Delusions and Hallucinations in Down Syndrome: Literature Review and Comparison With non-Down Syndrome Patients

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Individuals with Down syndrome are at a lower risk for psychiatric disorders compared to other individuals with intellectual disability. However, a literature review found a number of cases of psychiatric illness that included the presence of hallucinations and delusions. In order to determine whether this is unique to Down syndrome, a retrospective chart review compared 53 patients with Down syndrome against a matched group of 53 patients with intellectual disability of other etiologies. There was no significant difference between the groups for psychotic symptomatology. Those with Down syndrome were less likely, however, to present with aggression or self-injury.
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Individuals with Down syndrome are at a lower risk for all psychiatric disorders compared to children and adolescents of other intellectual disability (ID) etiologies, but they are at a higher risk than those from the general population.[13] Conversely, they may be at a greater risk for major depression compared to other adults with developmental disability.[2,19,24] The presentation of psychiatric illness in patients with Down syndrome, as for all patients with intellectual/developmental disability, may be atypical and then go unrecognized. Further, due to verbal and communication impairments, these individuals cannot adequately articulate subjective feeling states, thoughts, or perceptions as well as the general patient population.[28] Thus, the actual rate of psychiatric illness may be underestimated. Recognition of psychotic symptoms such as hallucinations and delusions may be most affected as they rely on verbal self-report. Due to developmental delay, however, there is risk for misdiagnosis of hallucinations or delusions because the behaviors typical of children persist into adulthood.[10] The presentation of imaginary friends, talking to oneself (a monologue), and open fantasy play can be quite normal for these individuals but can be mistaken for hallucinations or delusions.

In a review article, Myers[17] examined the literature on psychotic features including hallucinations and delusions in people with developmental disabilities. She carefully pointed out that there are multiple etiologies, including non-psychiatric conditions. Further, as Reid[25] asserted, hallucinations in patients with ID tend to be simple, florid, or fantastic, and delusions are simple compared to the complex systems common among intellectually normal patients.

Several relevant studies and review articles were located that examine hallucinations and delusions in persons with Down syndrome. Prasher[24] reviewed all clinical reports of dementia in patients with Down syndrome looking for any evidence of delusions and hallucinations. He found 86 cases, and only one case report alluded to possible hallucinations. Cooper and Prasher[6] compared a group of patients with Down syndrome and dementia to a comparison group of 26 patients with dementia and ID but without Down syndrome. In this sample, they found that those with Down syndrome had a higher prevalence of mood disturbance, restlessness, disrupted sleep, uncooperativeness and auditory hallucinations.

Pary and Loschen,[22] in their review of the research, found a combined frequency of occurrence for psychotic symptoms in 54% of cases with mood disorders in Down syndrome. McGuire and Chicoine[16] studied 40 patients seen over a period of three years. Patients were 23 males, 17 females, with average age of 31 and range of 19 to 38 years. All patients were diagnosed with depressive disorders and were patients in a larger adult Down syndrome clinic. Of these 40 adults, 70% had psychotic features, and these included extreme withdrawal, trance-like

TABLE 1: DEFINITIONS OF DELUSIONS AND HALLUCINATIONS[1]

DELUSIONS:

A delusion is a belief about a person or situation. A primary delusion arises without any mental events preceding it. Secondary delusions occur after a preceding mental experience, for example, someone who hears voices may eventually come to believe they are the object of scrutiny by the FBI. When these occur, a complex delusional system may result. On occasion, a person who lives with or is close to someone with a delusion may join in the delusion; this called a folie à deux. In Capgras syndrome, the patient believes that people are imposters of themselves, the exact double of family members or friends. Delusions may be persecutory or paranoid in nature. In delusions of reference, the patient believes that events in the environment are related to themselves, for example, a hurricane. Delusions of jealousy exist related to a loved one. Delusions of erotomania occur when a person believes that another, usually of higher stature, is in love with them when this is untrue. Erotomania may be on a continuum, denoted the "pathologies of love." Delusions may be grandiose and expansive, or guilt-laden and demeaning, and occur most frequently in mood disorders.

HALLUCINATIONS:

A hallucination is defined as a perceptual experience by a person without external stimuli of the sense organs and is perceived as originating in the outside world. Hallucinations may be elementary, as in a flash of light, or complex, as in hearing voices or seeing animals. Auditory hallucinations of the complex variety may be perceived as being in the third or first person. Second person or command hallucinations address the patient. Visual hallucinations occur in a variety of disorders and organic conditions. Tactile hallucinations occur when one feels as if he or she is being touched or hurt. Hallucinations of deep sensation occur, such as feelings of sexual stimulation. Hallucinations of taste and smell are rare. Hallucinations are experienced commonly in certain mental illnesses, among ordinary people occasionally, upon going to sleep, in some neurological conditions, and as the result of certain drugs.

stupor, imaginary others, and hallucinatory self-talk. Myers and Pueschel[19] examined the case histories of nine patients with Down syndrome and major depression, and found a higher than expected rate of hallucinations.

