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Title:

**Assessing and Managing Hallucinations in Children and Adolescents**

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**Abstract** (299 words)

Children and young people who disclose sensory experiences suggestive of hallucinations do pose a diagnostic and therapeutic challenge to mental health clinicians in their daily practice. Hallucinations, defined as erroneous percepts in the absence of identifiable stimuli, are a key feature of psychotic states, but they had also long been known to present in children with non-psychotic psychiatric disorders. The recent upsurge of interest in childhood hallucinations has arisen out of epidemiological studies of child populations, where comprehensive symptom enquiry has included screening questions on abnormal perceptions. This has resulted in what seemed surprisingly high rates of hallucinatory experiences among other psychotic-like symptoms. Children and adolescents show a prevalence rate of self-reported hallucinatory experiences of about 10% and are reported as more common in childhood than in adolescence. These hallucinatory phenomena are most likely to occur in the absence of any psychiatric disorder and would be expected more often than not to be simpler, less elaborate and distressing than those observed in clinical samples of children with psychiatric disorders. Longitudinal studies have in fact shown that only a small proportion of children in the general population with hallucinations (less than 10%) will suffer from a psychotic disorder later in life. In clinical settings, presentations with hallucinations can be an expression of a psychotic state, or alternatively of a symptom constellation co-occurring along other psychiatric conditions. Associations have been found between hallucinations and traumatic stressors (i.e. bullying and sexual assault), severity of psychopathology and suicidal symptoms. These associations could be mediated by individual vulnerability, involving neurodevelopmental anomalies and a tendency to mental dissociation and mood dysregulation. This review details the clinical assessment of hallucinations in children and adolescents taking into account developmental considerations and paediatric organic associations. It describes hallucinations in young people with psychoses (schizophrenic spectrum and mood disorders) and other non-psychotic psychiatric disorders (emotional and behavioural disorders), and it addresses therapeutic aspects.

**Keywords:** Hallucinations, childhood disorders, adolescents, assessment, management, psychotic disorders

## Objectives

- (1) To be knowledgeable of the frequency, associations and clinical significance of hallucinatory experiences in general populations of children and young people.
- (2) To learn how to conduct clinical assessments of children and young people presenting with hallucinatory experiences taking into account developmental considerations.
- (3) To recognize the characteristics and clinical associations of hallucinations in children with psychotic and/or non-psychotic disorders and to understand the therapeutic implications.

## MCQs and their answers (please note correct answer is underlined)

1. The frequency of hallucinatory type experiences in children and young people in the general population is closest to:
  - (a) 0.1%
  - (b) 1%
  - (c) 10% (true)
  - (d) 20%
  - (e) 30%
  
2. The rate of discontinuation of hallucinatory experiences in children in the general population over time is closest to:
  - (a) 20%
  - (b) 40%
  - (c) 60%
  - (d) 80% (true)
  - (e) 100%
  
3. The risk of a future psychotic state in children in the general population with psychotic symptoms/hallucinations is closest to:

- (a) 1%
  - (b) 10% (true)
  - (c) 20%
  - (d) 30%
  - (e) 40%
4. In clinical samples hallucinations in children with non-psychotic states have been found to be associated with
- (a) Imaginary companions
  - (b) Rich phantasy life
  - (c) Severe social deprivation
  - (d) Dissociative experiences and emotional dysregulation (true)
  - (e) Parental psychotic states
5. The clinical management of hallucinations in children primarily involves:
- (a) CBT for psychotic states
  - (b) Treatment of the concurrent psychiatric disorder (true)
  - (c) Antipsychotic medication
  - (d) Reduction of the Duration of the Untreated Psychosis
  - (e) Mindfulness training

## **Introduction**

From the earliest stages of life, the experiences of smelling, touching, tasting, hearing and seeing are the front door through which babies relate to the world that surrounds them. Sensations are interpreted as perceptions and processed into inner representations mediated by complex cognitive processing in the brain, involving the optimal combination of new sensory inputs with prior knowledge (Jardri 2014). Human perception can be distorted in different ways. Taking into account the presence or absence of external stimuli, and the level of consciousness, a variety of perception distortions are defined (Table 1) (Casey 2007).

[INSERT TABLE 1 HERE]

Hallucinations refer to sensory experiences which occur: (i) in the absence of corresponding external stimulation of the relevant sensory organ, (ii) in the awake state and (iii) with a sufficient sense of reality to resemble a veridical perception over which the subject does not feel s/he has direct and voluntary control. Hallucinations have been considered one of the paradigmatic psychotic symptoms together with their counterpart alterations in thought content or delusions. Nonetheless in both adult and child samples hallucinations are present not only in psychotic disorders, such as schizophrenia spectrum or mood disorders, but also in other psychiatric disorders including anxiety, stress reactions and conduct disorders, substance abuse, in medical conditions such as epilepsy and delirium, as well as in mentally healthy people.

## **Epidemiological findings on hallucinatory experiences**

Over recent years it has become evident that hallucinatory experiences are common in general adult and child populations. Following the hypothesis of the continuum of psychopathology and medical help seeking, psychopathological features would be present in the general population though in an attenuated and/or isolated form and with lower levels of distress and impairment not leading to need for care. Epidemiological studies have explored their presence through questions which identify both clinical hallucinations (those who fulfil the above criteria for the definition of hallucinations and cause distress and functional impairment significant enough to lead to help-seeking behaviour, and therefore as seen in clinical psychiatric samples) and broader hallucinatory experiences (those not

necessarily causing sufficient distress or impairment to lead to help-seeking behavior).

