Author's response to reviews

Title: Improving cognition in schizophrenia: Which is the more commonly used type of training, practice or strategy learning? A descriptive review.

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Author's response to reviews: see over
We would like to thank both reviewers for their constructive comments. We believe that the manuscript has been greatly improved thanks to their suggestions. We have also added a new co-author, who has worked on the Wykes and colleagues (2011) meta-analysis on cognitive remediation to ensure that we have included all the relevant articles in this review. We rewrote most of the article, putting the emphasis on a qualitative review and less on the effectiveness/efficacy of the trainings as well as adding all the missing articles.

Reviewer: Saperstein
1. Comparing the efficacy of implicit vs explicit vs combined approaches is confounded by a multitude of variables such as: the context in which remediation was conducted (e.g. in isolation versus integrated with rehabilitation), the treatment goal (e.g. to restore neurocognitive skills versus develop compensatory strategies to circumvent deficits), the outcome measures used to quantify treatment efficacy (e.g. improved performance on the training task vs an independent neurocognitive battery vs functional capacity or competence). Furthermore, the efficacy of different cognitive remediation paradigms have already been investigated in meta-analytic studies using statistical methods that allow for researchers to account for such variables. The authors here quantify the number of positive and negative outcomes from the studies included but are not able to adequately answer the question posed – which paradigm yields greater improvements in neurocognition or social cognition.

We have modified the focus of this manuscript, focusing less on efficacy (since as pointed out here, it has been thoroughly investigated in recent meta-analyses) and more on documenting the most used available trainings and the context in which they are used. These changes can be observed throughout the manuscript.

2. Remediation strategies have been otherwise categorized as drill and practice, strategy-based, or hybrid/combined approaches. This bears resemblance to the method of categorization used here (implicit, explicit, or both respectively) but has already been rigorously examined in meta-analyses (e.g. Wykes et al 2011). Thus it is uncertain to what extent this paper adds to our understanding of how different remediation paradigms compare.

Indeed, the vocabulary we used is not considered ‘standard’ in the current literature. As such, we modified our approach and incorporated Wykes and colleagues (2011) definitions of « drill and practice » as well as « drill and strategy » to categorize the studies. Further, we removed the distinction between ‘explicit alone’ and ‘explicit+implicit’ since Wykes considers there can be no explicit training without at least some form of implicit learning. The changes were made in text as well as in the various Tables, which brought about the removal of table 4.

3. The authors may be more effective in describing how implicit and explicit learning techniques are utilized in existing remediation programs, more in line with the authors’ first stated goal. To truly compare the magnitude of effects would require statistical analyses of existing studies or a dismantling study. If the purpose is to be descriptive, the authors might better clarify the roles of implicit or
explicit learning when the paradigm is restorative (CRT, NEAR) or provides compensatory training (CAT), whether the target is cognition or functional outcome, and whether the intervention is used in isolation or as a part of a larger rehabilitation program.

3. Yes, our main goal is to be descriptive. Our tables list the various trainings contained within each articles and give a sense of whether a certain type of training was used alone or in combination with a broader rehabilitation program, for instance. In theory, we could think that certain types of contexts or deficits would require trainings that are more restorative in nature versus compensatory, however, this was not what our review uncovered. In fact, CAT is one of the few ones that uses more of a compensatory approach while others focus on restorative practices. We did not describe individual trainings in details as there are far too many. Nevertheless, this was a great suggestion as it allowed us to better restrain our discussion in order for it to be more in line with our original objective

4. The authors’ designation of particular interventions as implicit/explicit is likely to arouse debate. For example, in the NEAR paradigm, drill and practice is utilized, which may be regarded as implicit learning, but strategy coaching and metacognitive exercises are used to supplement so as to facilitate generalization. Thus the authors’ designation of references #31 and #34 as exclusively explicit, for example, is of concern. Authors should revisit their classification of implicit/explicit but also check whether targets were misclassified as neuro vs social cognition. For example, Reference #82 refers to Training of Affect Recognition which targets an element of social cognition, but is included in Table 1 (Neurocognitive Deficits). A descriptive paper of implicit/explicit learning techniques might circumvent difficulties in classifying whole remediation paradigms.

4. Truly, our designations were too dichotomized, which led to confusion. However, as noted in point 2, we modified our classification process to endorse Wykes definitions.

Minor Essential Revisions
1. Introduction, final paragraph, “With these contrasting results, it is difficult to identify the best way to training cognitive functions…” – change training to train.
   1. This segment of the text was removed and rewritten.

2. Materials and Methods, first sentence, use of the word “retrain” is misleading since the study includes both restorative and compensatory training paradigms. “Improve” would be a better option.
   2. Yes, this was in fact misleading, the correction as been made and can be viewed via the “tracking changes”

3. Results, section 3.2 – please spell out REF before abbreviating.
   3. This was an omission on our part to include a reference. It was corrected.