A literature review of published cases of patients with Down syndrome who had hallucinations or delusions was conducted (see Table 1 for definition). Table 2 summarizes published case reports of hallucinations or delusions in patients with Down syndrome. These case reports were identified by a search of PubMed and PsycINFO using search terms Down and Down's syndrome with hallucination, delusion, psychotic, and mood disorder.

In several cases of published mood disturbance, hallucinations or delusions were not mood congruent. Patients also experienced, to a lesser extent, content that was not affectively laden, such as seeing "space ships."[30] Mood congruent hallucinations and delusions were well represented in the cases as well as hallucinations and psychotic behavior during a major depressive episode.[4,12,16,26,27,30] Reprimands and content related to negative events such as war or death occurred. McGuire and Chicone[16] reported two patients as case examples of their larger cohort who also had obsessional slowness. The first, Ms. B, a 24-year-old woman with depression, presented with extreme withdrawal, hallucinations and indecipherable conversations with imaginary others, and obsessional slowness. Ms. D, also a 24-year-old woman, who showed obsessional slowness, became extremely withdrawn and engaged in animated fantasies with imaginary others. Pary and colleagues,[23] in reporting six cases of bipolar disorder in Down syndrome, reported a man in his 40's who, during a manic episode, had the grandiose delusional belief that he was Elton John's brother and Lucille Ball's son.

Reactions to death and loss resulted in a major depressive episode with psychotic features.[3,20] One patient, a 32-year-old man with Down syndrome, became acutely ill following the death of his grandfather.[20] Previously, the patient had been very social, adaptive, and well-adjusted and became depressed, abusive, disobedient, destructive, sleepless, and ate soap. He complained of "daft people" insulting him and had paranoid thoughts. Neville[20] noted that despite these fears he appeared very calm and self-satisfied.

TABLE 2: SUMMARY OF LITERATURE REVIEW FOR CASES OF DOWN SYNDROME WITH HALLUCINATIONS AND/OR DELUSIONS			
AUTHORS	**DIAGNOSIS TREATMENT**	**HALLUCINATIONS DELUSIONS**	**OTHER SYMPTOMS**
Neville[20] 32 yo male mild MR	*schizophrenia* inpatient treatment; 6 ECT discharged on 25 mg. chlorpromazine with withdrawal of drug 17 months later and complete recovery	complained of "daft people" insulting him, paranoid thoughts, crying and laughing spells	following death of his grandfather, was depressed, abusive, disobedient, destructive, insomnia, masturbation, ate soap
Roith[26] 35 yo male moderate MR	*psychotic depression* inpatient; 12 mg. pheniprazine, 2 mg. Stelazine	stated mother was dead, paranoid delusions, fantasies of war and death	depressed, anxious, crying, insomnia, appetite loss, agitated, wandered
Keegan, et al[14] 23 yo female unspecified MR level	*considered depression/psychosis* trifluoperazine to 20 mg., chlorpromazine to 300 mg., haloperidol to 8 mg. ineffective, 150 mg. amitriptyline improved	auditory hallucinations	hyperactivity, posturing, regression partial mutism, insomnia, decreased appetite, stereotypies
Satten & Singer[27] 20 yo female moderate MR	*reactive depression/then schizophrenia* first 25 mg. imipramine bid, worsened; then 100 mg. chlorpromazine; then inpatient treatment, 100 mg. molindone; and intensive psychotherapy	later revealed auditory hallucinations	withdrawal, somatic complaints, fatigue, then stuttering, mute, slow gait, stopped eating, IV-Amytal test negative
Jakab[12] 18 yo female mild MR	*psychotic depression* *basal ganglia calcification* one year tranquilizers; then intensive inpatient milieu treatment with thioridazine 50 mg. t.i.d.	hallucinations and loss of ADLs and regression	after sisters left country, regressed and had hallucinations
Thase[29] 32 yo female moderate MR	*psychosis* *basal ganglia calcification* thioridazine 200 mg. activity therapy inpatient treatment	paranoid ideation; auditory hallucinations; spoke in several distinct voices; derogatory auditory hallucinations; convinced a man was watching her, planned to kill her; voices said she was bad/going to die	social withdraw; patient was raped by sister's common law husband and then decompensated,; became incontinent; stared and sat for hours