Epidemiological questionnaires have used questions such as: “*Have you ever heard voices or sounds that no one else can hear?*” or “*Have you ever heard voices when you were alone?*” -which target a continuum of experience from single noises or words more in line with hallucinatory experiences to clinically relevant ongoing conversing voices,. Overall about 10% of children and young people in the general population report some type of hallucinatory experience (Linscott 2013; Jardri 2014).

#### *Hallucinatory experiences and age*

Although evidence on the associations between age and hallucinatory experiences is not unequivocal, recent studies on the trajectory of hallucinatory experiences over time have found higher prevalence rates in childhood (age 9-12; 13%-17%) and a decrease in adolescence (age 13-18; 5%-7.5%) (Kelleher 2012a; Thapar 2012). However, it is of note that whereas psychotic experiences may be highly reported by children, the prevalence of psychoses conversely rises steeply in adolescence. This indicates that psychotic experiences are only rarely an expression of a psychotic disorder in children, and it further suggests that either hallucinatory experiences are part of normal developmental trajectories for a number of children or –as discussed later–the high general population rates reflect difficulty in eliciting hallucinations convincingly in young children.

#### *Hallucinatory experiences, emotional and behavioural symptoms*

Cross-sectional studies have documented positive associations between hallucinatory experiences and a range of concurrent emotional and behavioural symptoms and disorders in children and young people (Jardri 2014). As may be expected professional help-seeking in children with abnormal auditory experiences is related to hallucinatory-related distress, including more emotional triggers to the voices, negative views towards them, and perceiving them as influencing their emotions and behaviour (de Leede-Smith 2013). Associations have also been reported between hallucinatory experiences, traumas as in bullying and suicidal symptomatology (Jardri 2014). This work however has rarely controlled for the possible confounding effects of underlying or mediating neuro-

developmental and/or social anomalies, or the severity of the depressive symptomatology; the significance of these associations thus require further investigation.

#### *Persistence of hallucinatory experiences*

The majority of hallucinatory experiences are transitory (75-90%) and resolve spontaneously over time (Linscott 2013). Traumatic events such as maltreatment, assault or bullying have been identified not only as potential triggers to hallucinatory experiences but also as risk markers for their persistence (Linscott 2013; Jardri 2014). In addition, persistence has been shown to be predicted in some studies by: (i) higher severity, frequency and complexity of the perceptual phenomena (i.e. multiple voices with external attributions), (ii) the presence of emotional and behavioural symptoms and of drug use, and (iii) other risk factors including adverse backgrounds, disturbed childhood development, low academic achievement, and urbanicity, although these could be mediated, in part at least, by concurrent psychiatric disorders (Dominguez 2011; van Rossum 2011; Thapar 2012; Linscott 2013, Jardri 2014).

#### *Hallucinatory experiences and psychoses*

The great majority of children reporting hallucinatory experiences do not have psychotic states nor do they ever make the transition to a psychotic disorder. Earlier longitudinal studies showed an increased risk for schizophreniform diagnoses in adulthood, present in 25% of children self-reporting a combination of hallucinatory experiences and delusional thoughts aged 11. Later meta-analytic studies have estimated that only a small proportion of about 7% of children reporting hallucinatory experiences will suffer from a psychotic disorder later in life (Linscott 2013). The positive predictive value of the presence of psychotic-like symptoms is consequently low and of limited use for psychosis prevention.

Even in young people with more troublesome psychotic symptoms –some of whom might qualify for one of the “at risk mental states” - the risk of conversion to psychosis has been estimated as 26% (16% converting to schizophrenia) (Fusar-Poli 2013). Operationalized criteria developed to identify



“at risk mental states” usually require either attenuated positive psychotic symptoms; or full blown psychotic symptoms although brief and self-limiting; or a significant decrease in functioning in the context of a genetic risk for schizophrenia; or basic symptoms alongside with distress, dysfunction and help seeking (Fusar-Poli 2013).

It seems plausible that the predictive value of childhood hallucinatory experiences for adult psychoses will be accounted for by the experience of complex hallucinatory phenomena, in the context of a summation of psychotic indicators, such as delusional beliefs, negative and disorganized symptoms, neurocognitive and social impairment, behaviour and mood regulation anomalies, in combination with the exposure to sufficient environmental stressors (Dominguez 2010; Smeets 2012; Linscott 2013).

### **A Developmental Approach to Hallucinations**

Hallucinations are subjective phenomena and their assessment in children relies on their ability to understand and explain to others the difference between perceptions of externally and internally generated stimuli, between those that are sleep-related or experienced in full awareness. At what age are children able to do this? In addition, young children have a rich fantasy life: when do they become able to differentiate this from sensory perceptions?

#### *Fantasy and hallucinations*

It has long been established that young children are able to differentiate between fantasy and reality. Despert (1948) studied the behaviour and communications during play of children aged 2-5 and showed that though fantasy activities were not uncommon, hallucinations were absent. Some children talked about their fantasies repeatedly, but these lacked the characteristics of perceptions and those with the most creative imaginations were readily able to acknowledge their fantasies as “pretend” rather than reality. This suggested that already very young children are able to appreciate when experiences are generated by them as fantasy and when they are not.

