Cognitive Remediation in Anorexia Nervosa and Related Conditions: A Systematic Review

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Abstract

Research evidence for cognitive remediation therapy’s (CRT) effectiveness for anorexia nervosa (AN) has been gathering. This approach is also increasingly being implemented in other disorders including major depressive disorder, obsessive–compulsive disorder and autistic spectrum disorder that share commonalities with AN in neuropsychological profiles and clinical presentations. This systematic literature review identified and appraised the current evidence base to see whether evidence from related conditions could be integrated into the theoretical understanding of CRT for AN as well as future AN treatment developments and research.

Overall, CRT studies in AN report promising findings, and CRT appears to be associated with improvements in set-shifting and in central coherence. Cognitive remediation approaches in other conditions also show promising evidence in associated improvements in areas of executive functioning and information processing; links are made between AN treatment and what future treatment developments could consider. Copyright © 2014 John Wiley & Sons, Ltd and Eating Disorders Association.

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Keywords

cognitive remediation; systematic review; anorexia nervosa; mood; autistic spectrum disorder

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Introduction

Anorexia nervosa (AN) is a complex eating disorder (ED) with a serious course and outcome, enduring nature and relatively low rates of full recovery (Steinhausen, 2009). There is limited evidence for the treatment of AN (Hay, Touyz, & Sud, 2012; NICE, 2004) due to the difficulty of conducting clinical trials, in part owing to patients’ ambivalence about change, high drop-out rates between 35% and 75% (Bulik, 2014) and low treatment acceptance rates (Halmi et al., 2005). The challenge of treating AN has prompted the development of novel approaches with the aim of targeting the maintenance factors of AN as opposed to core ED concerns (Hay et al., 2012).

A cognitive-interpersonal maintenance model of AN (Treasure & Schmidt, 2013) suggests four key maintenance factors including cognitive rigidity, which can lead to ‘all-or-nothing’ type of thinking, a strict attention to details and perfectionistic tendencies. Neuropsychological research has highlighted two main areas of executive functioning difficulty in AN (Lang, Lopez, Stahl, Tchanturia, & Treasure, 2014; Tchanturia et al., 2012), namely, set-shifting and weak central coherence. First, set-shifting is the ability to move back and forth between multiple tasks or operations (Lezak, Howieson, Bigler, & Tranel, 2012) and systematic reviews, and large databases of set-shifting in AN have shown that it appears to be inefficient, as assessed by different neuropsychological tasks (Roberts, Tchanturia, Stahl, Southgate, & Treasure, 2007; Tchanturia et al., 2011, 2012). Second, weak central coherence, or extreme attention to detail, has also been systematically reviewed in AN (Lang et al., 2014; Lopez, Tchanturia, Stahl, & Treasure, 2008): research suggests difficulties in global processing and more efficient performance in tasks that require attention to detail. Both set-shifting and weak central coherence may be part of the risk factors for developing AN (Roberts, Tchanturia, & Treasure, 2010; Southgate, Tchanturia, & Treasure, 2005) and appear not to improve following weight gain (Green, Elliman, Wakeling, & Rogers, 1996; Lindner, Fichter, & Quadflieg, 2013; Tchanturia et al., 2004, 2011, 2012). In terms of clinical presentation, AN patients are often fixated with certain behaviours and routines, such as specific rules; an extreme detail focus and the aforementioned ambivalence towards change can impact on engagement with treatment (Tchanturia, Lloyd, & Lang, 2013). It is therefore important to develop interventions that target these difficulties, help patients to...
Cognitive remediation therapy (CRT) was originally developed for use in brain injuries (Cicerone et al., 2011) and was then further developed for psychosis (Wykes, Huddy, Cellard, McGurk, & Czobor, 2011). Over the last decade, evidence has been growing for CRT for AN (Tchanturia, Lloyd, et al., 2013). CRT for AN is a brief, manualised intervention, which consists of various cognitive flexibility and gestalt processing (‘bigger picture’) cognitive exercises. It addresses the processes of thought, rather than the content, thus targeting cognitive processes and not core ED features (Tchanturia, Davies, Reeder, & Wykes, 2010; http://www.national.slam.nhs.uk/wp-content/uploads/2014/04/Cognitive-remediation-therapy-for-Anorexia-Nervosa-Kate-Tchantura.pdf). These simple cognitive exercises aim to increase cognitive flexibility and the ability to switch between mental tasks. Individual CRT is delivered in 10 sessions, twice weekly, for 45 minutes each session. Patients complete the tasks and increasingly reflect on their thinking styles and strategies. The therapist gradually encourages reflection on how these strategies can be linked to examples from everyday life and also encourages practice between sessions with behavioural tasks. CRT benefits from its specific and nonthreatening material to encourage curiosity and reflectiveness at a metacognitive level, and as it contributes to establishing a therapeutic relationship, it can be used as part of an introduction to further psychological treatment (Tchanturia, Lloyd, et al., 2013). CRT is a low-intensity intervention for use when patients are first admitted to an inpatient unit and are in the acute (nutritionally compromised) stages of AN.

