



# Mental Imagery and its Relevance for Psychopathology and Psychological Treatment in Children and Adolescents: a Systematic Review

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## Abstract

This review provides an overview of the current state of research concerning the role of mental imagery (MI) in mental disorders and evaluates treatment methods for changing MI in childhood. A systematic literature search using PubMed/Medline, Web of Science, and PsycINFO from 1872 to September 2020 was conducted. Fourteen studies were identified investigating MI, and fourteen studies were included referring to interventions for changing MI. Data from the included studies was entered into a data extraction sheet. The methodological quality was then evaluated. MI in childhood is vivid, frequent, and has a significant influence on cognitions and behavior in posttraumatic stress disorder (PTSD), social anxiety disorder (SAD), and depression. The imagery's perspective might mediate the effect of MI on the intensity of anxiety. Imagery rescripting, emotive imagery, imagery rehearsal therapy, and rational-emotive therapy with imagery were found to have significant effects on symptoms of anxiety disorders and nightmares. In childhood, MI seems to contribute to the maintenance of SAD, PTSD, and depression. If adapted to the developmental stages of children, interventions targeting MI are effective in the treatment of mental disorders.

**Keywords** Mental imagery · Psychological disorders · Children · Adolescents · Treatment

## Introduction

Mental imagery refers to the representation of sensory information without external stimulation. Mental images can occur in any sensory form, including visual, auditory, gustatory, and olfactory properties, physical sensations, and tactile impressions

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(Andrade et al. 2014). Besides verbal-based thoughts, mental images create a cognitive subsystem that is strongly linked to emotions (Paivio 1986) and induce physiological responses that are often beyond conscious control (Papadelis et al. 2007). In adults, it was found that mental images may trigger emotions like joy, sadness, anger, disgust, and fear (Blackwell 2019; Holmes and Mathews 2010). Thus, imagining a walk on the beach with all the associated sensory qualities can lead to emotional processing that is similar to an actual walk. Brain imaging studies indicate that neural representations of MI and perceptions of actual pictures are similar (Pearson et al. 2015). This can be helpful and relaxing, but MI is associated with extensive distress and strain if people think about unpleasant events. Mental images are based partially on memories, or contain parts of them, but MI may also refer to a future event. These “flash-forwards” could have various different themes and therefore evoke different emotions (Hales et al. 2011). For example, thinking about a future moment of glory is associated with positive emotions. In patients with depression, however, imagining one’s own suicide is associated with both positive and negative emotions, such as comfort and distress (Holmes et al. 2007b; Moritz et al. 2014; Weßlau et al. 2015).

The potentially important role of negative MI as a maintenance factor of psychological disorders has been supported in studies with adults suffering from PTSD (Clark and Mackay 2015; Cockerham et al. 2016; Morina et al. 2013), obsessive-compulsive disorder (OCD; Da Silva 1986; Rachman 2007; Speckens et al. 2007), social anxiety disorder (SAD, e.g., Hackmann et al. 2000), agoraphobia (Day et al. 2004), body dysmorphic disorders (Osman et al. 2004), and depression (Holmes et al. 2008; Morina et al. 2011). The negative mental images may influence both behavior and cognitions. In SAD, the mental image of oneself blushing and embarrassing oneself in front of others leads to feelings of anxiety and increases self-focused attention in individuals. This in turn makes it difficult to correctly interpret environmental stimuli (Clark and Wells 1995) and could lead to severely distorted interpretations of ones’ appearance to others, resulting in elevated social anxiety. In PTSD, intrusive imagery seems to depend on characteristics of the traumata (Hackmann and Holmes 2004). These intrusive images can be triggered by various stimuli in the environment and cause emotional strain as the person relives parts of their trauma. To prevent the experience of these images, patients with PTSD avoid such triggers and therefore contribute to the maintenance of the disorder (Hackmann et al. 2012). Furthermore, a lack of positive MI and a greater amount of negative mental images are typical for depression. The repeated negative images are linked to cognitions about oneself, the world, and the future (Beck 1976; Morina et al. 2011; Holmes et al. 2016; Weßlau and Steil 2014).

In adults, it is evident that the vividness of the images (whether a mental image is perceived clearly and “real”) as well as the perspective (field- or observer perspective), in which the image is perceived, has an effect on the strength of triggered emotions (e.g., Kuyken and Moulds 2009). Furthermore, there is evidence that higher levels of vividness in negative MI are associated with greater distress (Holmes et al. 2016; Mathews et al. 2013; Moritz et al. 2014; Oertel et al. 2009). Regarding the perspective, research indicates that there are differences in the use and effect on emotions of imagery perspective among mental disorders. For example, an observer perspective is more often used in SAD (Hackmann et al. 1998). In depression, there is also a more frequent use of observer perspective, and it is associated with lower levels of affective content (e.g., Kuyken and Moulds 2009). In patients with PTSD, images are also more

often experienced in an observer perspective and might be less affect-provoking than images perceived from a field perspective (McIsaac and Eich 2004). An observer-perspective might be part of cognitive avoidance, aiming at the reduction of aversive emotions (Kenny and Bryant 2007). By contrast, patients with OCD perceive the images more often from a field perspective (Lipton et al. 2010). Treatment methods such as imagery rescripting attempt to overwrite negative mental images and to implement a rescript of the aversive image, which does not provoke negative emotions (Hackmann et al. 2012). In adults, IR is most frequently used in the treatment of PTSD and SAD, but has also been applied in the treatment of body dysmorphic disorder, bulimia nervosa, OCD, and depression. A meta-analysis (Morina et al. 2017) yielded large pre- vs. posttreatment effect sizes for PTSD (Hedges- $g = 1.48$ ) and SAD (Hedges- $g = 1.25$  for SAD) and medium to large effect size for depression (Hedges- $g = 0.61$ ).

These findings raise questions about the applicability in children and adolescents, who have less control over their conceptual images due to their cognitive development (Burnett-Heyes et al. 2013). Furthermore, there is research indicating that imagery vividness depends on both long-term memory and working memory (Baddeley and Andrade 2000). These abilities are not completely developed before the age of 14 (Kosslyn and Barrett 1990), which may explain the fact that unpleasant mental images occur more frequently at that age and manifest themselves as a result of emotional and cognitive defenselessness, because children and adolescents are unable to change and control their mental images (Burnett-Heyes et al. 2013). Mental disorders in adults can often be traced back to situations and certain factors in childhood (Caspi et al. 1996; Gregory and Eley 2007; Rutter 1984). Mental imagery could therefore be just such an important factor leading to a vulnerability to mental illness.