Imaginary friends are an example of fantasy activity by children. They have been reported in nearly half (46%) of 5-12 year old children (Pearson 2001) and tend to cease in middle childhood. They have been shown to be associated with positive developmental outcomes, such as superior performance on

theory of mind tasks. From a clinical perspective, imaginary companions -in addition to lacking the characteristics of perceptions of seeing and hearing- differ from hallucinations in at least two respects: (1) they can often be invoked by the child at will in contrast with the involuntary nature of hallucinations, and (2) they typically function as playing partners associated with positive emotions.

### *Hallucinations in young children*

In clinical samples, hallucinations seem to be especially rare under 7 years of age (Garralda 1984a). This has led to the suggestion that in young children limitations in cognitive development militate against the effective communication of hallucinations to others. They would have difficulty not in differentiating self-induced fantasies or “pretend” activities from reality, but in knowing the difference between dreams and other subjective phenomena like hallucinations. In Despert’s study (Despert 1948), some 2-5 year old children related hypnagogic experiences but it proved impossible to obtain sufficient evidence from the children themselves to conclude that the experiences were hypnagogic hallucinations as opposed to dreams. Piaget (1974) pointed that until 7-8 years of age dreams are still systematically considered as objective reality, “as a sort of ethereal picture floating in the air and fixed before the eyes”. The comparatively high rates of hallucinations reported in epidemiological samples of schoolchildren in response to standardised questioning may therefore be partly an artefact of immature cognition in the younger amongst them.

Pre-school children are more likely to demonstrate the presence of hallucinations through their behaviour –as discussed later- and be particularly vulnerable to experience hallucinations and other abnormal phenomenon in conditions of brain toxicity, such as high fever and septic illness. In a sample of children and adolescents with meningococcal disease “out-of-body” type experiences were mainly reported by preschool children, possibly reflecting cognitive or brain immaturity through failure by the brain to integrate complex somatosensory and vestibular information (Shears 2005).

### **Assessing hallucinations in clinical samples**

When a child presents with hallucinatory experiences, the first step is to clarify their nature, whether or not they are *illusions* or misrepresentations of sensory inputs, *fantasy-related* as with imaginary

friends (“can you bring them on?, do you actually hear them and see them as you see and hear me now?”), intrusive thoughts or inner images (as in *obsessions*, where ego-dystonic experiences are personalized and attributed to an external source: “are they like the voices you normally hear through your ears, or are they more like thoughts as when you are thinking about things”), or *post-traumatic flashbacks* (as in involuntary and intrusive vivid inner images or sounds from past traumatic memories).

Once the presence of hallucinations is established, the second task is to document their complexity: simple hallucinations such as occasionally hearing one’s own name being called or fleetingly seeing shadows out of the corner of one’s eye are regarded as non-clinically significant.

Thirdly, clinicians need to ascertain whether hallucinations are linked to states of lowered awareness as in sleep (hypnagogic or hypnopompic), fever, drug taking, toxicity, epilepsy or to migraine. The “Alison in Wonderland Syndrome” presents as a combination of migraine and a variety of hallucinations and illusions of size, time, colour body shape and movement (Smith 2015). Particular note merits the differentiation of sleep-related phenomena and hallucinations (see table 1). Although hypnagogic and hypnopompic hallucinations are usually without clinical significance, there are specific cases in which they may be part of a disabling childhood sleep disorder such as narcolepsy. Finally, the fourth task will involve assessing whether hallucinations are part of psychotic states and, failing this, whether there are any pointers to why this symptom is presenting in this child at this particular moment, including possible vulnerabilities and stressors in addition to other psychiatric morbidity. This assessment process is not always straightforward. In younger children or those with intellectual disability or in mistrustful and uncommunicative young people, it may require careful questioning from clinicians experienced in both interviewing children and diagnosing psychotic and other psychiatric states.

#### *The detailed exploration of the symptom*

Hallucinatory experiences can affect any of the five sensory modalities (Table 2). A comprehensive assessment requires detailed exploration of the symptom characteristics for each individual (Table 3). As a general rule, it is better to ask children and adolescents open questions where they can describe

the experiences or to provide alternative answers rather than close questions which may guide and contaminate their answers. Descriptions of symptoms should be factual, avoiding florid interpretation.

[INSERT TABLES 2 AND 3 HERE]

In children, hallucinations are regarded as having clinical significance when they occur without clouding of consciousness and are comparatively complex (i.e. voices containing a narrative or that are multiple, elaborate visions, multi-sensory experiences), distressing and impairing, if they are linked to physical illness and/or to active psychopathology and suicidality. Adult studies have identified markers of risk in the case of auditory verbal hallucinations which include emotional valence driven by negative voices content, appraisal of the identity, intent and power of voices as a source of distress, perceived lack of control and presence of command hallucinations which may encourage harm of self or others (de Leede-Smith 2013). However these findings are yet to be replicated in child and adolescent populations.

#### *Clinical scales to assist the assessment of hallucinations*

A number of clinician-rated scales have been used to assess the severity of hallucinations in adults with psychotic disorders, such as the Positive and Negative Syndrome Scale (PANSS; (Kay 1987)) and may be useful to quantify treatment progress in young people with psychoses.

More recently validated instruments explore the characteristics of psychotic symptoms regardless of diagnosis, including: the Psychotic Symptoms Rating Scales (PSYRATS, 17 items; (Haddock 1999)) which quantifies in considerable detail the multidimensional features of hallucinations (frequency, duration, location, loudness, origin, negativity, distress, disruption and controllability), and delusions, and has been validated in clinical and nonclinical samples; and the more recently developed Questionnaire for Psychotic Experiences (QPE, 50 items; (Nijboer 2015)) which measures the presence, severity and phenomenological characteristics of (auditory, visual and other sensory modality) hallucinations and delusions. The PSYRATS is increasingly being clinically used as a measure of symptoms change, whereas the QPE is a promising clinical scale at earliest steps of research and clinical development. However although these scales look promising, there is as yet little evidence on the use of these measures with populations of children and young people.