TABLE 2: SUMMARY OF LITERATURE REVIEW FOR CASES OF DOWN SYNDROME WITH HALLUCINATIONS AND/OR DELUSIONS (CONT.)			
AUTHORS	**DIAGNOSIS TREATMENT**	**HALLUCINATIONS DELUSIONS**	**OTHER SYMPTOMS**
Meakin et al[15] 29 yo male mild-moderate MR	*folie à deux* treated mother, and symptoms resolved	from mother's delusion, heard women's voices from the attic, they swore at him, threatened to cut his throat	mother developed a paranoid psychosis and son joined with her, and recovered without treatment when she was treated and recovered
Cook & Leventhal[2] 23 yo male mild MR	*bipolar affective disorder* inpatient treatment; no other treatment information given	grandiose delusions he was a famous musician	increased activity, impulsivity, decreased sleep, wandered, lost 20 lbs., dancing and singing during the night
Warren et al[30] 17 yo female unspecified MR level	*major depression* 75 mg. nortriptyline; 14 ECT treatments	visual hallucinations	lost adaptive skills, mute, lost 15 lbs., irregular sleep, incontinence, fearful, laughter and crying
Warren et al[30] 24 yo male mild MR	*major depressive episode* nortriptyline discontinued due to side effects; 10 ECT treatments	visual and auditory hallucinations of a "space ship" and a "storm" family; also heard a "motor" and "voices" in his head	loss of adaptive skills, shuffling gait, apathetic, withdrawn, cried, irritable, assaulting, memory loss, lost 30 lbs., insomnia
Warren et al[30] 38 yo male unspecified MR level	*major depressive episode* 50 mg. amitriptyline	hallucinations, auditory and visual hallucinations, saw "cats eyes" and heard voices coming from under the table	decreased interest in life, irritable, fearful, sad, insomnia, incontinence, abdominal pain, family history alcoholism, depression
Warren et al[30] 24 yo male profound MR	*major depressive episode* 225 mg. amitriptyline not effective; 5 ECT and lithium	delusions regarding the left side of his body	loss of adaptive skills, decreased speech fearful, withdrawal, poor hygiene, mannerisms
Collacott & Napier[4] 42 yo female mild MR	*erotomania* thioridazine 50 mg. tid, limited response to treatment; at anniversary of father's death, she believed she saw him but gradually gave up the delusion after this incident	since father's death, transient visual hallucinations of him; at one point during the erotomania, she developed grandiosity, e.g., believing she was the best ballet dancer in the world	later depressed mood with diurnal variation seen

TABLE 2: SUMMARY OF LITERATURE REVIEW FOR CASES OF DOWN SYNDROME WITH HALLUCINATIONS AND/OR DELUSIONS (CONT.)			
AUTHORS	**DIAGNOSIS TREATMENT**	**HALLUCINATIONS DELUSIONS**	**OTHER SYMPTOMS**
Fotheringham & Thompson[8] 39 yo male moderate MR	*multiple personality disorder* thioridazine 10 mg. to 25 mg. b.i.d. helped combined with behavioral support programs	since age 27 had talked to imaginary friends or enemies, waxed and waned with stress, also said famous people talked to him, e.g., George Bush	adaptive behavior decreased, less cooperative, irritable
Myers & Pueschel[18] 33 yo male unspecified MR level	*schizophrenia* 4 mg. thiothixene with improvement	auditory hallucinations, persecutory delusions, talking to nonexistent persons and objects, paranoid accusations	six months personality change, probable thought disorder, flat or inappropriate affect, social isolation, deterioration in self-care and work
Duggirala et al[7] 49 yo male mild ID	*schizophrenia* treatment details unavailable	multiple delusions, e.g., microphone planted on him and broadcasts given, talked to the radio, used toilet bowl as microphone, second and third person auditory hallucinations	at age 38 began to deteriorate, became increasingly bizarre, could not function normally
Duggirala et al[7] 44 yo female moderate ID	*schizophrenia* thioridazine 50 mg. t.i.d. and 50 hs, gradual improvement	preoccupied with Bible instructor, heard him from the TV,; visual hallucinations, second person auditory hallucinations	social withdrawal, bizarre behavior
Duggirala et al[7] 40 yo female mild MR	*schizophrenia* thyroid abnormal; patient totally recovered with thyroid treatment	heard voices giving instructions, telling her she was bad, threatened to assault her, visual hallucinations seeing people whom others could not see, regularly talked into open space	acute onset at age 34 yrs, social withdrawal, communication skills deteriorated, cheerful mood
Duggirala et al[7] 45 yo female moderate ID	*schizophrenia* inpatient hospitalization, chlorpromazine 50 mg. t.i.d., recovered	voices talked to her, no details, delusional about the Beatles	acute onset, restless and agitated, refused food
Duggirala et al[7] 49 yo male severe ID	*schizophrenia* thioridazine 50 mg. t.i.d., change to clopixol 6 mg. t.i.d.	arguments with imaginary friends. delusional belief he was pregnant	acute, restless, agitated and aggressive. social withdrawal