The aim of this systematic review is to provide an overview of the current state of research concerning the role of MI in mental disorders in children and adolescents, as well as to describe and evaluate treatment methods for changing MI. A wide range of mental disorders are included, so as to identify similarities and differences in the role of MI between the disorders. Furthermore, the review combines knowledge on mental imagery, developmental psychology, psychopathology, and treatment methods, and in addition, guidelines for future research are provided, as well as recommendations for therapists concerning the value of MI in psychotherapy with children and adolescents.

## Method

### Literature Search

This review was prepared according to recommendations from Petticrew and Roberts (2006). A systematic literature search for papers in English and German, from the earliest indexed studies (year 1872) to September 2020, was conducted using the electronic databases PubMed/Medline, Web of Science, and PsycINFO. The following search terms were used for titles and abstracts: (“imagery” OR “mental imagery” OR “intrusive memories” OR “mental images”) AND (“mental disorders” OR “psychological disorders” OR “depression” OR “social anxiety” OR “anxiety disorder” OR “phobia” OR “PTSD” OR “bipolar disorder” OR “psychotic disorder” OR “borderline personality disorder” OR “eating disorder” OR “obsessive compulsive disorder” OR

“agoraphobia” OR “body dysmorphic disorder” OR “ADHS” OR “autism” OR “imagery rescripting” OR “guided imagery” OR “cognitive bias modification” OR “MI training” OR “emotive therapy” OR “vividness” OR “assessment” OR “emotions”) AND (“children” OR “adolescents” OR “child” OR “youths” OR “development” OR “adults”). Furthermore, lists of references from review papers and other important articles were checked, and authors were asked for full-text versions, so as to obtain more useful information.

### **Inclusion Criteria**

In order to be included in the present systematic review, studies had to meet the following criteria: publication in a peer reviewed journal or in a book; deal with the measurement of triggered emotions and/or MI vividness and/or other clinical aspects (such as symptom-strength) and/or developmental changes in MI; and include participants not older than 20 years.

In addition, intervention studies were included when imagery and symptom assessments include at least pre- and post-measurements and an imagery component was described and mentioned explicitly.

No restrictions were made concerning diagnoses or symptom stage. Healthy and clinical samples were included. Meta-analysis and randomized controlled trials were preferred, but quasi-experimental and cohort studies, as well as case studies, were also included, due to the general lack of rigorous studies.

### **Exclusion Criteria**

Articles were excluded if they were not written in either English or German, or if they referred to non-psychological areas such as sport or language training, or if they were outside the timeframe.

After removing duplicates, the titles and abstracts of eligible studies were screened. Papers that did not meet the inclusion criteria were excluded. The full text of potentially relevant papers was examined, and 28 relevant papers were finally identified.

### **Data Extraction**

Data was entered into a data extraction sheet. Variables extracted included: the author(s) of the study, study title and publication year, study design, inclusion/exclusion criteria, number and characteristics of participants (gender, age, ethnicity), characteristics of outcomes (e.g., effects on mood), characteristics of the intervention and of the comparison groups, and number of sessions and the main results. Methodological rigor (such as sample size, allocation to the groups, reliability of instruments used, and effect sizes) was assessed by the first author.

### **Data Synthesis**

The included studies were highly diverse in terms of study design, characteristics, and outcome measures. Similarities and differences between study findings were analyzed with regard to characteristics of the studies themselves, characteristics of participants,

characteristics of the intervention, outcome measures, and methodological rigor. Studies were grouped according to whether they investigated the characteristics of mental images across mental disorders, or whether they tested the effect of a treatment.

## Results

In total, 13,253 titles were identified using electronic databases. In the next step, 2553 were excluded as duplicates, and 10,700 were screened for inclusion in the review. Of these studies, 10,608 publications were excluded, as they did not meet the inclusion criteria, for example, covered a non-clinical topic or did not measure MI. Eight additional publications were identified through screening the reference lists of relevant papers and reviews or books. In total, 95 publications were screened full-text. Sixty-seven articles were excluded subsequently (because, for example, their sample group was not relevant; see Fig. 1 for details). Twenty-eight were included in the qualitative synthesis. Figure 1 depicts the literature search process.

The results of the literature search were assigned to two different topics, imagery in mental disorders of children and adolescents and mental imagery and psychotherapy. First, fourteen studies are described which investigate the characteristics of MI in

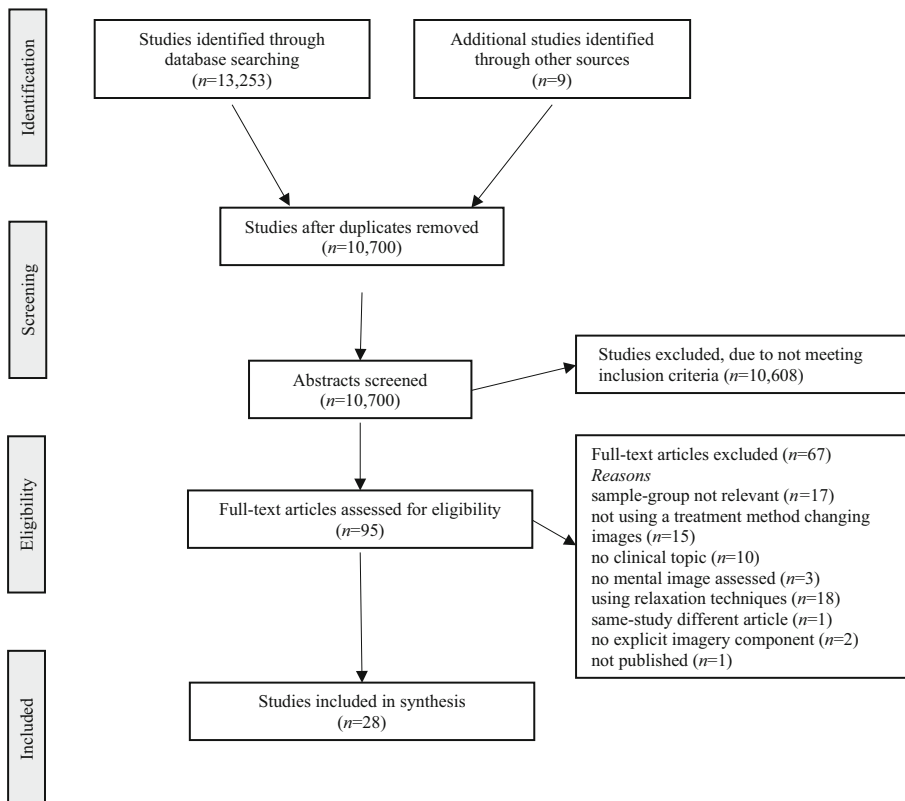


Fig. 1 Flowchart of selection of studies

children and adolescents with psychological disorders. Second, a summary of fourteen studies is provided which evaluate treatment methods targeting MI.

