**APPENDIX**

**Extended discussion**

In order to inform future research we will discuss the mechanisms through which interventions may be beneficial and contextualise these in light of our current state of knowledge.

Our review identified common yet heterogeneous therapeutic targets across psychological treatments which may help inform future research to strengthen the evidence base, including emotion regulation, acceptance, interpersonal skills, dissociation, and trauma re-processing. Further work is needed to assess their acceptability by patients. These treatment targets would need to be considered to be within the context of a *good-enough* therapeutic relationship[1,2]. Our findings concur with a recent meta-analysis which found that trauma-focussed psychotherapies had a modest, but significant, effect on positive psychotic symptoms[3].Whilst recent studies[3,4] did not distinguish developmental trauma from other trauma histories, developmental trauma was not ruled out, leading us to infer that many of the cases would have included developmental trauma, making those findings very relevant to our review. The potential for trauma-focussed and trauma-informed psychotherapies in reducing psychotic symptoms is promising given that the interventions represent an additional therapeutic target beyond targeting psychotic symptoms *per se*, and warrants further urgent research.

Notably, nearly all of the psychological treatment studies required individuals to talk about trauma, which would have been associated with varying degrees of memory re-processing. This

may be the mechanism through which such interventions might bring about psychotic and/or Post-traumatic stress disorder (PTSD) symptom reduction. Dominant models of cognitive psychotherapy propose that PTSD persists when there is reduced contextual processing during the trauma exposure[5] with peri- and post-traumatic negative cognitive appraisals such that people feel severe current threat[6], giving rise to the archetypal re-experiencing symptoms of PTSD. Attentional and attributional biases towards threat are also significant factors in the process of transition to and maintenance of psychotic illness[7]. Thus, re-processing of traumatic memories, cognitive restructuring, and modifying cognitive biases could be important therapeutic targets in treatments for this patient group. Improvements during trauma-focussed CBT (TF-CBT) included having the trauma narrative becoming more organized and coherent[8], which may also help reduce PTSD persistence[9]. Given evidence that TF-CBT is safe and effective in individuals with comorbid PTSD and psychosis[10], and that it reduces threat in individuals with PTSD[11], together with evidence that cognitive models underlying the role of threat processing in paranoia[12], these suggest that more research is needed to see if TF-CBT reduces psychotic symptoms in this population. Similarly, given that this patient group may have experienced trauma during pre-verbal stages of development, research is needed into the use of other interventions such as artistic/creative therapies which may help to symbolize preverbal imagery and allow exploration of meanings which could be useful in processing and understanding the trauma narrative[13]. It is striking that we did not identify trials of other trauma-reprocessing interventions such as eye movement desensitization and reprocessing (EMDR)[14]. Research using EMDR for adult survivors of developmental trauma with psychosis (ASDTP) is therefore markedly lacking.

An additional target to memory reprocessing is emotion regulation [15-18] which is likely to be in the context of attachment dysfunction[19], stress-sensitization[20,21] and dissociation[22]. A range of

psychotherapies have been used to target emotional regulation as a means of addressing trauma and dissociation including CBT[23], dialectical-behavioural therapy (DBT)[24], acceptance and commitment therapy (ACT)[20], mindfulness-based cognitive therapy (MBCT)[25], and mentalization-based therapy (MbT)[26]. Third wave treatments which emphasise acceptance, whereby one accepts and resigns to the experiences one has gone through in life, have also been proposed to improve emotion regulation[27], the subjective experience of having a psychotic illness[20] and positive symptoms[28]. Since treatments targeting emotional regulation can be feasibly delivered in group settings[20], if shown to be effective it may be possible to deliver these alongside individual trauma-focused work and/or for patient who do not tolerate memory re-processing.

Attachment difficulties were reported in a range of studies[15-17,29-34]. There is evidence that attachment may mediate the relationship between developmental trauma and psychotic symptoms[35-37]. Since developmental trauma and the family system's response to it can directly and/or indirectly involve an attachment figure, it is unsurprising that ASDTP may have difficulties in forming and maintaining healthy relationships[38]. Clinicians should help re-establish the individual's capacity to form a trusting therapeutic relationship[1,2] as low service engagement has been reported in this group of patients[39,40], which can disrupt the recovery process[20]. Given the role of the attachment system in emotional regulation[19], some interventions may involve a reciprocal relationship between the two. Research is needed to establish whether attachment and/or interpersonally focused interventions enhance wider service engagement, which could potentially improve treatment concordance[41]. It has also been proposed that disrupted mentalization in children with insecure attachment[42], if accompanied with past and/or continued traumatic experiences[43], might give rise to dissociative and psychotic symptoms[44,45] due to disorganization of the trauma narrative[46].

Many of the treatments reported “reintegrating dissociated ego states”[17,29,32,34,47-53]. At a phenomenological level, auditory hallucinations could be considered to be dissociative[54]. Whilst it has been argued that voice hearing in individuals with dissociative identity disorder (DID) and schizophrenia can be distinguished diagnostically depending on the perceived location of the voices, research does not support this assumption[55]. However, this remains controversial and further research is needed to definitively address this controversy.

In summary, we have identified a range of mechanisms through which interventions reported in the literature may be helpful for ASDTP. These mechanisms include threat processing, memory re-processing, the attachment processing, emotional regulation, and mentalization. Further work is therefore needed to understand these mechanisms in the pathophysiology and treatment of psychosis in survivors of developmental trauma.

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