Method

Cognitive remediation and training approaches are also increasingly being implemented in other disorders, including major depressive disorder (MDD), obsessive–compulsive disorder (OCD) and autistic spectrum disorder (ASD). These three conditions are often comorbid conditions with AN, sharing some overlaps with AN in neuropsychological findings. No review to date has investigated the use of cognitive remediation across these conditions, therefore, this systematic literature review aimed to appraise the current evidence base across all four conditions and to consider any similarities and differences in the use of such approaches. The review focuses on how the main characteristics and research findings from different treatment approaches in other conditions could be related to AN.

An electronic search was conducted between September and November 2013 using the PubMed and PsyInfo databases and was updated in May 2014. The search terms used were anore*, depress*, obsses* and compuls* and aut* combined with ((cognit*) and (remed* or train*)). These search terms allowed for multiple spellings, plurals and combinations. Only published, peer-reviewed literature in English was considered, with no specific date parameters. Criteria for inclusion of studies were as follows: studies cognitive remediation or training interventions in AN, MDD, OCD and ASD and no other disorders (e.g. Schizophrenia); only studies on adult clinical populations only were considered and only of individual and group programmes (i.e. no solely self-help or web-based programmes); both quantitative and qualitative studies were considered. The titles, abstracts and full texts were screened, and articles were also found via hand searches of reference lists. In total, 2068 records were screened, 79 followed up and 24 studies were reviewed (Figure 1 and Tables 1 and 2). The review was conducted according to the ‘PRISMA’ statement (Moher, Liberati, Tetzlaff, & Altman, 2009).

Cognitive remediation therapy for anorexia

In total, 15 articles are reviewed on AN.

Case studies and series

Inpatient case studies first reported significant improvements in neuropsychological tests of set-shifting and positive patient feedback (Davies & Tchanturia, 2005; Pretorius & Tchanturia, 2007; Tchanturia, Whitney, & Treasure 2006). A preliminary case series (Tchanturia, Davies, & Campbell, 2007) then investigated the intervention (n = 4 inpatients) with assessments pre-intervention and post-intervention and at 18 month follow-up, showing improvements in a cognitive flexibility neuropsychological task (medium to large effect sizes). A larger pilot case series followed (Tchanturia et al., 2008) investigating neuropsychological and self-report measure at baseline and post-intervention (n = 27 inpatients; 23 completers). Improvements were found in set-shifting and central coherence (medium to very large effect); the patients’ mean body mass index (BMI) also significantly increased and there was a significant decrease in self-reported symptoms of depression.

An outpatients case series (n = 7) found that CRT was associated with self-reported improvements in flexibility of thinking and levels of perfectionism (Pitt, Lewis, Morgan, & Woodward, 2010). Finally, a larger case series was conducted (Abbate-Daga, Buzzichelli, Marzola, Amianto, & Fassino, 2012), which evaluated CRT with 20 AN outpatients. Neuropsychological assessments found results consistent with those described earlier, namely, that following CRT, there were improvements in set-shifting (medium to large effect), despite the use of different neuropsychological tests. Also reported was a significant improvement in BMI, in general functioning and no dropouts.