### **Differential diagnosis of hallucinations with paediatric organic conditions**

[INSERT TABLE 4 HERE]

A variety of paediatric organic conditions need to be considered and investigated when there are relevant clinical indicators (Table 4) (Freudenreich 2009; Algon 2012) based on detailed medical history and physical exploration. Freudenreich (2009) and Algon (2012) have outlined broad and specific medical screening of medical disorders in first episode psychosis.

### **Hallucinations and paediatric psychiatric conditions**

As important as carefully exploring the nature of hallucinatory experiences is to assess the constellation of symptoms of which hallucinatory experiences form part for each particular child or adolescent. The psychiatric differential diagnosis of hallucinations includes:

- (a) Psychiatric disorders where psychotic symptoms are a hallmark feature (hereafter: psychotic disorders), as in schizophrenia spectrum (i.e. schizophrenia, schizoaffective, schizotypal, acute and transient psychotic disorders) and mood disorders (i.e. bipolar disorder and major depression with psychotic symptoms). Each of them requires specific symptom combinations and time frames to warrant clinical diagnosis level (World Health Organization 1990). For an initial psychotic presentation, all these disorders are grouped into First Episode Psychosis.
- (b) Psychiatric disorders where hallucinations are not a hallmark feature but an associated symptom, e.g. emotional and behavioural disorders.
- (c) Psychiatric disorders with psychopathological features which may resemble those of hallucinations such as intrusive obsessions in obsessive-compulsive disorders, intrusive images/thoughts in post-traumatic stress disorders, or elaborated magical bizarre thoughts as in autistic spectrum disorder.

### **Hallucinations and psychotic disorders**

[INSERT TABLE 5 HERE]

First Episode Psychosis is defined by more than a week of unremitting frank psychotic symptoms, namely clinically defined delusions, hallucinations, passivity experiences or severe thought disorder. Psychotic symptoms are considered frank with a threshold higher than 4 in the PANSS (Table 5). In psychotic states hallucinations co-occur with a constellation of symptoms, as part of the clinical psychosis phenotype shed by the five psychopathological dimensional model (Dikeos 2006), including:

- (i) the 'positive' dimension: delusions, ideas of reference, unusual thought content, hallucinations, grandiosity and suspiciousness/persecution;
- (ii) the 'negative' dimension: alogia, affective flattening, avolition, apathy, anhedonia, asociality, social withdrawal, stereotyped thinking and motor retardation;
- (iii) the 'disorganized' dimension: conceptual disorganization, positive formal thought disorder, difficulty in abstract thinking, derailment, tangentiality, incoherence, illogicality, circumstantiality, associative loosening, inattention/distractibility, disorientation, inappropriate affect, bizarre behavior, mannerisms and posturing;
- (iv) the 'depressive' dimension: observed depression, hopelessness, self-depreciation, feelings of guilt, guilty ideas of reference, early wakening, suicidal ideation, anxiety and active social avoidance;
- (v) the 'manic/excitement' dimension: pressured speech, excessive activity, thoughts racing, elevated mood, increased sociability, reduced need for sleep, reckless activity, irritable mood, increased self-esteem and grandiose delusions.

An individual can then be defined by how high or low they score on the different dimensions, which may co-exist. Close monitoring over time will be required to observe the direction towards that psychopathology evolves. This may veer towards a schizophrenic spectrum or mood disorder picture.

*Characteristics of hallucinations in psychotic disorders*

The paediatric hallucinations *South London* study (Garralda 1984b, 1985) identified auditory hallucinations as the most common psychotic symptom, present in three quarters of a clinical sample of children with psychotic states (schizophrenia, manic-depressive, schizoaffective or unspecified diagnoses) and it described their clinical manifestations. In terms of content, voices tended to address children telling them to carry out actions which, in half the cases, could be considered as wrong doings. Some contained suicidal instigations, and occasionally there was a direct relationship with suicidal symptoms. Their tone was equally likely to be unpleasant as pleasant, and voices were varyingly attributed to unspecified or familiar people such as school contacts or parents; more rarely they were thought to be God's. Some children interpreted the voices as their own thoughts being spoken aloud or other people speaking their thoughts. Visual hallucinations were less common, varyingly described as of unidentified people or family members, animals or objects; rarely would a child report seeing the devil.

Hallucinations co-occurred with delusional beliefs (mainly paranoid or persecutory such as complaining that people were poisoning or conspiring against them), abnormalities in language production (incoherence, mutism or laconism, repetitive speech), inappropriate affect (including giggling), bizarre behaviour, hypo-activity and social withdrawal. Schneiderian first rank symptoms were rare, present in 15%.

The presence of hallucinations in this sample (when compared with other children with psychoses who did not report hallucinations) was linked to reporting precipitants of illness, symptoms of depression and anxiety and problems in reading ability (Garralda 1984b) suggesting a role of stressors, mood changes and cognitive vulnerability for the experience of hallucinations in children and young people with psychotic disorders.

