotional tension by internalizing anger (Brytek-Matera, 2007). In general, body awareness of anger-related interoceptive stimuli needs to be improved before one is able to express emotions. Interoceptive awareness can be considered the result of the process of perception and recognition of the visceral sensations associated both with physical (e.g. muscle tension, body temperature and heartbeat) and emotional stimuli. Many authors have suggested an interoceptive awareness deficit in ED (Truglia et al., 2006).

The high baseline score on Anger In in our study is in line with previous research findings (Truglia et al., 2006; Zaitsoff, Geller, & Srikameswaran, 2002). Before treatment, the intervention group scored three deciles higher than the Anger In norm scores of a Dutch general population of women in the same age group ($M = 22.1$, $SD = 7.0$; Van Elderen et al., 1994). At post-treatment assessment, the Anger In score had dropped one decile. The control group started two deciles above average on Anger In, and this score increased with one decile at post-treatment assessment. Although the intervention made a significant and substantial difference on anger internalization, at the same time, the outcome underscored the persistence of anger suppression in ED as the mean score still remained above average of the norm population at post-treatment assessment. For patients in an initial phase of outpatient treatment, this might not be surprising, because there had been no explicit treatment of anger internalization, despite of previous healthcare experience.

This trial did not detect a direct change on Anger Out, as we had expected from the significant increase of anger externalization in the pilot study. Apparently, it is not one on one that if someone reduces the hiding of anger, she will also show more outwardly directed anger. One explanation could be that there is an association between reported level of Anger Out and the level of social desirability, as was found earlier (Bartz, Blume, & Rose, 1996). Generally, behaviour outcome expectancies may have a suppressing influence on Anger Out, because of the negative consequences that people, who tend to act and answer in a socially acceptable way, expect from behaving aggressively (Van Coillie & Van Mechelen, 2006). It could well be that the negative content of most Anger Out items of the SECS could have increased the threshold for a higher score: 'I say nasty things', 'I make sarcastic remarks to others', 'I'm a nuisance to others', 'I say hateful things'. In fact, these items do not represent positive aggression as pursued in the intervention. A minority of Anger Out items could be interpreted in a positive way: 'I express my anger', 'I express clearly how I feel', 'I make sure that my anger is shown'. Regarding the SECS scales, positive aggression is more akin to a high score on another subscale focusing on Control Anger Out. A high score on this subscale means that patients express their anger in a socially acceptable way, so that they do not engage in conflict situations, which would keep their anger levels up. In the non-controlled pilot study prior to the current study, a short-term increase in Anger Out score was shown. However, the pilot involved more severe

inpatients who were possibly more triggered to extreme emotions by the ongoing interactions within the therapeutic community (24 h a day, five days a week) (Boerhout & Van der Weele, 2007).

A recent review on emotional difficulties in the context of ED indicated that positive emotions need more attention in helping patients to focus on their strengths and resources (Tchanturia, Dapelo, Harrison, & Hambrook, 2015). We like to add that anger should not be labelled one-sided as a negative emotion, for that would reinforce a taboo on expression and overlook the positive clinical worth of learning patients to reappraise and express anger feelings, which are a resource in building a stronger identity and in defending personal territory (Boerhout et al., 2013).

It remains to be investigated whether inadequate anger expression and skill deficits in dealing with anger are features of the ED itself or predisposing risk factors. Anger may have an etiological role or may be a barrier for treatment by maintaining psychopathology and should therefore be addressed in treatment (Krug et al., 2008). Although suggestions have been made to apply elements of existing cognitive-behavioural approaches, a specific intervention protocol targeted at aggression regulation is still missing (Boerhout et al., 2013).

With this trial, we provided initial evidence that a targeted treatment of anger and aggression in ED may profit from a body and movement oriented approach. For application in clinical practice, it is crucial to address anger inhibition as an integral part of the ED and not as an isolated problem. Letting patients physically hit a bag is no mere solution, just as venting anger on another person does not solve a problem. The therapist needs to acknowledge the patients' fears for losing control, losing contact, or feeling empty or frustrated. It should be explained to patients and colleagues that anger and aggression need a relational approach, that is, an awareness of the significance of interactions with others, with momentary circumstances, with individual and cultural norms, mediated by present and past body experiences (Boerhout et al., 2013).

The intervention seems to be a viable add-on for treatment as usual. It potentially may enhance the patients' responsiveness to further psychotherapeutic treatment because it tackles a difficult emotion to treat that may have a role in blocking the entire process of treating ED. Although an extension of sessions or a multidisciplinary commitment might be most efficient, the brief intervention in this study already appears to be effective and therefore of interest in terms of cost-effectiveness.

Additional research with more participants across various settings is needed to generalize the results of this study. Furthermore, studies with a homogenous patient population are necessary to shed more light on possible differences in effect of aggression regulation between specific diagnostic groups.

Conclusion

The findings of this study support our hypothesis that body and movement oriented therapy may contribute significantly to improvement in internalization of anger and is well appreciated by patients. Moreover, the significant and substantial decrease of ED symptoms in the intervention group supports the premise that anger and aggression belong to the core of ED problems. Follow-up research with larger sample sizes is needed to confirm these first findings.

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