Randomised controlled trials (RCT) of CRT in AN

Dingemans et al. (2014) randomly assigned 82 patients with severe and enduring AN to CRT plus treatment as usual (TAU; n = 41) or TAU only (n = 41). Assessments pre-CRT and post-CRT and at 6 months follow-up showed that CRT was associated with significant improvements in quality of life post-CRT and in ED symptoms at follow-up. Moderator analyses showed that patients with poorer baseline set-shifting abilities benefited more from CRT and had better quality of life at follow-up. Neuropsychological performance in set-shifting and central coherence, however, improved significantly in both groups; the authors argue that this could be due to practice effects or nonspecific ingredients of treatment.

A second RCT (Brockmeyer et al., 2014) assessed CRT’s feasibility and efficacy by randomising 40 inpatients to tailored CRT (n = 20) or nonspecific neurocognitive therapy (NNT; n = 20); patients were offered a more intensive 30 sessions (21 computer-assisted and nine face-to-face) and assigned computer-assisted
homework. The NNT focused only on attention, memory and deductive reasoning. The manual-based CRT was tailored and focused solely on set-shifting; as argued by the authors, central coherence was omitted to remove any potentially confounding factors with regard to the control condition. The primary outcome was performance on a computer-based task-switching paradigm that assessed pre-intervention and post-intervention. Overall CRT participants significantly outperformed the NNT group in set-shifting, and overall patient feedback was more positive for CRT. The authors argue that specific tailored neurocognitive training is more effective (medium effect) and argue for the feasibility of CRT for AN.

An outpatient’s RCT assessed the feasibility of using CRT with a focus on reducing drop-out rates in AN RCTs (Lock et al., 2013). The authors randomised 46 outpatients to eight sessions of CRT or cognitive behavioural therapy (CBT) over 2 months, followed by 16 CBT sessions over 4 months. The authors report a lower drop-out rate in the CRT group (13%) compared with the CBT group (33%); they also found improvements in cognitive efficiencies in the CRT group compared with the CBT group at the end of the trial. Furthermore, a recent RCT (Steinglass et al., 2014) compared CRT with exposure and response prevention for AN (AN-EXRP), which is a new approach that targets maladaptive eating behaviour by addressing eating-related anxiety. Inpatients (n = 32) who were weight restored (BMI over 18.5) were offered 12 sessions of AN-EXRP or CRT, and the outcome measure was caloric intake at a test meal, which the authors found was higher in the AN-EXRP group; this improvement was also significantly associated with eating-related anxiety. However, because of the inpatients being weight restored, they differ significantly from participants in all the other studies mentioned earlier.

**Group CRT for AN**

Following the development of individual CRT, the intervention was adapted to group format; group CRT is delivered weekly over four sessions and encourages the practice of global and flexible thinking with the addition of peer support and group facilitators. The group comprises psychoeducation, practical exercises, reflection and discussion and the planning of homework tasks.
### Table 1 Summary table of studies (in chronological order and in note form)