### **Imagery in Mental Disorders in Children and Adolescents**

Fourteen studies investigating mental images and their effects on children's and adolescents' clinical symptoms were found. Six of the fourteen studies investigated a clinical sample, four of which had a healthy control group. The other eight studies examined clinical symptoms in analogue samples. Social anxiety symptoms and SAD were investigated in seven studies, depressive symptoms in three studies, autism spectrum disorder (ASD) and PTSD-symptoms (two studies each). PTSD and generalized anxiety symptoms (GAS) were both explored in one study. The age range across the studies is between 7 and 20 years. These results are summarized in Table 1.

**Posttraumatic Stress Disorder** Studies investigating MI and PTSD have focused on peri-traumatic aspects which are linked to occurrence and the sensoric qualities of MI in PTSD. Holmes et al. (2007a) examined posttraumatic stress symptoms in 76 healthy schoolchildren (age range 10–11) who were exposed to the 9/11 attacks in 2001 on television. Mental imagery was related to posttraumatic stress symptoms, if combined with a high peri-traumatic anxiety level. Therefore, the authors recommend focusing on the improvement of imagery treatment techniques for children, given that the images may be important in the maintenance of PTSD-symptoms. Eksi et al. (2008) examined the sensoric qualities of MI in five children with PTSD after an earthquake (and after 20 months) who met the criteria of PTSD at the beginning of this observational study. Children with PTSD reported experiencing intrusive mental images and ones with various sensoric qualities, such as visual or auditory. However, the impact on emotions and long-term effects remained unclear. McKinnon et al. (2008) examined 75 children and adolescents in an observational study, who had experienced an injury which led to hospital treatment. It was shown that peri-traumatic thoughts were significantly associated with the encoding of the traumatic memories and linked to unpleasant intrusions. Furthermore, the level of anxiety due to intrusions was linked to how clearly the intrusive images appeared (McKinnon et al. 2008). In summary, MI might play a role in the development of PTSD, since some mental images relate to aspects of the trauma (Ehlers and Clark 2000).

**Social Anxiety Disorder** All studies investigating MI in the context of social anxiety symptoms or SAD examined various aspects and effects of self-imagery. Schreiber and Steil (2013) investigated 31 adolescents with a diagnosis of SAD, and a control group without a mental disorder (also  $N=31$ ), in order to explore the role of negative self-imagery in SAD. The participants were asked to imagine a previous anxiety-provoking or embarrassing situation and recall the negative self-image they had experienced. Negative self-imagery was linked to greater emotional distress, was more vivid, and more often perceived through an observer-perspective in patients with SAD, compared with the control group. In another study with a large adolescent sample, participants completed a questionnaire on negative self-images. Negative self-imagery was connected to social anxiety-level and therefore might be an important cognitive feature of social anxiety (Schreiber et al. 2012). These results supported the assumption of MI

**Table 1** Characteristics of mental imagery in psychological disorders

Author	Mental disorder or symptoms	Inclusion criteria	Sample size and characteristics	Age range ( <i>M</i> ; <i>SD</i> ) (as provided)	Imagery assessment	Main findings
Holmes et al. (2007a)	PTSD-symptoms	Age range 10–11 years	<i>n</i> = 76 (51% female)	10–11 years	Checklist of images (given images according to the topic + free report section for additional images)	MI seems to predict PTSD-symptoms only if combined with extreme peri-traumatic anxiety
Eksi et al. (2008)	PTSD	Experienced earthquake in Turkey	<i>n</i> = 5 (one 11-year old girl, 4 boys aged 10, 12, 15 and 15)	10–15 years	CAPS which is dedicated to PTSD, measures the extent to which the traumatic event is re-experienced (Blake et al. 1990)	Indications that children with PTSD have intrusive images & that they occur with different sensoric qualities
Alfano et al. (2008)	SAD	Primary diagnosis SAD	<i>n</i> = 21 (CG) <i>n</i> = 21 (SAD) (53% female)	Age range ( <i>M</i> = 14.05; <i>SD</i> = 1.56)	Questionnaire assessing the degree to which the adolescents were able to engage in self-imagery during the previous task	Negative self-images are a possible consequence, rather than a salient causal factor of SAD
Hignett and Cartwright-Hatton (2008)	Social anxiety symptoms	Age range 12–18 years	<i>n</i> = 124	12–18 years	Questionnaire assessing the degree to which the participants were able to generate a self-image and in which perspective they perceived the image	Increased social anxiety correlates with increased observer-perspective use
Ranta et al. (2014)	Social anxiety symptoms and SAD	Inclusion criteria according to group	<i>n</i> = 133 (50.4% female) 4 groups: SAD, non-clinical SAD, high-anxiety-levels; low-anxiety levels	( <i>M</i> = 15.9; <i>SD</i> = 0.32)	Semi-structured imagery interview!	Increased self-imagery in SAD-patients, more often in an observer perspective

Table 1 (continued)