TABLE 2: SUMMARY OF LITERATURE REVIEW FOR CASES OF DOWN SYNDROME WITH HALLUCINATIONS AND/OR DELUSIONS (CONT.)			
AUTHORS	**DIAGNOSIS TREATMENT**	**HALLUCINATIONS DELUSIONS**	**OTHER SYMPTOMS**
Duggirala et al[7] 53 yo female moderate ID	*schizophrenia* thioridazine, 25 mg. b.i.d. and 50 mg. hs, withdrawn after improved and relapse, treated with trifluoperazine 10 mg. hs.	auditory hallucinations of men talking about her, giving instruction, a constant humming noise, delusions people were stealing things	acute deterioration, frightened, hygiene and overall functioning deteriorated
McGuire & Chicoine[16] 24 yo female (Ms. B) unspecified MR level	*major depression with psychotic features* paroxetine, family counseling, gradual improvement	became withdrawn, self-absorbed, stared in a trance, appeared to be hallucinating and animated or angry with indecipherable conversations with imaginary others	moody, irritated, aggressive, movement slowed drastically, fearful of being out in public.
McGuire & Chicoine[16] 24 yo female (Ms. D) unspecified MR level	*major depression and anxiety disorder* hospitalized with bleeding ulcer, counseling and environmental interventions resulting in gradual cessation of depressive and anxiety symptoms	withdrawn, engaged in fantasies with imaginary others, slowed down dramatically	moody, irritated, lost sense of humor, agitated, chewed on fingers, sleep disturbance
Pary et al[23] 40's - male unspecified MR level	*bipolar disorder, rapid cycling* lithium therapy, paroxetine 20 mg. qd. and counseling	in manic phase, paranoid ideas of reference, grandiose delusions belief Elton John's brother and Lucille Ball's son	when depressed tearful, spoke of suicide, initial insomnia, social withdrawal, psychomotor retardation, when manic, 3-4 day cycles, pressured speech, elevated mood, flight of ideas, paranoid ideas of reference, grandiose delusions belief being Elton John's brother and Lucille Ball's son
Myers[18] 27 yo male (Mr. H) moderate MR	*major depression* initial treatment with clomipramine 150 mg. to which depression responded; after three months, awoke at night with hallucinations, EEG diagnosed temporal lobe epilepsy, change to fluoxetine 20 mg. daily resolved symptoms	after initial treatment for depression, awoke, frightened, stated he saw flames all around him;	acute onset after father's death, crying, agitation, insomnia, ruminations, biting of his arm

Myers and Pueschel[18] reported the case of a 33-year-old man with Down syndrome who developed schizophrenia. The chronic disorder of six months duration was shown by a personality change, auditory hallucinations, a probable thought disorder, flat or inappropriate affect, social isolation and impairment of self-care activities.

A case of folie à deux was reported in a 29-year-old man with Down syndrome.[15] After his father was hospitalized, his 77-year-old mother became psychiatrically ill and developed the delusion that two young women had escaped from prison and were living in the rafters of her house. The son confirmed his mother's delusions and stated that he heard the women's voices, that they swore at him whenever he flushed the toilet at night, told him his father was dead. His mother was treated with fluphenazine decanoate injections and community psychiatric nurse support. When she recovered, her son's symptoms resolved without treatment.

One case report of multiple personality disorder was found, and this patient experienced hallucinations and delusions.[8] The patient, a 39-year-old man with Down syndrome, had a history of imaginary friends first noted at age 27. He was heard speaking in two voices in his room, the other person an antagonist. This antagonist berated the patient, who bruised his face, attributing it to the other person. The patient later invented a bionic woman friend. On some occasions he used an imaginary friend as an excuse to avoid work. During the Gulf War, he stated that George Bush and Dan Rather talked to him from the television. Overall behavioral abilities also deteriorated. He reacted negatively to criticism and was irritable. The treating clinicians considered the early stages of Alzheimer's disease. Symptoms of depression were noted, but a trial with fluoxetine was unsuccessful and increased his symptoms. Finally, he was treated with low dose thioridazine.