<table>
<thead>
<tr>
<th>Study aims and design</th>
<th>Participant and intervention characteristics</th>
<th>Summary of measures and results</th>
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<tbody>
<tr>
<td><strong>Lock et al., 2013 (USA)</strong></td>
<td>RCT; <em>n</em> = 46 outpatients (11% men) eight CRT or CBT sessions then 16 sessions of CBT</td>
<td>Assessments pre-intervention and post-intervention; neuropsychological tests of set-shifting and central coherence; self-report (e.g. ED symptoms, self-esteem and mood) and clinical measures</td>
</tr>
</tbody>
</table>
| **RCT assessing the feasibility of using CRT to reduce drop-out rates in AN RCTs** | BMI: *M* = 17.5 (*SD* = 1.2)  
Age: *M* = 22.7 (*SD* = 5.9)  
Duration of illness: *M* = 6.4 years (*SD* = 5.8)  
CRT: eight sessions over 2 months; 1-hour session  
CBT: 24 sessions over 6 months | Lower drop-out rate in the CRT group (13%) compared with the CBT group (33%). Larger improvements in cognitive difficulties in the CRT group compared with the CBT group at the end of 2 months |
| **Brockmeyer et al., 2014 (Germany)** | *n* = 40 women with AN; inpatients receiving treatment as usual | Assessment pre-treatment and post-treatment of cognitive set-shifting; also assessed attention, working memory and intelligence to control for potentially confounding difficulties (details available) |
| **Pilot RCT of CRT—tailored CRT compared with non-specific cognitive training** | Age—CRT: *M* = 23.63 (*SD* = 6.7); NNT: *M* = 26.65 (*SD* = 8.9)  
BMI—CRT: *M* = 14.74 (*SD* = 1.6); NNT: *M* = 14.68 (*SD* = 1.7)  
Illness duration (years)—CRT: *M* = 7.89 (*SD* = 7.6); NNT—*M* = 6.82 (*SD* = 7.6) | At Time 2, CRT participants outperformed the NNT participants in cognitive set-shifting (*p* = 0.027; *d* = 0.62)  
Patient feedback: training matched their problems: CRT, 80%; NNT, 57%; felt more flexible after training: CRT, 60%; NNT, 43%; felt more ready to tackle problems: CRT, 100%; NNT, 100%; would recommend to others? CRT, 90%; NNT, 86%  
Specific-tailored neurocognitive training for AN appeared to be more effective than non-specific neurocognitive therapy (medium effect size)  
Assessments pre-CRT and post-CRT and at 6 months follow-up.  
CRT associated with significant improvements in quality of life post-CRT and in ED symptoms at follow-up.  
CRT not associated with changes in neuropsychological performance in set-shifting or central coherence.  
Neuropsychological performance improved significantly in both groups  
Moderator analyses showed that patients with poor baseline set-shifting abilities benefited more from CRT, and had better quality of life at follow-up, than patients with no such difficulties at baseline. |
| **Prospective, randomised controlled, superiority pilot trial** | CRT was manual-based and focused only on cognitive set-shifting (omission of the central coherence component); NNT focused on attention, memory and deductive reasoning; computer-assisted homework; CRT and NNT provided by the same therapists.  
TAU included weekly individual and group psychodynamic psychotherapy, art therapy, behavioural and family interventions. | Outcome measure: caloric intake at a test meal  
Caloric intake higher in the AN-EXRP group  
Improvement in caloric intake associated with eating-related anxiety.  
Higher caloric intake at a test meal in the exposure group; this improvement was significantly associated with eating-related anxiety |
| **Dingemans et al., 2014 (Netherlands)** | CRT versus treatment as usual (TAU)  
Randomisation of 82 patients to CRT plus TAU (*n* = 41) or TAU only (*n* = 41) | CRT associated with significant improvements in quality of life post-CRT and in ED symptoms at follow-up.  
CRT not associated with changes in neuropsychological performance in set-shifting or central coherence.  
Neuropsychological performance improved significantly in both groups  
Moderator analyses showed that patients with poor baseline set-shifting abilities benefited more from CRT, and had better quality of life at follow-up, than patients with no such difficulties at baseline. |
| **RCT in severe and enduring AN (CRT plus TAU versus TAU only)** | *n* = 32 inpatients (weight restored, i.e., BMI over 18.5)  
12 sessions of AN-EXRP or CRT  
NNT focused on attention, memory and deductive reasoning; computer-assisted homework; CRT and NNT provided by the same therapists.  
TAU included weekly individual and group psychodynamic psychotherapy, art therapy, behavioural and family interventions. | Outcome measure: caloric intake at a test meal  
Caloric intake higher in the AN-EXRP group  
Improvement in caloric intake associated with eating-related anxiety.  
Higher caloric intake at a test meal in the exposure group; this improvement was significantly associated with eating-related anxiety |

**Note:** RCT, randomised controlled trial; CRT, cognitive remediation therapy; CBT, cognitive behavioural therapy; ED, eating disorder; BMI, body mass index; M, mean; SD, standard deviation; AN, anorexia nervosa; NNT, non-specific neurocognitive therapy.
A group CRT pilot (Genders & Tchanturia, 2010) investigated outcomes for 30 inpatients: at the first and last group sessions, patients completed a feedback form and self-report measures assessing cognitive flexibility, self-esteem and motivation to change (perceived importance to change and ability to change); data for both time points were available for 18 patients. Overall, there was a significant improvement in self-reported ability to change and an improvement in cognitive flexibility. Patients reported finding the group useful in sharing their experiences and appreciated the use of practical tasks to demonstrate thinking and behaviour. A second study aimed to assess the feasibility and acceptability of group CRT (Zuchova, Erler, & Papezova, 2013). Two weekly CRT groups were run (n = 14 and n = 20 inpatients) and included 10 CRT sessions and 10 sessions on reflection and exploration of thinking styles. Patients gave positive feedback overall, and the authors argue that group CRT also gives the patients the opportunity to experience the therapeutic effects of group interaction without some of the emotional demands of other types of group therapy.