Author	Mental disorder or symptoms	Inclusion criteria	Sample size and characteristics	Age range ( <i>M</i> ; <i>SD</i> ) (as provided)	Imagery assessment	Main findings
Schreiber et al. (2012)	Social anxiety symptoms	Age-range 14–20 years	<i>n</i> = 581 (55.2% female)	14–20 years ( <i>M</i> = 16.49; <i>SD</i> = 1.67)	QRI-SP (Schreiber et al. 2009) <sup>1</sup>	Recurrent self-images (besides other cognitive aspects) seem to be an important indication for social anxiety
Schreiber and Steil (2013)	SAD	Age-range 14–20; primary diagnosis SAD	<i>n</i> = 31 (CG) <i>n</i> = 31 (SAD) CG and SAD matched for age and gender (64.5% female)	14–20 years; ( <i>M</i> = 16.6; <i>SD</i> = 2.21)	QRI-SP (Schreiber et al. 2009) <sup>1</sup>	Negative self-imagery is more frequent, more vivid, is more often received in an observer perspective, and is associated with greater emotional distress in SAD patients
Vassilopoulos et al. (2012)	Anxiety and depression symptoms	Not mentioned	<i>n</i> = 164 (74 boys; 90 girls) 2 groups, negative and positive self-imagery condition	10–12 years ( <i>M</i> = 10.7; <i>SD</i> = 0.51)	Instruction of positive or negative self-imagery, SEIQ adapted from Vassilopoulos et al. (2009)	Social anxiety is linked to more negative interpretation; exposing highly anxious children to negative or positive self-imagery affected their interpretation biases
Pile and Lau (2018)	Anxiety & depression symptoms	Age range 11–16 years	<i>n</i> = 375 (54.1% female)	11–16 years ( <i>M</i> = 13.69; <i>SD</i> = 1.30)	Prospective Imagery Task (Holmes et al. 2008)	Less vivid positive imagery and more vivid negative imagery (past and future) are linked to depressive symptoms, anxiety symptoms only with more vivid negative future imagery
Kuyken and Howell (2006)	Depression	Age range 12–18 years; Diagnosis of major depression, or never depressed	<i>N</i> = 65; groups, never-depressed and depressed adolescents; 78% female;	12–18 years DEP: <i>M</i> = 16.12, <i>SD</i> = 1.41, 29 Not-DEP: <i>M</i> = 15.71, <i>SD</i> = 1.66	Self-defining memory task (Singer and Moffitt 1992)	Memories are more vivid and more often perceived from an observer perspective in DEP-group



Table 1 (continued)

Author	Mental disorder or symptoms	Inclusion criteria	Sample size and characteristics	Age range (M; SD) (as provided)	Imagery assessment	Main findings
Meiser-Stedman et al. (2012)	Depressive symptoms	Age range 11–18 years	$n = 231$ (57.5% female)	11–18 years; ( $M = 14.5$ ; $SD = 2.2$ )	TMQQ	Sensoric quality of the intrusive memory seems to play an important role in the maintenance of depressive symptoms
Pile and Lau (2020)	GAS, SAS, depressive symptoms	Age range 11–16 years	$n = 352$ (54.5% female)	11–16 years ( $M = 13.68$ ; $SD = 1.32$ )	Impact of Future Events Scale (IFES, Deeprose and Holmes 2010) Prospective imagery task (PIT, Holmes et al. 2008)	Impact of flash-forwards is associated with generalized anxiety and depression, but not social anxiety.
Ozsvadjian et al. (2017)	Autism	Age range 8–16 years children with a Full-Scale IQ >=70 Autism diagnosis	$n = 43$ children with ASD $n = 35$ non-ASD (both groups divided in high- and low-anxiety group)	8–16 years, ( $M = 12.05$ )	SUIS Imagery interview <sup>1</sup>	Children with ASD tend to have more images than children without ASD
Ten Eyeke and Müller 2015	Autism	Autism diagnosis	$n = 25$ (ASD) $n = 29$ (ND)	ASD group ( $M = 9.7$ ) ND-group ( $M = 8.7$ )	Drawings of imaginary houses and of persons	Imagination impairment among children with autism may be specific to social stimuli.

<sup>1</sup> ASD autism spectrum disorder, CAPS clinician-administered post-traumatic stress disorder scale, CG control group, DEP depression, GAS generalized-anxiety symptoms, ND neurotypically developing children, QRI-SP questionnaire of recurrent images in social phobia, SAD social anxiety disorder, SEIQ social events interpretation questionnaire, SUIS spontaneous use of imagery scale, TMQQ trauma memory quality questionnaire, TSSC trauma symptom checklist for children; on the basis of Hackmann et al. (2000)

being a maintaining factor of SAD, according to Clark and Wells (1995). Alfano et al. (2008) examined self-imagery in 21 adolescents with SAD and compared it with a healthy control group during two social tasks (both entailing peer interaction in the classroom). The results indicated that having self-imagery at all is a substantial factor in SAD during adolescence, and that the valence or content of self-image plays only a minor role. This finding is in contrast to research results from the adult area, indicating that valence is important and that negative self-imagery plays a causal role in SAD (Hirsch et al. 2006).

In Vassilopoulos et al. (2012), participants (age 10–12) were asked to generate both positive and negative self-images and afterwards interpret social scenes. Negative self-imagery seems to be associated with more negative interpretations of ambiguous social scenes, and therefore seems to play a significant role in the maintenance of social anxiety (Vassilopoulos et al. 2012). Ranta et al. (2014) compared the results of an imagery interview of four groups (SAD, non-clinical SAD, high-anxiety levels, low-anxiety levels), and found that adolescents with high-anxiety-levels had more negative thoughts and more observer perspective images than adolescents with low-anxiety levels. These differences were even larger in both SAD-groups. Hignett and Cartwright-Hatton (2008) examined youths by means of a questionnaire about their self-images, including questions as to the perspective with which they generate a self-image. The results showed that high-anxiety-levels correlate with an increased use of observer-perspective. If one considers the studies in summary, it is evident that in SAD, the maintenance of the disorder seems to be influenced by MI, and that adolescents with SAD perceived the mental images more often through an observer perspective (Hignett and Cartwright-Hatton 2008; Ranta et al. 2014; Schreiber and Steil 2013, as was also shown for adults: Hackmann et al. 1998). This is in accordance with results from a review by Chapman et al. (2020) who found studies including young people older than 20, which indicated that a higher social anxiety score is associated with more negative mental images, observer perspective images, and provided some evidence to support the cognitive models of SAD. It can therefore be assumed that these characteristics of mental images in SAD might remain constant over the life span.