In order to systematically examine the occurrence of hallucinations and delusions in patients with Down syndrome, a study of patients referred to a psychiatry clinic was conducted. Based on previous studies and the large number of case reports, it was hypothesized that patients with Down syndrome would have a higher rate of hallucinations and delusions compared to patients with ID of other etiologies. Patients with Down syndrome were matched to patients with a developmental disability of another etiology. This was a retrospective chart review using the initial psychiatric diagnostic assessment for each patient.

Method

This case series comparison was a chart review of patients seen in a developmental disabilities psychiatry clinic at a large metropolitan medical center. The larger group has been previously reported.[11] Information was abstracted from the initial psychiatric diagnostic evaluation.

Patients

Patients with Down syndrome were identified resulting in 53 individuals. They were matched with 53 other patients for age, sex of the patient and level of mental retardation. In addition, 7 patients with Down syndrome were referred for vocational assessment and were without psychiatric illness. They were matched to other patients with developmental disability without Down syndrome also referred for vocational assessment. Patients selected to match those with Down syndrome were excluded if they had any other identifiable genetic syndrome/behavioral phenotype (e.g., Prader-Willi). Each group had 19 females and 34 males. Each group had the following degree of ID: mild 19; moderate 27; severe 5; profound 4. Ethnic and racial background of the groups was categorized as Caucasian, African-American, Latino, and Asian. There was no significant difference between groups (chi-square 3.991, df = 3, p .262). The average age of the Down syndrome group was 38.60 and non-Down syndrome was 39.45, and this was not significant (F = 3.181, significance 0.77).

Measures

Presenting Problem/Chief Complaint

This information was recorded in the chart as a problem or as a statement by the patient, e.g., "I am so depressed I cannot work." If a direct support staff or family member reported information, this was recorded in his or her words, e.g., "Mr. A is refusing to go to work." This information was categorized as follows:

1. Aggression: verbal or physical aggression, fighting, tantrums
2. Depression: reports of feeling depressed, sad, looking depressed, crying, irritability

3. Anxiety: feeling anxious, looking anxious, stating a fear, compulsions or obsessions
4. Suicidality: threats, statements of suicide, or suicidal attempts and gestures
5. Self-Injurious Behavior (SIB): self-inflicted wounds or self-aggression; not suicidality
6. Psychotic: bizarre behavior, statements of presumed hallucinations or delusions
7. Memory: any reports of cognitive problems concentrating, memory problems, forgetting, confusion
8. Physical Problems: sleep disturbance, appetite, pain, stomach upset, tremors, pseudoseizures
9. Behavior/Other: screaming, making noises, work refusal, hyperactivity
10. Evaluation/No Psychiatric Complaint: these evaluations were performed for needed eligibility or assessment of ability to perform work

Hallucinations, Delusions and Pseudopsychotic Symptoms

Each patient's symptoms were systematically recorded as present or not during the intake evaluation through a questionnaire administered verbally with the clinicians. Symptoms 1 through 8 refer to possible hallucination or delusion. Symptoms 9 and 10 refer to fantasy play and imaginary friends that may be well within normal limits for developmental delay. Symptoms 1, 2, and 3 can be self-talk, i.e., a symptom of developmental delay, but depending on content, can also be a hallucination or delusion. The reported symptom was scored as present or not:

1. talks to himself or herself out loud;
2. talks directly to people not there;
3. talks out loud to himself or herself if upset;
4. says he or she sees things that are not there;
5. complains that he or she senses smells not evident to others;
6. reports feeling sensations that are not explainable;
7. has beliefs that seem strange or untrue;
8. thinks people are controlling himself or herself, or that others are "out to get me";
9. engages openly in fantasy thought or play;
10. has an imaginary friend.

Statistical Analysis

Patients with and without Down syndrome were compared using a Chi-Square test and Fisher's exact test was used for a cell size of 5 or less.

Results

Demographic Variables

Age, Male/Female: Racial/Ethnic Mix

Each group had 33 males and 20 females. Level of ID in each group was as follows: mild 19; moderate 27; severe 5; and profound 2. From this point forward in the report, patients will be referred to as either DS (Down syndrome) or non-DS (patient without Down syndrome but with developmental disability). There was no significant difference in the average age for the groups. For DS patients the average age was 36.60 years (SD = 9.72), and 39.45 years for non-DS (SD = 12.50). There was no significant difference for racial/ethnic background (DS: 49 Caucasian, 2 African-American, 1 Latino, 1 Asian; non-DS: 43 Caucasian, 8 African-American, 1 Latino, 1 Asian).