### Related conditions and cognitive remediation or training

#### Major depressive disorder

In total, six articles are reviewed on MDD. Prevalence rates amongst ED inpatients are as high as 94% for mood disorders, mainly unipolar depression, across ED types (Blinder, Cumella, & Sanathara, 2006). MDD is argued to be associated with broad difficulties in executive functioning that are not solely accounted for by slower processing speed (Snyder, 2013). Compared with healthy controls, reduced neuropsychological functioning has been found in cognitive flexibility, attention and attentional switching and visual learning and memory (Lee, Hermens, Porter, & Redoblado-Hodge, 2012).

Cognitive remediation (CR) for MDD aims to target neuropsychological functioning and cognitive control. These interventions mainly target areas of memory, attention, executive functioning and psychomotor speed by using computerised individual and/or group training sessions and informal practice between sessions. Such interventions have been associated with significant improvements in cognitive performance on executive functioning skills as well as verbal learning and memory (Bowie et al., 2013; Elgamal, McKinnon, Ramakrishnan, Joffe, & MacQueen, 2007). Three studies of CR for MDD have also investigated the ‘Neuropsychological Educational Approach to Remediation’ (NEAR), which uses therapist-led ‘drill and practice’ group activities as well as computer-assisted cognitive training. It aims to promote motivation and learning by using principles such as errorless learning, positive reinforcement, participant choice and the contextualisation of learning. This intervention was found to be associated with significant improvements in memory encoding and retention (Naismith, Redoblado-Hodge, Lewis, Scott, & Hickie, 2010), visual and verbal memory (Naismith et al., 2011) and immediate learning and memory (Lee et al., 2013); however, no associated improvements were found in executive functioning. A preliminary study has also investigated the use of cognitive control training for MDD, which is a neurobehavioural therapy in that it uses computer-based tasks to activate the prefrontal cortex neural network to practice attention focus and executive control; the authors found associations with decreased negative affect and self-reported rumination and improved focus and concentration; however, there appears to be no published follow-up study to this preliminary one (Siegle, Ghiassi, & Thase, 2007).

In summary, there is preliminary evidence for CR for MDD, which warrants further research (Anaya et al., 2012; Porter, Bowie, Jordan, & Malhi, 2013). An interesting focus is the motivational aspect in the Neuropsychological Educational Approach to Remediation approach, which places emphasis on principles such as errorless learning, positive reinforcement and the contextualisation of learning. As mentioned earlier, CR for AN has a motivational component in using the tasks to encourage reflection in everyday life, and group CRT was associated with a significant improvement in self-reported ability to change (Genders & Tchanturia, 2010). This perceived increase in competency could, in and of itself, have a positive impact.

#### Obsessive–compulsive disorder

In total, two articles are reviewed on OCD. Prevalence rates for anxiety disorders amongst ED inpatients could be as high as 56% across ED types, with OCD being twice as likely in AN compared with other EDs (Blinder et al., 2006). Research has shown that obsessive–compulsive personality disorder (OCDP) traits are associated with a poorer prognosis in AN and that these traits may moderate outcome (Crane, Roberts, & Treasure, 2007). Childhood OCD traits also show a high predictive value for ED development, and childhood perfectionism and rigidity are associated with higher rates of OCPD and OCD co-occurrence in ED (Anderluh, Tchanturia, Rabe-Hesketh, & Treasure, 2003). Neuropsychological research in OCD has highlighted inefficiencies in various areas although there are some conflicting findings. Some studies have found difficulties in memory and processing speed (Segalás et al., 2008; Shin, Lee, Kim, & Kwon, 2013), whereas other studies have found difficulties in executive functioning, especially in strategising and organising stimuli (Kashyap, Kumar, Kandavel, & Reddy, 2013) and in set-shifting, response...
inhibition and decision-making (Dittrich & Johansen, 2013). It appears that, in the context of uncertainty and ambiguous situations, there may be difficulties in adequately information processing: for example, when faced with a complex problem, participants with OCD direct their attention towards more trivial information at the expense of the overall context (Savage et al., 1999).