**Generalized Anxiety Disorder** Pile and Lau (2020) investigated intrusive prospective negative imagery (flash-forwards) and symptoms of GAS, depression, and social anxiety in 352 participants (age ranging from 11 to 16). A higher frequency and hyperarousal due to these flash-forwards was linked to GAS and depressive symptoms, but not to those of social anxiety. Furthermore, suppressing emotions seems to increase the relationship between generalized anxiety and the impact of intrusive prospective imagery.

**Depression** Studies investigating MI in adolescent depression have focused on characteristics of MI and their links to depressive symptoms. Kuyken and Howell (2006) compared 31 adolescents without depression and 34 with depression, aged 12–18, with regard to autobiographical images. In this sample, they found that depressed adolescents are more likely to perceive memories as more vivid, more often from an observer perspective and experience more vivid negative memories than adolescents who have never suffered from depression.

Meiser-Stedman et al. (2012) investigated 231 high-school students, who had experienced a non-traumatic but unpleasant life event. It was found that the sensoric quality, as well as the frequency of intrusive images, seems to play an important role in the maintenance of depressive symptoms, as more intrusive images correlate with higher depression scores. Intrusive images seem to be linked to distress, and as adolescents with depressive symptoms have more intrusive images, they also might experience an elevated level of stress. In a study from Pile and Lau (2018), 375 adolescents (aged 11–16) imagined future events and described a past negative event. They also completed questionnaires about symptoms of anxiety and depression. Less vivid positive imagery, as well as more vivid negative imagery (future and past), was associated with symptoms of depression. In comparison, anxiety symptoms were only linked with increased vividness for past negative events. Additionally, adolescents who described future positive events that were less vivid also had higher depression scores and experienced the past negative event as more unpleasant (Pile and Lau 2018). With regard to depression, the results for children and adolescents indicate that maintenance seems to be influenced by MI.

**Autism Spectrum Disorder** Ozsivadjian et al. (2017) investigated the effects of three images; a relaxed self-generated situation, a proposed anxious situation (either presenting to the class, or to the entire school), and a spontaneously generated anxious image experienced by children with ASD and non-ASD. Autistic children tend to have more images than healthy participants, and are more likely to have images which are based on their own imagination, rather than upon real events (Ozsivadjian et al. 2017). Difficulties in imagining among children with ASD seem to be specific to social stimuli (such as finding it difficult to imagine a funny-looking person) and not to imagination problems in general (Ozsivadjian et al. 2017; Ten Eycke and Müller 2015). Accordingly, it is evident that MI seems to have a different character in patients with ASD in contrast to children without ASD.

## Mental Imagery and Psychotherapy

With respect to treatments of psychological disorders in children and adolescents, imagery can be used as an explicit part of the intervention (e.g., imagery rescripting, IR) or implicitly involved as an objective (e.g., video-feedback). Video-feedback aims at modifying of the distorted view of the social self in SAD by providing a realistic image (Warnock-Parkes et al. 2017). However, this review will focus only on interventions explicitly using imagery to tackle distressing images.

The use of MI in the treatment of children and adolescents has also been evaluated in 14 studies (age range 4 to 18). In these studies, the treatment methods differed as to how MI was used. Imagery rescripting is a method for modifying negative mental images. The patient is instructed to recall an aversive experience of the past and to implement a rescript of the aversive image, which does not provoke negative emotions (Hackmann et al. 2012). In emotive imagery (EI; Lazarus and Abramovitz 1962), the therapist helps the patient to develop a story, which deals with a feared object and makes it ridiculous (e.g., as in the Riddikulus-spell in Harry Potter). By contrast, with imagery rehearsal therapy (IRT), participants select a nightmare that they want to

change, write down the nightmare, and are taught to convert it into a pleasant “new dream.”

**Imagery Rescripting in Children and Adolescents** Three case studies with children and adolescents, (age ranging from 4 to 16) explored the effectiveness of IR. The treatments comprised between one and four sessions. In two studies, IR was incorporated into a cognitive behavioral treatment of sleeping disorders (Davis et al. 2003; Fernandez et al. 2013). Fernandez et al. (2013) treated two cases (8 and 11 years.) involving nightmares after experiencing a trauma, using IR, exposure (by talking or writing about, or drawing pictures of the nightmare) and instructions for progressive muscle relaxation. Both cases met the criteria for PTSD. After four sessions, the frequency of nightmares, sleep quality, and behavioral problems was found to be significantly improved.

Davis et al. (2003) demonstrated a reduction in nightmare frequency and intensity for a 16-year-old girl. The effects of imagery rescripting and reprocessing therapy (IRRT) were tested in a sample with mixed disorders (Nelius and Ahrens-Eipper 2017). The authors found a reduction and remission of mental disorders after IRRT embedded in a CBT treatment in 13 cases aged 4 to 14. Table 2 provides an overview of the studies investigating IR in children and adolescents.

**Emotive Imagery** Emotive imagery (EI) is a technique which uses imagery for the treatment of childhood anxiety disorders and extends back to Lazarus and Abramovitz (1962). Accordingly, the therapist helps the patient to develop a story which deals with a feared object. In that story, the favorite superhero of the child helps to deal with the feared situation successfully, so that positive feelings are generated. One more possibility is that the child imagines becoming the superhero (with all his/her brave characteristics and superpowers). Table 3 gives an overview of these studies using EI.

In all studies, EI led to a reduction of anxiety and nightmares in children and adolescents. Muris et al. (2011) compared, in their experimental study, verbal and imaginative methods for reducing anxiety in 72 children, after inducing anxiety with respect to a fictional animal. After inducing this fear, the participants were randomly assigned to three conditions: receiving positive information about the fictional animal to reduce anxiety, to an imagery condition and a control group (which had to tell what they had heard about the animal). Both experimental conditions led to a higher reduction of anxiety than the control condition. However, the verbal technique was superior to the positive imagery. These results contrast to those from the adult area, where imaginative methods have a greater effect on emotions than verbal instructions (Holmes et al. 2006, 2009; Holmes and Mathews 2005). A possible explanation is that verbally induced fears (as in Muris et al. 2011) could be reduced more effectively by methods at the verbal level as well (Muris et al. 2011).

Cornwall et al. (1996) treated children (aged 7 to 10) with fear of the dark, and compared the effects of EI with a waiting list control condition ( $N = 24$ ). They showed a reduction of darkness fears and anxiety after six sessions of treatment and also in a follow-up after 3 months. Case studies investigating the effect of emotive imagery in phobia of dogs (cynophobia), nighttime fears, and school phobia (aka. school avoidance) (Chudy et al. 1983; Jackson and King 1981; King et al. 1989; Lazarus and Abramovitz 1962; Shepherd and Kuczynski 2009) also indicated that EI was effective.