#### *Psychotic schizophrenia spectrum disorders*

Youth onset schizophrenia is an infrequent but important cause of hallucinations in young people. The prevalence of schizophrenia increases rapidly from age 14 and accounts for 24% of UK psychiatric admissions in young people aged 10-18 (NICE 2013). Schizophrenic spectrum disorders are commonly preceded by the so-called prodromal period, lasting up to 12 months, in which the child or

young person's behaviour and experience are altered leading to social withdrawal or impaired functioning. In the especially rare pre-pubertal childhood-onset schizophrenia (David 2011), auditory and visual hallucinations have been documented in 95% and 80% of children during their hospitalizations respectively. In this group visual hallucinations showed a significant relationship with lower IQ and earlier age of onset, and tactile (60%) and olfactory (30%) hallucinations were observed only in children with visual hallucinations.

### *Psychotic mood disorders*

Mood changes are a particularly common association of hallucinations in children and should therefore be explored carefully. Both extremes of mood disorders (i.e. bipolar disorder and major depression) may present with psychotic hallucinatory experiences which tend to be mood congruent. In paediatric bipolar populations (Kowatch 2005), increased energy, distractibility and pressured speech, followed by racing thoughts, decreased need for sleep and poor judgment are the most common symptoms of mania, in contrast to flight of ideas or hypersexuality which are less frequently present. It is of note that irritability or dysphoria is not a distinctive feature of mania as it may be the predominant mood state in young people presenting with the constellation symptomatology of depression (i.e. anhedonia, fatigue and suicidal ideation) (Chang 2009). In a pediatric bipolar sample (Tillman 2008), excluding the perceptual experiences of imaginary companions or voice calling name (which occurred in 43.6% of cases), visual hallucinations were the most frequent hallucination type (16%), followed by command auditory hallucinations (15.6%), tactile (10.1%), olfactory (8.2%), conversing voices (7.4%), commenting voices (6.6%), and other verbal hallucinations (5.4%).

### **Hallucinations and non-psychotic psychiatric disorders**

Population studies show that children who report hallucinatory experiences score significantly higher than those who do not on general and specific measures of psychopathology, including both internalizing and externalizing features (Scott 2009; Kelleher 2012b). This has been replicated in clinical samples, where hallucinations co-occur in children and young people presenting with anxiety disorders, stress reactions and conduct/oppositional disorders (Garralda 1984a; Askenazy 2007;



Braakman 2009). Hallucinations are however not a frequent feature of clinical presentations: in Ulloa et al (2000)'s study of children and adolescents referred to a Mood and Anxiety disorders clinic, psychotic symptoms (mainly hallucinations) were reported by 4% and suspected in a further 4%: definite symptoms were associated with mood disorders and suicidal ideation, the latter mediated by the presence of a mood disorder.

There has been comparatively little work to characterize hallucinations in children with emotional and behavioural disorders (as Ulloa only looked at mood disorders), but the paediatric hallucinations *South London* study (Garralda 1984a) described in some detail the experiences of a group of children with hallucinations in the context of emotional and conduct disorders. As in children with psychotic states, auditory hallucinations predominated, and visual phenomena being reported by about half. The length of time hallucinations had been present ranged from one week to years, and episodes tended to be brought on by stressful events, distress, naughtiness or temper. Three quarters of the children reported that voices addressed them, in half asking them to do something wrong and unpleasant and threatening comments were heard by over a third. About half were said to be anxious and frightened while the experiences took place, and in a quarter they fought them, refusing to obey orders. There was a trend for the voices to be located predominantly in the child's internal space before the age of 13 and in the external space after that age. Visual hallucinations included seeing frightening objects such as skeletons or ghosts, but a number of children also talked about seeing recently deceased people.

Children with hallucinations and non-psychotic diagnoses were found to be older and with lower intellectual level than the majority of clinic attenders and they were also more likely to be admitted as in-patients, a proxy for illness severity. In comparison to a matched control group of children without hallucinations, they were found to have experienced more illness precipitant stressors, display more mood changes and dissociative symptoms (i.e. derealisation) and episodes as well as more neuro-developmental deficits (i.e. problems in reading ability, and verbal/performance intellectual discrepancies). Hallucinations were however not linked to lower socio-economic backgrounds, social deprivation, sensory deficits, vivid imagination or daydreaming. At long-term follow-up in adulthood (Garralda 1984c), the psychiatric adjustment of children with a history of hallucinations was

comparable to that of controls, but although rates of psychoses were not increased amongst them, they continued to be more likely to experience complex hallucinations and dissociative phenomena (i.e. depersonalization and derealisation, déjà vu and short dissociative episodes) over the years.

These findings are in keeping with the increasing evidence of first, a relationship between early traumatic events and stress reactions including hallucinations (Braakman, 2009) and in a minority of individuals psychotic disorders (de Leede-Smith 2013), and secondly the possibility of dissociation as a mediator in the relationship between childhood trauma and hallucination-proneness (Varese 2012). Links between hallucinations and dissociation, low intellectual function and emotional dysregulation have since been confirmed by epidemiological findings and clinical reports (Linscott 2013; Jadri 2014). This points to the relevance of emotional dysregulation and its perceptual correlates in young people's responses to traumatic events. For the clinician, the findings indicate the advisability of exploring the presence of possibly unacknowledged traumas and losses, as well as dissociative tendencies and cognitive vulnerabilities in these children, in addition to assessing mood regulation and suicidality.

There is little information on the short term outcome or of hallucinations in clinical samples. In a small group of 13 pre-pubertal out-patient attendees with hallucinatory experiences, half were free of these three months following assessment and at one year follow –up, about one in ten had recovered but had had a relapse following new stresses, and the rest (under one third) continued to report hallucinatory experiences at one year follow-up (Ashkenazy et al, 2007).