Two studies to date have investigated the use of cognitive training in OCD and found that it was associated with improvements in visual organisational strategies and visual memory following training, which provides strategies to break down complex figures into meaningful structures (Buhllmann et al., 2006; Park et al., 2006). The initial difficulties that participants have at effectively using organisational strategies could be related to anxiety in ambiguous situations, which leads to difficulties in encoding material and effectively carrying out tasks. This can be linked to the AN presentation in terms of processing information in the context of strong emotional activation and focusing on trivial details instead of the overall context. In CRT for AN, patients reflect on their typical strategies and consider alternatives, such as adopting more ‘bigger picture’ strategies. From these studies in OCD, it appears that psychoeducation about strategies may be important in helping patients to practice these skills in sessions and in then feeling able to apply them when faced with uncertain situations in their everyday life.

**Autistic spectrum disorder**

In total, one article is reviewed on ASD. A systematic review of the prevalence of ASD in ED found high rates compared with healthy controls (Huke, Turk, Saeidi, Kent, & Morgan, 2013). Women with AN display a greater number of self-reported autistic traits compared with healthy controls, especially in global thinking and inflexibility of thinking (Tchanturia, Smith, et al., 2013). With regard to central coherence, people with AN do not seem to have superior local processing like in ASD, but they do seem to experience difficulties with central coherence (Harrison, Tchanturia, Naumann, & Treasure, 2012; Harrison, Tchanturia, & Treasure, 2011; Lopez et al., 2008) as in ASD where there are high levels of ability in tasks that require detail-focused processing (Happe & Frith, 2006). People with AN also have difficulties in emotional processing and socio-emotional processing; in social interactions, there also appear to be difficulties in alexithymia (i.e. difficulties in identifying and describing emotions) (Harrison, Sullivan, Tchanturia, & Treasure, 2009; Kyriacou, Easter, & Tchanturia, 2009). With regard to emotional Theory of Mind, which is the ability to infer what another person feels, Oldershaw, Hambrook, Tchanturia, Treasure, and Schmidt (2010) found that recovered AN patients performed well on emotional Theory of Mind tasks and were also significantly better than patients currently in treatment at inferring emotions in themselves and others. Eack, Bahorik, McKnight, et al. (2013) argue that interventions for social and non-social cognitive difficulties in ASD should integrate neurocognitive and social CR to improve adaptive functioning and quality of life.

Eack, Bahorik, Hogarty, et al. (2013) describe the cognitive enhancement therapy (CET), which targets both social and non-social information processing difficulties through the integration of computer-based neurocognitive training with group-based social–cognitive exercises; it uses repetitive practice, strategic training and homework assignments to apply CET to everyday life. The only published study to date on CET for ASD is a pilot trial, which assessed feasibility (Eack, Greenwald, et al., 2013): the intervention comprised computer-based neurocognitive training followed by a social–cognitive group programme. Overall, there were associations with highly significant and large effect size improvements in neurocognition (especially processing speed), cognitive style, social cognition (emotional understanding and management), functioning and adjustment.

This pilot study shows preliminary support, and the focus on emotional material and skills can again be linked to the context of AN where there are difficulties with emotional processing and with relationships. However, in ASD, there is a wide use of technology in interventions and interventions need to help individuals to apply their knowledge in the real world context (Wass & Porayska-Pomsta, 2013); similarly in AN, it is crucial to apply knowledge and skills to everyday life and to encourage social interaction, for example, with the use of group activities.

**Discussion**

**Treatment development and clinical implications**

In summary, studies on CRT for AN consist of single case studies, case series and four RCT-s, which report promising findings from neuropsychological, self-report and clinical measures. CRT that appears to be associated with improvements in set-shifting and in central coherence task performance and drop-out rates appear to be low, around 10–15% (Tchanturia, Lloyd, et al., 2013, supported by recent RCT-s by Brockmeyer et al., 2014; Dingemans et al., 2014; Lock et al., 2013). More research is needed with regard to the specific versus non-specific effects of CRT. Treatment developments, such as group CRT, also show interesting results in the more social aspects and difficulties of the AN presentation.