**Table 2** Imagery rescripting in psychotherapy with children and adolescents

Author	Clinical symptom	Study characteristics	Age range ( <i>M</i> ; <i>SD</i> )	Sessions	Outcome
Davis et al. (2003)	Nightmares	Single case-study EERT Participant met criteria for PTSD (as well as panic disorder without agoraphobia and major depressive disorder (recurrent, moderate)	16 years	3 sessions, involving relaxation procedures, exposure to the nightmare theme and rescripting the nightmare	At 1- and 3-month follow-up sessions, decreased intensity, and frequency of nightmares were reported
Fernandez et al. (2013)	Nightmares and sleeping disorder	2 children and their caregivers EERT-C Participants had to have experienced a potentially traumatic event and had at least one recurring nightmare per week for 4 or more consecutive weeks	8 and 11 years	4 sessions with caregivers and children, consisting of psychoeducation, exposure to nightmare content, relaxation (PMR) + one pre- and post-measure-session	Reduction in the frequency of nightmares, sleep disorders, and reported behavioral problems
Nelius and Ahrens-Eipper (2017)	PTSD-diagnosis and -symptoms, GAD, specific phobia of injection, SAD	13 children and adolescents IRRT	4–14 years ( <i>M</i> = 9.54; <i>SD</i> = 3.13)	At least one session of IRRT, mostly implanted in a CBT	Reduction and remission of diagnosed mental disorders

*CBT* cognitive behavioral therapy, *d* = Cohen's *d*, *ERRT-C* exposure, relaxation, and rescripting therapy for children, *IR* imagery rescripting, *IRRT* imagery rescripting and reprocessing therapy, *PTSD* posttraumatic stress disorder

Table 3 Emotive imagery

Author	Clinical symptom or diagnosis	Study characteristics	Age range ( <i>M</i> , <i>SD</i> )	Sessions	Outcome
Cornwall et al. (1996)	Fear of darkness	RCT; <i>n</i> = 24 children; 2 groups: waiting list and treatment group	7–10 years; ( <i>M</i> = 8.25; <i>SD</i> = 1.28)	6 sessions, once a week, one 3-month follow-up	Reduction in darkness fears and anxiety and better performance in the darkness probe task (results remained till follow up) (effect sizes not provided)
Chudy et al. (1983)	Phobia of dogs	Case-study	7-year-old boy	Not provided	Decreased maladaptive avoidance behavior and increasing adaptive social interaction (also in 15-month follow-up)
Jackson and King (1981)	Fear of darkness	Case-study	5 ½-year-old boy	4 sessions, + 5 follow-up-measures 1, 2, 3, 15, and 18 months	Less reported fear in the rating of the mother also in the follow up-measure
King et al. (1989)	Night time fears	Case-study with 3 children	6-year-old boy; 8- and 11-year-old girls	6–13 sessions	Reduction of nighttime behavior disturbances and reported fear
Lazarus and Abramovitz (1962)	Phobia diagnosis (dog phobia, fear of darkness, school phobia)	Case-study with 9 children	7–14 years	3 sessions	Better performance in a darkness-tolerance test
Muris et al. (2011)	Anxiety symptoms	RCT; <i>n</i> = 72; 3 groups; a group receiving positive information, an imagery group and a CG	9–13 years ( <i>M</i> = 10.64; <i>SD</i> = 1.23)	One session	Successful treatment in 7 of 9 children, no diagnosis after treatment
Shepherd and Kuczynski (2009)	Nocturnal fear of zombies and ghosts	Case-study	10-year-old boy	6 sessions in weekly intervals+ one final session occurring 2 weeks after the 6th	Reduced anxiety level in Imagery group ( $\eta^2 = 0.79$ ) and positive information group ( $\eta^2 = 0.91$ ) Verbal technique was superior to the imaginative method Self-reported anxiety and frequency of nightmares decreased Number of nights in his own bedroom increased

CG control group,  $\eta^2$  = partial Eta<sup>2</sup>, RCT randomized controlled trial. Only significant effect sizes are mentioned

**Imagery Rehearsal Therapy and Rational-Emotive Therapy with Imagery** St-Onge et al. (2009), Simard and Nielsen (2009), and Krakow et al. (2001) investigated the effect of imagery rehearsal therapy (IRT) in children and adolescents suffering from nightmares (age ranging from 6 to 18). Sample sizes were 10 (Simard & Nielsen), 19 (Krakow et al.), and 20 participants (St-Onge et al.). All studies compared the results with a waiting list control group and had a clinical sample suffering from nightmares. Warren et al. (1984) explored the effects of rational-emotive therapy with imagery (REI) in a sample aged 12 to 16 with anxiety symptoms. This therapy method is based on the rational-emotive theory that negative emotions are mediated by irrational beliefs and self-verbalization. Warren et al. (1984) compared rational-emotive therapy (RET), rational-emotive imagery (REI), and relationship-oriented counseling in groups to a waiting list control condition. The REI-condition received the same treatment as the RET-condition (Ellis 1962), but had to practice the specified social scenes in their imagination and not only try to focus on changing their cognitions. Table 4 summarizes the four studies.

The IRT led to significant decreases in the frequency of nightmares ( $d = 1.41$  according Krakow et al.;  $\eta^2 = 0.22$  according St-Onge et al.) and nightmare distress ( $d = 1.13$  according Krakow et al.;  $\eta^2 = 0.42$  according Simard and Nielsen) with large within-group effect sizes. Therefore, all studies showed a reduced nightmare frequency, also in the follow-up.

RET and RET with imagery were both more effective than the other two conditions, but only the RET with imagery had an effect on the self-measurements of anxiety (Warren et al. 1984). Therefore, a combination of RET with imagery seems to be important, as the treatment might have a more profound effect.

## Discussion

Mental imagery-based interventions in psychotherapy for adults are widely used, and empirical evidence supports its effectiveness. This is the first comprehensive review to summarize the empirical evidence regarding mental imagery (MI) in children and adolescent psychopathology, and related interventions for the treatment of children and adolescents.