#### *Schizotypal disorder and autistic spectrum presentations*

Some young people with psychotic-like features such as hallucinations may pose a further challenge to clinicians when these occur in the context of either an autistic spectrum or of a schizotypal disorder. Schizotypal disorder is characterized by eccentric behaviour and anomalies of thinking and affect which resemble those seen in schizophrenia, and may include unusual perceptual experiences as well as transient quasi-psychotic episodes with intense hallucinations. Schizotypal disorder is rarely diagnosed in children but in adolescence it may overlap with autistic disorders (Barneveld

2011) and account for psychotic symptoms in some adolescents with autism. The differentiation of transient quasi-psychotic states from full blown schizophrenic disorder may require particularly careful assessment and observation over time in young people with autism and hallucinations.

### **Management Plans**

Childhood hallucinatory experiences in non-clinical samples rarely cause substantial suffering in children's lives and high rates of symptom discontinuation make treatment usually unnecessary. In clinical samples of children presenting with psychotic disorders specific treatment strategies will be put into place whilst in those with non-psychotic disorders treatment of the associated psychiatric disorder, and/or therapeutic work aimed at stress/anxiety reduction and mood regulation may be expected to improve hallucinatory-related distress. Occasionally and in the face of persisting hallucinations which do not respond to appropriate interventions, the use of antipsychotic medication may be helpful (Vickers 2002).

#### *Psychotic disorders*

When hallucinations are part of a first psychotic episode, early identification and treatment are indicated. NICE guidelines (NICE, 2013) recommend urgent referral to a specialist mental health service, either to child and adolescent mental health services or to an early intervention in psychosis service. The currently recommended treatment includes the use of anti-psychotic medication (i.e. Risperidone or Aripiprazol, for at least 12 months) in conjunction with psychological interventions, namely psychoeducation, discontinuation of illicit drug use, reduction of stresses, family intervention and individual cognitive behavioural therapy. Duration of Untreated Psychosis, which refers to the time between the onset of psychotic symptoms continuous with the presenting episode and the onset of continuous antipsychotic medication (30 days of antipsychotic medication), has become established as an important factor associated with worse psychosis and early diagnosis and treatment therefore called for. Antipsychotic medication is not recommended for psychotic symptoms which are not sufficient for a diagnosis of first episode psychosis or with the aim of decreasing the risk of psychosis

(NICE 2013). This might however include young people “at risk mental states” when careful monitoring of the clinical state is called for.

### *Non-psychotic presentations*

When hallucinations are part of anxiety, post-traumatic stress, disruptive or substance misuse disorders, treatment of these disorder is indicated. The hallucinations themselves deserve particular attention and monitoring in clinical practice when complex (i.e. containing a narrative, multiple voices, multi-sensory), distressing and impairing even after the accompanying psychopathology has subsided, or if the latter does not respond to treatment.

### *Psychological Therapy for Hallucinations*

Since distress is one of the risk markers for hallucinations, stress management can be a major target of specific psychological therapies. In addition, there has been over the years a development of psychological theories and related therapeutic modalities for auditory hallucinations (Thomas 2014). Cognitive behavioural therapy (CBT) for psychotic symptoms has been evaluated as an adjunct to routine care in the context of psychotic states, results suggesting a modest reduction in symptom severity, but there have been few trials focusing on hallucinations per se. Recent developments in the management of hallucinations include mindfulness based therapies, competitive memory training and compassionate mind training, which aim to help promote greater resilience to critical commenting. A recent development has been the use of computer-generated avatars that enable the therapist to role-play the voice to aid the person in practising different responses to the experience. These techniques have been used primarily with adults and require further evaluation, and their suitability and efficacy in child populations are not known. Edelson (2006) described a modification of CBT as a brief intervention for hallucinations in children in the emergency setting consisting of gaining an appreciation of the patient’s beliefs about the hallucinations (what do they mean), details of how they started, and whether he or she can start or stop them, followed by helping the patient identify alternative explanations for the hallucinations and introducing coping strategies.

*Psychoeducation when hallucinations are part of non-psychotic disorders*

In children where hallucinations present in the context of non-psychotic disorders psycho-education to children and family about the hallucination symptoms is important. The popular understanding of hallucinations is that they are an expression of severe mental illness. These symptoms can therefore be very alarming, which may partly explain why they tend to present as psychiatric emergencies (Edelsohn 2006). This may be compounded by concern arising out of a family history of psychotic illness. It is therefore highly relevant for the clinician to carry out a careful differential diagnosis and share this with the family, explain the potential ubiquitous presence of hallucinations across different child psychiatric diagnoses and their response to treatment and to convey information about the limited predictive value of childhood hallucinatory experiences for adult psychotic states.

Destigmatization and normalization alongside attention to concurrent stressors and psychiatric disorders (including mood disorders and suicidality as well as any concurrent neurodevelopmental risks) are thus key elements of therapeutic input.