Cognitive remediation and training approaches are used across conditions that share commonalities with AN. There are not as many available published studies, but there is evidence from pilot studies in terms of feasibility and associations with improvements in various domains of executive functioning and information processing. The studies reviewed all used cognitive exercises and reflection to target disorder maintenance processes and aim to promote the use of new skills and knowledge; however, the interventions have different learning principles, active therapy ingredients and delivery strategies.

First, especially in AN and MDD, it appears that motivation to change and perceived competence in ability to make changes may be of particular relevance. As mentioned earlier, group CRT was associated with improved self-reported perceived importance to change and ability to change. The qualitative feedback from patients also reflects an appreciation for in-session practice of skills and intra-session behavioural ‘challenges’. Although CRT for AN uses the exercises more as a tool for reflection, it may be that some patients would value the opportunity for more practice of these skills; patients’ ambivalence about change can be difficult to address, and engagement in treatment may be facilitated by an increase in perceived self-efficacy and their role in their recovery, particularly because of the relationship between early engagement and treatment outcome (Tchanturia, Lloyd, Lang, 2013). CRT’s role in increasing motivation to change needs to be assessed.
further, especially in light of motivational interviewing also being increasingly used in AN as a client-centred directive method for encouraging intrinsic motivation to change by exploring ambivalence and considering readiness to change (Macdonald, Hibbs, Corfield, & Treasure, 2012). Socio-emotional processing also appears to be a commonality across the conditions, especially the processing of emotional material; emotion avoidance is suggested as a maintenance factor for AN (Treasure & Schmidt, 2013), and people with AN often experience negative emotions as dangerous and unpredictable and can strive to avoid them (Fox, Federici, & Power, 2012). Thus, as is the case in developments such as the cognitive remediation and emotion skills training intervention, focusing on both executive functions (‘cold cognitions’) and emotional processing (‘hot cognitions’) may be beneficial (Tchanturia, Doris, & Fleming, 2014) as an additional module to CRT.

This review has also highlighted the frequent use of psychoeducation, especially in MDD and OCD, in learning skills to focus attention and manage uncertainty. CRT exercises are often used to explore aspects of everyday life such as specific routines that could be challenged; it may be that in-session reflections could also focus on how to apply CRT skills, for example, in ‘seeing the bigger picture’ rather than their usual strategies, when faced with more complex and anxiety-provoking situations. Regarding intervention delivery, this literature review has highlighted the use of group activities, as opposed to individual treatment, and varying lengths of CR programmes. Group activities may be particularly useful because of the importance of promoting social interactions and a reduction of social isolation in this group, in the context of frequent emotional processing difficulties.

Research implications

To date, the studies on CR and training have small sample sizes and low statistical power, and many are not randomised trials with the control of potentially confounding variables. More research is needed with regard to the specific and non-specific effects of these interventions. Further research could also aim to replicate individual CRT studies using self-report, neuropsychological and clinical measures. Similarly, group CRT merits further research, especially on its social and motivational aspects. Follow-up longitudinal studies could also further elucidate any long-term effects of CRT and consider broader outcomes such as work and social functioning and quality of life. Furthermore, the optimal length or amount of CRT merits further attention, particularly given the differences in length of treatment of CR interventions in the related conditions. The heterogeneity of study methodologies needs to be addressed as well as the consideration of measures that may be more sensitive in gauging CRT’s specific effects. This could occur alongside research into brain mechanisms implicated in the cognitive difficulties, such as brain imaging studies that have begun to investigate clinical outcomes and the effects of CRT on neurocognition (Fonville et al., 2013; Garrett et al., 2014). Furthermore, this review focused on the adult population only; however, studies in the adolescent population also merit attention (e.g. Dahlgren, Lask, Landrö, & Ro, 2013, 2014; Pretorius et al., 2012).

Conclusion

Further research is needed not only regarding CRT’s effectiveness but also on how it is developed and tailored to meet individuals’ needs. Different approaches or foci may be suitable for different pre-treatment characteristics, and an avenue for future research and treatment developments could be to look at broad functioning and behavioural difficulties as opposed to strict diagnostic categories. More transdiagnostic considerations may also be beneficial, especially given the overlaps in conditions and similarities in associated difficulties. In addition, a qualitative component to randomised trials to gather participant experience of the interventions could help to illuminate dropout and the key mechanisms of change and separate specific from non-specific components.

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