### Mental Imagery in Psychopathology

In PTSD, mental images seem to play a potential role in the development of the disorder in children and adolescents, as found in adults as well (e.g., disturbed recording of information under the influence of trauma, separation of semantic information, and sensory perception). The influence of MI on maintenance in children and adolescents is still unclear, but can be assumed, as patients with PTSD prevent the experience of these images by avoiding triggers (as shown in adults: Hackmann et al. 2012). For SAD, results for children and adolescents show that recurrent self-imagery is more frequent and more vivid in SAD and might be a maintenance factor, according to Clark and Wells (1995). In contrast to findings from the adult area (see Hirsch et al. 2006), having a self-image is a substantial factor in SAD during adolescence, and

**Table 4** Imagery rehearsal therapy and rational-emotive therapy with imagery

Author	Clinical symptom or diagnosis	Study characteristics	Age range (M; SD)	Sessions	Outcome
Krakow et al. (2001)	Nightmares	RCT; $n = 19$ ; 2 groups: IRT and waiting list CG	13–18 years ( $M = 15.6$ ; $SD = 1.0$ )	3 sessions of showing, 12-weeks of rehearsal at home	Significant decrease in nightmare frequency ( $d = 1.41$ ) and nightmare distress ( $d = 1.13$ ) in a 3 month-follow-up
Simard and Nielsen (2009)	Nightmares	RCT; $n = 10$ ; 2 groups: IRT and waiting list CG	6–11 years ( $M_{CG} = 8.25$ ; $SD_{CG} = 2.25$ ; $M_{IRT} = 8.0$ ; $SD_{IRT} = 3.2$ )	3 sessions, 8-week-period (90 min each) + 3- and 6-month follow-up	Significant decrease in nightmare-distress ( $\eta^2 = 0.42$ ); drawing the nightmare seems to be useful
St-Onge et al. (2009)	Nightmares	RCT; $n = 20$ ; 2 groups: IRT and waiting list CG	9–11 years ( $M = 10.2$ ; $SD = 0.77$ )	4 meetings (including a 9-month-follow-up) + 8-week IRT-period at home	Reduced frequency of nightmares ( $\eta^2 = 0.22$ )
Warren et al. (1984)	Anxiety symptoms	RCT; $n = 59$ ; 4 groups: REI, RET, relationship-oriented counseling, and a waiting list CG	12–16 years ( $M$ and $SD$ not provided)	7 sessions of group therapy in a 3-week-period (50 min each) + pre- and post-measure	Only REI led to reduced interpersonal anxiety in self-report measures (effect sizes not provided)

CG control group,  $d$  = Cohen's  $d$ ,  $\eta^2$  = partial Eta<sup>2</sup>, IRT imagery rehearsal therapy, RCT randomized controlled trial, REI rational-emotive therapy with imagery, RET rational-emotive therapy. Only significant effect sizes are mentioned



valence or content of self-images seems to play only a secondary role (Alfano et al. 2008). In GAS and depression, the impact of prospective negative mental imagery seems to be associated with these symptoms. In depression, the previous results for children and adolescents show that maintenance seems to be influenced by MI, as vivid positive imagery, as well as more vivid negative imagery (about the future and the past), was associated with symptoms of depression. In ASD, the characteristics of MI are typical for the disorder, as difficulties in generating MI seem to be specific to social stimuli, but conclusions due to the development or maintenance cannot be drawn.

MI may be an important factor in some mental disorders and should thus be targeted in the treatment (e.g., Holmes and Mathews 2010). However, longitudinal studies are needed to examine causal relationships between clinical symptoms and mental images. Moreover, the clinical aspects of imagery, the characteristics of re-experiencing intrusions or flashbacks, as well as the prospective imagery, and imagery bias across different mental disorders, are all important aspects for clinical research, as the results might be helpful in the therapy of mental disorders. Only one of the studies (Pile and Lau 2020) investigates the occurrence and effects of positive prospective images and flash-forwards in children and adolescents, yet flash-forwards seem to play a significant role in adults with depression, as images may appear of their own suicide, thus increasing the risk of acting out the suicidal ideation in reality (Holmes et al. 2007b). This might be an important research field for adolescents, as the number of attempted and successful suicides in this age group is high (World Health Organization 2016). In cases of depression, positive, prospective images seem to help adults (Blackwell and Holmes 2017; Ji et al. 2017) and could therefore also be a suitable method for younger patient-groups. Because this is a complex and wide-ranging aspect, it seems promising to investigate disorders for which there is already evidence from studies with adults, in order to generate evidence across the lifespan. Accordingly, MI in PTSD, SAD, and depression seems to be the most appropriate disorders with which to commence.

As depressive symptoms were associated with less vivid positive MI, and more vivid and a higher frequency of negative MI (Kuyken and Howell 2006; Pile and Lau 2018), and comorbid depressive symptoms might mediate the effect of MI on symptoms (as in Karatzias et al. 2009; McTeague et al. 2009), the depressive symptoms in individuals must be controlled whenever MI is investigated.

In future studies, the perspective of mental images should be controlled. There are differences in the use and effect of imagery perspective between mental disorders, given that an observer perspective is present in SAD (adults: Hackmann et al. 1998; adolescents: Hignett and Cartwright-Hatton 2008; Ranta et al. 2014; Schreiber and Steil 2013) and depression (adults: Holmes et al. 2016; adolescents: Kuyken and Howell 2006). In depression, an observer perspective was also associated with lower levels of affective content in adults (Kuyken and Moulds 2009), which might be in contrast to the effect of observer perspective in SAD, as this perspective is more frequent in SAD, and MI is linked to higher emotional distress in SAD (Schreiber and Steil 2013). Thereby, it can be assumed that in SAD, the observer perspective is linked to higher levels of affect. In PTSD, images are also more often experienced in an observer perspective, and might therefore be less affect-provoking (McIsaac and Eich 2004). The observer perspective might be part of a cognitive avoidance tendency of adult patients with PTSD, as the observer perspective is associated with decreased emotions and may be less anxiety provoking than a field perspective (Kenny and Bryant 2007).

When investigating the perspective, it is important to note that adolescents need explicit guidance on how to adopt different perspective-options, because cognitive abilities, such as working-memory (Luna et al. 2004) and metacognitive accuracy (Weil et al. 2013), which are important in this context, still develop during adolescence. In addition to pre-selected standardized images, it seems relevant to investigate spontaneous images (Vassilopoulos et al. 2012) and the emotions triggered by these images.