Presenting Problem/Chief Complaint

The two patient groups were matched for referral that was not psychiatric, for example, as an evaluation of eligibility for work (n = 7) (See Table 3). There was a significant difference between groups for referral due to aggression (DS = 7; non-DS = 21). Those with Down syndrome were significantly more often referred for problems with anxiety (DS = 5, non-DS = 0). Those without Down syndrome were significantly more often referred for self-injury (DS = 0, non-DS = 4). Those with DS were more often referred with concerns related to memory or cognitive problems (DS = 11, non-DS = 2). All other comparisons were not significantly different.

Hallucinations, Delusions and Pseudopsychotic Symptoms

For all comparisons, there were no significant differences between the patients with and without Down syndrome for types of psychotic or pseudopsychotic symptoms (see Table 4). Although there were many patients in both groups for whom psychotic/pseudopsychotic symptoms were endorsed by the referring parties, only 3 patients with Down syndrome and 3 patients without Down syndrome were judged to have hallucinations and/or delusions upon clinical

Table 3. Chief Complaint and Presenting Problem					
Presenting Problem	**Down syndrome**	**non-DS**	**F**	**df**	**significance**
aggression	7	21	9.513	1	.002*
depression/mood	4	3	0.153	1	.50 (Fisher)
anxiety	5	0	5.248	1	.028 (Fisher)*
suicidality	0	3	3.087	1	0.12
self-injury	0	4	4.157	1	.05 (Fisher)**
cognitive/memory	11	2	7.102	1	.008 (Fisher)
physical	7	3	2.434	1	0.107
psychotic	4	3	0.153	1	0.5
other	8	7	0.078	1	0.5
Evaluation	7	7	matched		
* $p < 0.01$ ** $p < 0.05$					

Table 4: Psychotic Symptoms or Pseudopsychotic Behavior Reported by Family or Direct Support Staff					
Psychotic and Pseudopsychotic Symptoms	**Down syndrome**	**non-DS**	**F**	**df**	**significance**
talks out loud	34	29	0.978	1	0.214
talks to people not there	13	13	0	1	0.589
talks out loud more if upset	16	16	0	1	0.584
sees things not there	0	3	3.087	1	0.12
smells not explainable	0	0			
sensations not explainable	1	2	0.343	1	0.5
strange beliefs	2	7	3.036	1	0.08
people controlling self	2	6	2.163	1	0.13
acts out fantasy	9	10	0.64	1	0.5
has imaginary friend	3	0	3.087	1	0.12

evaluation (see Table 5). The number of cases was too small for statistical comparison. One woman with Down syndrome and Alzheimer's disease developed hallucinations and delusions, and had a similar presentation to intellectually normal patients with this dementia. Two other women with Down syndrome and a major depressive disorder developed hallucinations. Two men without Down syndrome had a chronic psychiatric disorder with delusions or hallucinations. Another developed hallucinations after a major life stressor.

Discussion

Individuals with and without Down syndrome may experience hallucinations and delusions in the course of a psychiatric illness, much as the general population. Compared to intellectually normal individuals, the character of the psychotic symptoms tends to be more like that of young children, despite adult age in the patient. The content may be more simple, include child-like fantasy, and in the case of mood disorders, may not necessarily be mood-congruent. The present study compared the records of patients with Down syndrome who had hallucinations or delusions to a matched sample of patients with ID of other etiologies. Because of previous studies and case reports, it was hypothesized that individuals with Down syndrome would have a higher frequency of hallucinations and delusions. The results did not affirm this for the present matched sample. There

are a number of limitations to the present study. It was a retrospective record review from one hospital clinic in a major urban medical center. Thus, the results may be particular to this center's patient population and clinical practice. Nonetheless, the sample size of 53 patients in each group is quite adequate. The matching of patients on the basis of level of ID and sex, as well as lack of significant difference in age or racial/ethnic background, provides a strong basis for comparison.

The two groups had many commonalities in psychiatric presentation. There were reports of hallucinations and delusions in both patient groups, and also reports of pseudopsychotic features of self-talk, vivid fantasy and imaginary friends. There were no significant differences between those with and without Down syndrome with regard to hallucinations and delusions or pseudopsychotic behavior. In contrast, the data on comparison of patients with and without Down syndrome found a significant difference in type of presenting problem/chief complaint. Despite the presence of many psychotic and pseudopsychotic features in both groups, only 4 patients with Down syndrome and 3 patients without Down syndrome were referred on the basis of psychotic symptoms as the chief complaint.