**Table 1. Psychopathology of Human Perception: Sensory Distortions.** (Casey 2007)

In the presence of real external stimuli	Quantitative variation	<i>Hypoesthesia or hyperesthesia</i> – the involuntary experience of reduced or amplified intensity related to the sensory perception (in any of the five sensory modalities) of real external stimuli; e.g. neurological disorders such as cutaneous sensory disorder or herpes zoster, as well as in manic states, drug misuse or anxiety.
		<i>Metamorphopsia</i> – the involuntary experience of variation in size or shape of real external stimuli; e.g. in ophthalmological disorders such as macular degeneration.
	Qualitative variation	<i>Derealisation</i> – the involuntary alteration of perception (and attributed meaning) of the external environment so that it seems unreal; e.g. in anxiety disorders or epilepsy, jamais vu or deja vu.
		<i>Illusions</i> – the experience of erroneous (auditory or visual) percepts in the presence of identifiable external which may lead to misinterpretation of true sensations; voluntary or involuntary. Facilitated by crepuscular states, fatigue, stress, increased or reduced light stimulation, noise or affective states.
In the absence of real external stimuli	Reduced level of consciousness	<i>Hypnagogic hallucinations</i> – involuntary erroneous percepts immediately before falling asleep
		<i>Hypnopompic hallucinations</i> – involuntary erroneous percepts during the transition from sleep to wakefulness waking up.
		<i>Hallucinosi</i> (or hallucinations with decreased consciousness levels)– the involuntary experience of erroneous percepts in the absent of external stimuli in compromised level of consciousness; e.g. in alcohol intoxication or withdrawal,

		delirium, drugs intoxication.
	Normal level of consciousness.	<i>Eidetic images</i> – the experience of vivid visual perceptions which resemble those previously seen in the external environment or imagined; the image is not subject to voluntary control or recall; can last for a few minutes or hours.
		<i>Hallucinations</i> – the involuntary experience of erroneous percepts in the absence of identifiable external stimuli

**Table 2. Hallucinatory experiences in five sensory modalities: Description and Differential**

**Diagnosis.** (Jardri 2014; de Leede-Smith 2013; Waters 2014)

Sensory modality	Hallucinatory modality	Differential diagnosis
Hearing	<p>Auditory hallucinations are the perception of sound in the absence of external stimuli. These include a broad variety of auditory experiences, ranging from hearing noises, melodies, ringing, whistling, whispering, animal sounds, single words, human voices or elaborated sentences, commanding or insulting voices. These can be either friendly or distressing, either single words or commenting/commanding voices.</p>	<p>They can be present in neurological conditions (i.e. temporal lobe epilepsy) and a broad range of psychiatric disorders (including schizophrenia and mood disorders).</p> <p>Differential diagnosis is required with obsessional thoughts and post-traumatic auditory flashbacks.</p>
Seeing	<p>Visual hallucinations are the perception of visual images in the absence of external stimuli. They may range from simple visual hallucinations or non-formed visual hallucinations (i.e. lights, colors, shapes or indiscrete objects) to complex visual hallucinations or formed visual hallucinations (i.e. elaborated vivid images or people, animals, objects or scenarios).</p>	<p>They can be present in neurological conditions (especially in migraine, occipital lobe tumor, neoplasms of optic nerve or retina), substance abuse or medication side effects (i.e. ranitidine, fentanil), but also in a range of psychiatric disorders (including schizophrenia).</p> <p>Differential diagnosis is required with hypnagogic or hypnopompic images, imaginary companions, intrusive images in obsessive-compulsive disorder and post-traumatic visual flashbacks.</p>



Sensing	Tactile hallucinations involve the experience of tactile sensing in the absent of external stimuli. They include experiences of been touched, hold, hurt, burn, pushed, among others.	They can be present in substance abuse such as cocaine consumption (Magnan Syndrome – the sensation of insects crawling underneath the skin), alcohol withdrawal or cannabis use, medical conditions (peripheral neuropathy, high fever, Lyme disease, skin cancer) or psychiatric disorders such as schizophrenia.
Smelling	Olfactory hallucinations involve smelling odours that are not really present, i.e. unpleasant smells such as rotting flesh, vomit, urine, faeces, smoke or others.	They can be present in neurological conditions (i.e. temporal lobe pathology, complex partial seizures or olfactory tumour) or psychiatric conditions (i.e. schizophrenia or depression).
Tasting	Gustatory hallucinations are the perception of taste without a stimulus. They tend to be typically strange or unpleasant tastes. .	They can be present in neurological conditions (i.e. temporal lobe epilepsy) medication side-effects (i.e. methylphenidate), substance abuse and psychiatric conditions (i.e. psychotic disorder).

**Table 3. The detailed exploration of hallucinations' characteristics.** (de Leede-Smith 2013; Waters 2014)

Domain	Description
Content	For any sensory modality, the child should be asked to describe the content of noises or voices, visual images, smells, tactile sensations, tastes. In children with psychiatric disorders, hearing voices addressing the child or talking amongst themselves or mixed auditory and visual hallucinations are most commonly reported; visual perceptual anomalies are commonly part of confusional states.
Timing	Do they occur only in drowsiness? Are they part of a confusional state, or in the context of high fever in young children?
Frequency and duration	Experiences usually have clinical significance when frequent and or continuous.
Belief/awareness of reality	This is difficult to explore with children: even children with psychotic disorders can be uncertain as to whether voices are happening in the real world or are a product of their "imagination" or mind.
Level of distress	Subjective report of the level of distress caused by the experiences, which may be related to negative content (such as blaming voices) or level of intrusiveness.  When the young person's activity and thoughts are interfered by unpleasant experiences this is highly clinically significant and may be the driver to help seeking.
Observed behavior	This is particularly important in young children under 7 years and may be the only way of establishing their presence. The same applies to older children with hostile or suspicious attitudes, unwilling to share their unusual experiences with others.  Possible indicators are: listening into space, abrupt interference with speech, tendency to lateral gazing with signs of hyper vigilance, escaping behavior, compliant with commanding messages, searching for cameras/microphones, talking to himself, inappropriate laughing, gesturing towards empty space.