4. Discussion, 5th paragraph, reference #52 refers to the McGurk meta-analysis, and does not appear to be what the authors are actually referring to (rather McGurk, Mueser, de Rosa et al., 2009?)
4. It is indeed the McGurk (2007) « A meta-analysis of cognitive remediation in schizophrenia » that we are referring too.

**Discretionary Revisions**

1. In the final paragraph, the authors suggest that more attention is paid to the effects of cognitive remediation on “real-life” situations. The authors should consider that functional outcomes are often discussed and measured with respect to functional capacity given the limitations on affecting change in functional attainment within the time period of study. There have been papers written on exactly this topic, eg. Medalia and Saperstein, 2013 “Does cognitive remediation for schizophrenia improve functional outcomes?”. Perhaps clarification is needed on what the authors are suggesting?

1. Thank you for pointing this out. We were trying to make a distinction between functional outcome and something more tangible such as work outcome for instance. But we modified this section entirely because the argument was not very strong indeed. Therefore, we focused more on the importance of tailor-fitting the trainings to the individual’s deficits to increase the impact of the training. We further added the Medalia and Saperstein (2013) reference too, linked it to the previous suggestion too and also highlighting the importance of rehearsal in link with functional outcomes.
Reviewer: Choi

1. Literature Search: There are a number of cognitive remediation therapy (CRT) studies that were missed in the literature search for unknown reasons. For example, Wykes et al. (2007a) was included, but Wykes et al. (2007b) appears to have been either missed or mistakenly excluded, as well as Wykes et al. (2003), and Penadés et al. (2006).

1. Although we had initially thought the review was complete, there were in fact a number of articles missing. Here are the steps we took to improve upon this issue. 1) we re-conducted our literature search, 2) we compared the articles we had to the 3 known recent meta-analysis by Wykes T, Huddy V, Cellard C, McGurk SR, Czobor P (2011), Grynszpan O, Perbal S, Pelissolo A, Fossati P, Jouvent R, Dubal S, Perez-Diaz F (2011) et Medalia & Saperstein (2013) and, 3) we also included all the follow-ups studies listed by the referee.

2. Inclusion/Exclusion Criteria: The authors state that they have excluded studies that target other difficulties besides neurocognition and social cognition, such as social skills, the improvement of symptoms, and metacognitive awareness. However, it is unclear whether the authors intended to excluded studies that only target these other areas, or that they meant to exclude studies that target these areas as well as neurocognition and social cognition. If the authors intended to exclude studies that only target these other areas then they seem to have mistakenly included some studies (e.g., Veltro et al., 2011; which is a study on social skills and CBT intervention, rather than CRT), and missed a number of others that combine CRT with other interventions (Bell et al., 2005, 2007; Kern et al., 2003; McGurk et al., 2009). On the other hand, if the authors intended the former, then they seem to have mistakenly included some studies that combine CRT with another treatment modality (e.g., Galderisi et al., 2010; Penadés et al., 2003). We recommend rerunning the literature search, using the additional keywords (e.g., “rehabilitation”) and also using the reference section of published meta-analyses and other reviews to help insure the thoroughness of the search.

2. Indeed this should have been stated more clearly in the inclusion/exclusion criteria and we adjusted it accordingly. We would like to thank the referee for pointing this out. What we meant to say was that studies that focused ‘exclusively’ on social skills, or metacognition or symptoms were to be excluded. Studies that looked at neurocognitive or sociocognitive deficits but that ‘also’ included social skills, metacognition or symptoms were included. We also carefully reviewed all of the studies to ensure that we did not mistakenly included or excluded studies.

3. The dichotomous division of implicit/explicit training is problematic, as most cognitive remediation paradigms tap some combination of implicit and explicit processes. A more careful operationalization of implicit and explicit interventions may help clarify this ambiguity, or perhaps shifting terminology to ‘drill and practice’ versus ‘drill plus strategy’ based interventions as other authors have done (e.g., Wykes et al., 2011).
3. We agree that our classification and definition of the trainings did bring about some confusion. We therefore adopted Wykes and colleagues (2011) definitions of drill and practice versus drill and strategy and made the changes throughout the articles, including in the tables.

Minor Essential Revisions

1. The authors state that the aim of the review is to analyze whether implicit or explicit CRT paradigms were most utilized and which yielded greater improvements. While stating which type of paradigm is used most is within the scope of a qualitative review, analyzing which yields the greatest improvements is a task that is only achievable with a review that employs quantitative methods.

   1. Yes, we fully agree with this remark. We rewrote the article with a focus on a more qualitative/descriptive approach and removed most mentions of efficacy and effectiveness.

2. The authors discuss the number of studies that use CRT versus Neuropsychological Educational Approach to Remediation (NEAR). However, NEAR is a type of CRT, not a contrasting therapy.

   2. This wrong distinction was a mistake on our part, thank you for pointing it out. We made the appropriate modifications in the text, which can be followed through the “tracking changes”