For patients with Down syndrome, referrals occurred more frequently due to concerns about memory, and it is now widely known that Alzheimer's disease occurs frequently in the Down syndrome population. Those with Down syndrome were referred more often due to symptoms of anxiety. While the numbers of this study are small, it is possible that people with Down syndrome experience anxiety more frequently, as suggested by other researchers, or that they are more able to articulate anxiety compared to others with developmental delay. In contrast, those with Down syndrome were referred much less often for aggression or self-injury, consistent with the personality-behavioral phenotype of having relatively good social skills and social adaptability.[3,5]

Psychotic symptoms occur during a major depressive episode in the general population as well, and a recent study of intellectually normal patients reported finding that 12.5% experienced either hallucinations or delusions during a major depressive episode.[21] Thus, the occurrence of hallucinations or delusions in patients with ID is not unusual. Further, it is well established that patients with Alzheimer's disease experience hallucination or delusions. For example, Gormey and Rizwan[9] reported a rate of 34% with delusions and 11% with hallucinations in a sample of intellectually normal patients. In a review of the literature on Down syndrome and dementia, Prasher[24] found no reports referring to delusions and only one report intimated possible hallucinations. In this study, we had one patient with Alzheimer's disease and delusions. With further research on Down syndrome and Alzheimer disease, more reports of psychotic symptoms may occur, but it may be more rare in the Down syndrome population.

Pseudopsychotic symptoms were common in those with and without Down syndrome. A majority of both groups were found to engage in open self-talk frequently. This is most likely related to their delay and not yet having sublimated self-talk to private talk as effectively as the general population. Individuals with and without Down syndrome acted out fantasy to a lesser ex tent, but in this study, only the Down syndrome patients had an imaginary friend (3 patients). When statistically analyzed, this was not a significant difference. Large scale studies are needed to explore the degree of psychotic symptoms in patients with Down syndrome with particular attention to mood disorders and treatment response, in addition to study of the frequency and intensity of pseudopsychotic symptoms in the general population of people with developmental disabilities.

It is imperative that families and direct support professionals be trained to identify hallucinations and delusions. When they occur, they signal significant psychiatric illness that must be recognized and treated immediately as there is significant suffering and loss of ability for the patient. In addition, families and direct support professionals, as well as psychiatric clinicians, must be alert to the misdiagnosis of hallucinations and delusions in patients with developmental delay lest they diagnose a psychiatric illness when the patient is functioning normally for his or her developmental level.

TABLE 5: CASES WHERE HALLUCINATIONS OR DELUSIONS WERE JUDGED AS PRESENT UPON CLINICAL EVALUATION

DEMOGRAPHICS	HALLUCINATIONS OR DELUSIONS	BRIEF CASE REPORT
Down syndrome 57 yo female mild MR Alzheimer's disease	hallucinations delusions	She had Alzheimer's disease and began to have mood changes. After an illness, she developed paranoid delusions, e.g., that she was being poisoned. She had multiple visual and auditory hallucinations. She responded to 0.5 mg. risperidone b.i.d. and her symptoms remitted.
Down syndrome 37 yo female mild MR major depressive episode with psychotic features	hallucinations delusions	After a serious illness, she became profoundly depressed. She developed hallucinations of voices speaking about her and delusions about the characters on "Baywatch." She did not respond to antidepressants or antipsychotics, and finally was successfully treated with a course of 14 ECT treatments.
Down syndrome 30 yo female mild MR major depressive episode with psychotic features	hallucinations	She become depressed, with irritability and severe insomnia. She reported hallucinations of angry voices talking to her. A brief hospitalization was arranged, and she was treated with bupropion and risperidone, and eventually returned to her baseline with risperidone alone.
unknown etiology of developmental disability 50 yo male mild MR psychotic disorder nos	delusions	He had poor daily living skills, was isolative, behaviorally underactive, and not interested in work. He had delusions about women being sexually involved with him and identified women as being really another person in disguise. He had a moderate response to risperidone and had intensive supports at his community residence.
unknown etiology 50 yo male mild MR brief psychotic disorder hallucinations	hallucinations delusions	He lived in a community residence and a female staff person who had worked with him closely for years left employment. He had hallucinations of her having sex with him at night and during interview, reported she was there causing him to be aroused in the exam room. A brief psychiatric admission and treatment with risperidone resulted in improvement and return to his baseline.
prematurity, anoxia at birth 25 yo male mild MR schizoaffective disorder	hallucinations	Since early childhood, he was treated for bipolar disorder with a chronic manic variant. As he entered his teen years, he had increasing loss of daily living skills, motivation, and hallucinations of others speaking about him or to him. He was treated with typical and atypical antipsychotics, as well as mood stabilizers with limited therapeutic response.