Level of impairment	Whether the young person continues with daily life activities (i.e. school, family life, pleasure and social life) is a crucial aspect of clinical significance.
Socio-Cultural factors	Cultural beliefs in relation to these experiences may be relevant; e.g. hallucinations may become be mixed up with beliefs of possessions by evil forces in certain cultures.
Change over time	The phenomenological features of hallucinations may fluctuate over time, possibly reflecting changes in clinical state.
<i>Additional exploration for auditory verbal hallucinations:</i>	
Inner/outer space	Auditory verbal hallucinations may be experienced as coming from inside the head or outside the head (or both). It is important to know that children and young people may find it difficult to make this distinction, and moreover that research suggests that the perceived location of these experiences does not have any clear meaningful relationship with diagnostic or prognostic factors.
Content	They may be positive, neutral or negative (i.e. shaming themes, commands, personal insults). Negative voices tend to be reported more in association with mood changes and mood disorders. Command voices may result in risky behavior.
Personification and attributions	Voices are often personified by individuals. Young people may report knowing the identity of their voices, and the voices may tell them his/her name. Attributions may range from attributions to self (“I hear my own voice”) to attributions that do not identify a specific source, to attributions to others (“I hear someone else talking to me”).

**Table 4. Paediatric organic conditions which may present with hallucinations or related perceptual phenomena – with or without reduced levels of consciousness** (Freudenreich 2009; Algon 2012)

Neurological disorders	Migraines with aura (e.g. Alicia in Wonderland Syndrome); sleep disorders (e.g. narcolepsy), epilepsy (i.e. complex partial seizures, temporal lobe epilepsy), malignancies, brain occupying lesions, head injury, demyelinating diseases (multiple sclerosis), basal ganglia disease (Wilson disease, Huntington disease and Fahr disease), delirium.
Infections	Meningitis, encephalitis, or febrile illness. HIV infection. Travellers should consider cerebral malaria, toxoplasmosis, neurocysticercosis and sleeping sickness.
Autoimmune disorders	Systemic lupus erythematosus, Hashimoto encephalopathy, N-Methyl D-Aspartate (NMDA) encephalitis, paraneoplastic limbic encephalitis.
Endocrine diseases	Thyroid (hyperthyroidism or hypothyroidism) and parathyroid disease, adrenal disease, steroid-producing tumours located in either the adrenal gland (Cushing disease) or other tissues (eg. ectopic Cushing syndrome from small-cell lung cancer), insulinomas, pheochromocytoma.
Metabolic disorders	Acute intermittent porphyria, Tay-Sachs disease and Niemann-Pick disease type C, hypoglycaemia, electrolyte imbalance (calcium, phosphate, sodium and magnesium derangements), intoxication with lead and copper.
Nutritional deficiencies	Vitamin B12 deficiency, Thiamin deficiency, Niacin deficiency.
Congenital disorders	More than 60 congenital disorders, including genetic and metabolic disorders and lysosomal storage diseases.
Substance abuse	Cannabis, lysergic acid diethylamide (LSD), cocaine, amphetamines, ecstasy (3, 4- methylenedioxymethamphetamine), opiates and barbiturates, PCP (“angel dust” or phencyclidine); alcohol abuse or

	withdrawal.
Medication toxicity	Stimulants (i.e. methylphenidate), anticholinergics, corticosteroids, beta-blockers (i.e. metoprolol), digitals, dopaminergic agonists, interferon, antituberculous drugs (i.e. isoniazid), antibiotics (ciprofloxacin), antivirals (HIV medications), anticonvulsants, antineoplastics, pain medications (opioids), and others.

**Table 5. Criteria for hallucinations based on the Positive and Negative Symptom Scale (PANSS;**

**(Kay 1987)**

Score	Hallucinatory behaviour
	<ul style="list-style-type: none"> <li>- defined as verbal report or behaviour indicating perceptions which are not generated by external stimuli. These may occur in the auditory visual, olfactory, or somatic realms. Basis for rating: Verbal report and physical manifestations during the course of interview as well as reports of behaviour by primary care workers or family.</li> </ul>
1: Absent	Definition does not apply
2: Minimal	Questionable pathology; may be at the upper extreme of normal limits.
3: Mild	One or two clearly formed but infrequent hallucinations, or else a number of vague abnormal perceptions which do not result in distortions of thinking or behaviour.
4: Moderate	Hallucinations occur frequently but not continuously, and the patient's thinking and behaviour are affected only to a minor extent.
5: Moderate severe	Hallucinations are frequent, may involve more than one sensory modality, and tend to distort thinking and/or disrupt behaviour. Patient may have a delusional interpretation of these experiences and respond to them emotionally and, on occasion, verbally as well.
6: Severe	Hallucinations are present almost continuously, causing major disruption of thinking and behaviour. Patient treats these as real perceptions, and functioning is impeded by frequent emotional and verbal responses to them.
7: Extreme	Patient is almost totally preoccupied with hallucinations, which virtually dominate thinking and behaviour. Hallucinations are provided a rigid delusional interpretation and provoke verbal and behavioural responses, including obedience to command hallucinations.

*Note* – This scale is mainly used in presentations where hallucinations are key aspects of the clinical picture, mainly schizophrenic disorders.

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