## Mental Imagery and Psychotherapy

As imagery rescripting (IR) seems to be the imagery technique with the most reliable results in adults (Morina et al. 2017), this method could be especially promising for the treatment of children and adolescents. However, for IR, the study situation for children and adolescents is unsatisfactory and more evidence is needed, as there have only been three studies investigating the effect of IR in children and adolescents. The results show that IR led to a decrease in the intensity and frequency of nightmares, reported behavior problems (Davis et al. 2003; Fernandez et al. 2013) and to a decrease or remission of mental disorders like PTSD, GAD, and specific phobia (Nelius and Ahrens-Eipper 2017). All studies investigating IR in childhood are case studies with a very low number of participants. Therefore, the external validity and the generalizability of the results are low. As the most reliable findings in adults are for PTSD, SAD, and depression in adults, as shown in the meta-analysis of Morina et al. (2017), there should be a future focus on studies examining these mental disorders in children and adolescents. Especially PTSD needs to be investigated, as the combination of intrusive imagery and peritraumatic life threat is associated with symptom persistence (Holmes et al. 2007c).

Furthermore, emotive imagery (EI) seems to be a promising method for treating specific phobias in children and adolescents, as there are two useful studies comparing the effect of EI with a waiting list control group. Studies comparing EI with the effectiveness of other interventions remain to be conducted. There is some evidence that this technique has a significant effect on symptoms of anxiety. However, most of the studies investigating the effect of EI adopted a case approach, which limits the external validity. Nevertheless, the effectiveness of EI regarding the number of sessions is impressive (large effect sizes were found).

Studies exploring the effects of imagery rehearsal therapy (IRT) and rational-emotive therapy (REI) with imagery have shown that imagery seems to be a component which enhances the effectiveness of REI (Warren et al. 1984), since it led to a reduction in nightmare frequency and the associated distress. The effect sizes were very large, despite the limited number of sessions. The intensity or severity of nightmares was not assessed in these studies and should be therefore considered in further studies. As there are only a few studies with a randomized design and control groups, and mostly case studies with no control group, the effects cannot be generalized and need to be examined further. As there were contradictory findings concerning whether verbal (Muris et al. 2011) or imaginative instructions (Holmes et al. 2006, 2009; Holmes and Mathews 2005) led to larger effects regarding the provoked anxiety, it might be worthwhile to examine and control whether and how children and young people generally use mental images during verbal instruction.

With respect to the assessment of MI, perceived vividness was assessed only in one study by Warren et al. (1984). Although this factor did not have a significant effect on reducing interpersonal anxiety, it may be an important mediator of treatment effects on emotions, as shown in a study with adult patients with depressive symptoms (Moritz et al. 2014). Having group differences in imagery vividness, as well as differences in the perspective and depression score, could falsify the effects of training and therefore needs to be controlled.

In conclusion, it seems useful to test the efficacy and effectiveness of these direct treatment methods in children and adolescents in further studies, as they can easily be formulated in a child-adapted manner, for instance, using a monster or a superhero to provide help in the mental image. These methods are more appropriate for children than complex cognitive processes. The cognitive ability of children to process abstract or logical information (e.g., Socratic dialog) is limited, whereas imagery provides information in a way that can easily be processed and help children with psychological disorders in a more targeted manner (De Voogd et al. 2017; Hautzinger et al. 2006). The therapist should use well-known situations and also pay attention to non-verbal reactions, as they are important sources of feedback. Furthermore, children have difficulties in describing their feelings during imagination processes and need guidance from the therapist (Rosenstiel and Scott 1977). Working with unpleasant images in therapy should be done more creatively, such as to paint it (as in Nelius and Ahrens-Eipper) or re-enact it with toys such as “Lego,” “Duplo,” clay, and plasticine and to change it in playful manner. Especially with children, externalizing the image seems to be important, as the concentration range is lower than in adults, and the cognitive ability to control images develops very slowly and is still poor at this age (Burnett-Heyes et al. 2013). The image should therefore become physical. Mental images and associated thoughts are often not concrete, and thus difficult for many children to become aware of and make more pleasant (Kosslyn and Barrett 1990). If the images have a tangible shape, it could pave the way for altering the image. It also might be helpful for the children to play a game, in which they have to control the image again and again. Examples might be to create an image with a positive ending, or to imagine a helping superhero. The age of participants in treatment studies using MI varied from 4 to 18 years, which is a remarkably wide range; considering the rapid social and cognitive development over that timeframe and still, the results indicate an effective treatment for all participants. Methods for changing MI might not only be important for the therapy of mental disorders. Given that MI might also play a role in the development of various mental disorders (such as PTSD), these methods should be included in prevention programs.

Finally, several limitations impact on the research reviewed, such as heterogeneity in the extent of imagery used during treatment (e.g., as the vividness was assessed in only one study) and the reliance on a low number of studies and small sample sizes for interventions. Comparisons across interventions are also difficult, as the methodological quality differs, which limits the ability to draw definite conclusions. For IR, only case studies were found. For ER, IRT, and RET with imagery, there are RCTs, but with a relatively small number of participants, which limits external validity. Especially for IR, it is surprising that there are no RCTs, as IR is a widely used treatment method in adults (Morina et al. 2017). Finally, it cannot be ignored that authors have missed potentially relevant papers and search terms. To assess the effectiveness and effectivity,

a meta-analytic approach would be appropriate, as soon as there are sufficient reliable studies with reasonable sample sizes.

## Conclusion

Mental images in children are vivid and probably exert an influence on the emotions of children and adolescents, as primarily studies in adults suggest. MI seems to play a role in the maintenance of PTSD, SAD, and depression in children and adolescents. Therefore, it is important to identify negative and disturbing mental images and treat them in therapy. Techniques which include MI should be adapted to the cognitive abilities of children and adolescents. The vividness of MI, the perspective in which the image is perceived, as well as the role of comorbid depressive symptoms, may influence the level of emotional distress due to MI, and need to be controlled in future studies. Using MI in helping children to control and change their mental images may be both an effective treatment and an effective measure of prevention, thus increasing resilience to mental disorders.

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## Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflict of interest.

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