References

1. American Psychiatric Association. **Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition.** Washington DC: American Psychiatric Association, 1994.
2. Cook EH Jr, Leventhal BL. Down's syndrome with mania. **Br J Psychiatry** 1987;150:249-250.
3. Collacott RA, Cooper SA, McGrother C. Differential rates of psychiatric disorders in adults with Down's syndrome compared to other mentally handicapped adults. **Br J Psychiatry** 1992;161:671-674.
4. Collacott RA, Napier EM. Erotomania and Fregoli-like state in Down's syndrome: Dynamic and developmental aspects. **J Ment Defic Res** 1991;35:481-486.
5. Collacott RA, Cooper SA, Branford D, McGrother C. Behaviour phenotype for Down's syndrome. **Br J Psychiatr** 1998;172:85-89.
6. Cooper SA, Prasher VP. Maladaptive behaviours and symptoms of dementia in adults with Down's syndrome compared with adults with intellectual disability of other etiologies. **J Intellect Disabil Res** 1998;42:293-300.
7. Duggirala C, Cooper SA, Collacott RA. Schizophrenia and Down's syndrome. **Ir J Psychol Med** 1995;12:30-33.
8. Fotheringham JB, Thompson F. Case report on a person with Down's syndrome and multiple personality disorder. **Can J Psychiatry** 1994;39:116-119.
9. Gormley N, Rizwan MR. Prevalence and clinical correlates of psychotic symptoms in Alzheimer's disease. **Int J Geriatr Psychiatry** 1998;13:410-414.
10. Hurley AD. The misdiagnosis of hallucinations and delusions in persons with mental retardation: A neurodevelopmental perspective. **Sem Clin Neuropsychiatry** 1996;1:122-133.
11. Hurley AD, Folstein M, Lam N. Patients with and without intellectual disability seeking outpatient psychiatric services: Diagnoses and prescribing pattern. **J Intellect Disabil Res** 2003;47:39-50.
12. Jakab I. Basal ganglia calcification and psychosis in mongolism **Eur Neurol** 1987;17:30-314.
13. Kahn S, Owinowo T, Pary RJ. Down syndrome and major depressive disorder: A review. **Ment Health Aspects Dev Disabil** 2002;5:46-52.
14. Keegan DL, Perttigrew A, Parker Z. Psychosis in Down's syndrome treated with amitriptyline. **Can Med Assoc J** 1974;110:1128.
15. Meakin CJ, Renvoize EB, Kent J. Folie à deux in Down's syndrome: A case report. **Br J Psychiatry** 1987;151:258-260.
16. McGuire DE, Chicoine BA. Depressive disorders in adults with Down syndrome. **Habil Ment Healthcare Newslett** 1996;15:1-7.
17. Myers BA. Psychotic disorders in people with mental retardation: Diagnostic and treatment issues. **Ment Health Aspects Dev Disabil** 1999;2:1-11.
18. Myers BA, Pueschel SM. Brief report: A case of schizophrenia in a population with Down syndrome. **J Autism Dev Disord** 1994;24:95-98.
19. Myers BA, Pueschel SM. Major depression in a small group of adults with Down syndrome. **Res Dev Disabil** 1995;16:285-299.
20. Neville J. Paranoid schizophrenia in a mongoloid defective: Some theoretical considerations derived from an unusual case. **J Ment Sci** 1959;105:444-447.
21. Ohayon MM, Schatzberg AF. Prevalence of depressive episodes with psychotic features in the general population. **Am J Psychiatry** 2002;159:1855-1861.
22. Pary RJ, Loschen EL, Tomkowiak SB. Mood disorders and Down Syndrome. **Semin Clin Neuropsychiatry** 1996;1:148-153.
23. Pary RJ, Friedlander R, Capone GT. Bipolar disorder and Down syndrome: Six cases. **Ment Health Aspects Dev Disabil** 1999;2:59-63.
24. Prasher VP. Psychotic features and effect of severity of learning disability on dementia in adults with Down syndrome: Review of the literature. **Br J Dev Disabil** 1997;43:85,pt2,85-92.
25. Reid AH. Schizophrenia in mental retardation: Clinical features. **Res Dev Disabil** 1989;10:241-249.
26. Roith AI. Psychotic depression in a mongol. **J Ment Subnorm** 1961;7:45-47.
27. Satten NH, Singer M. Successful treatment in a woman with Down's syndrome. **Psychiatr Opin** 1977;16:36-40.
28. Sovner R. Limiting factors in the use of DSM-III criteria with mentally ill/mentally retarded persons. **Psychopharmacol Bull** 1986;22:1055-1059.
29. Thase ME. Basal ganglia calcification and psychosis in Down's syndrome. **Postgraduate Med J** 1984;60:137-139.
30. Warren AC, Holroyd S, Folstein MF. Major depression in Down's syndrome. **Br J Psychiatry** 1989;155:202-205.

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