

Psychiatric Diagnoses and Psychosocial Needs of Outpatient Deaf Children and Adolescents

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Abstract Deaf youth may be more vulnerable to psychiatric disorders but very little research data is available. The current study identified prevalence rates of psychiatric disorders and examined the psychosocial needs and strengths of deaf youth aged 4–17 receiving specialized outpatient mental health services for the deaf. Compared to hearing peers, deaf youth had greater rates of attention deficit hyperactivity disorder, conduct, autism-spectrum and bipolar disorders and spent three times longer in treatment than their hearing peers. In the deaf subsample, moderate-severe risk was found in social functioning (33.3 %) and suicidal behavior (14 %). Deaf youth had moderate to severe impairment in social relationships (54.8 %), school functioning (42.9 %). Over one-third of deaf youth had impaired family relationships, living situation, communication, judgment and physical health. Deaf youth present with higher rates of certain clinical disorders and have deficits in multiple life domains that may impact functioning and create a longer treatment course.

Keywords Deaf · Children · Adolescents · Diagnosis · Epidemiology

Introduction

It has been estimated that there are 290,000 children and adolescents (ages 6–17) in the United States who are “functionally deaf” (e.g. either deaf or unable to hear normal verbal conversation even with a hearing aid) [1]. Inequities in the health care of deaf and hard-of-hearing individuals have come under increasing scrutiny. Deaf people, particularly American Sign Language (ASL) users, have more barriers to health care access, increased vulnerability to additional disabilities and limited health literacy [2]. Despite this, limited health data is available on this minority group [2]. Regarding mental health, and despite previous authors’ conclusions that deaf people are more vulnerable to mental health problems [3], there remains a paucity of empirical literature examining psychiatric illnesses in children and adolescents who are deaf.

Healthy social, emotional and cognitive development of deaf children depends upon complex interactions between the many individual and environmental factors associated with deafness [3]. The bioecological model has been proposed as the lens through which the development of deaf children should be viewed [4]. This model argues that the course of a child’s development is the result of the reciprocal influence of systems (e.g. parents, schools, culture) upon the child and the influence of the individual characteristics of the child (e.g. temperament, intelligence, skills, physical abilities) upon the systems with which he/she interacts [5]. Dysfunction in one or more systems impacts all the other systems with the child interacts increasing the risk for maladjustment and poor mental and emotional health. Deaf youth are at greater risk for disruption in interactions between the child and his/her environment and hence are also at greater risk for social and emotional problems.

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Factors Associated with Deafness that Place Deaf Youth at Greater Risk for Mental Health Problems

As many as one-third of deaf children have additional disabilities [6] that may increase their vulnerability to emotional and behavioral disorders. Many etiologies of deafness (e.g. infectious diseases, genetic syndromes, brain injury) result in co-morbid disabilities (e.g. blindness, intellectual disabilities, epilepsy) or other developmental problems and are associated with greater risk for mental illnesses such as psychosis and autism [7–13]. Attentional problems and hyperactivity are also associated with etiologies of acquired deafness in children that impact the central nervous system [14]. Deaf children have also been found to possess significant general neurocognitive deficits (e.g. working memory capacity, inhibition, and organization-integration sequencing skills, motor sequencing), relative to their hearing counterparts which may impact language development and subsequent behavior [15–17].

Language plays a crucial role in healthy social and emotional development in youth and forms the foundation upon which many developmental tasks are learned. Language skills impact and are impacted by multiple systems in a child's environment (e.g. parent-child interaction, academics, socialization) as well as by individual characteristics of the child (e.g. neurological deficits, physical disabilities). As a result, language development has a profound impact upon all aspects of a child's social, emotional and cognitive development. Language delays and deficits in deaf children are not uncommon. Language deficits may stem from the neurocognitive problems reviewed above, a lack of consistent language exposure (most deaf children are born into hearing families) or an interaction of these factors. Despite an increased emphasis on early detection of hearing loss and intervention efforts, some deaf children still receive inconsistent exposure to an accessible language and ultimately lack proficiency in any language. The important role of language ability in the healthy adjustment of deaf youth is evidenced by its mediating function in the relationship between hearing loss and behavioral problems. Deaf children with limited language abilities have been found to have increased levels of behavioral problems and poorer psychosocial adjustment whereas deaf children with fully developed language abilities do not [18, 19]. Language deficits have been linked with difficulties with emotional regulation, impulsivity and psychosocial difficulties in deaf children and higher levels of parental stress [18–21]. These problems place language dysfluent deaf children at a greater risk for the development of psychiatric disorders.

Environmental factors (e.g. hearing status of parents, interaction with the Deaf community/culture, quality of parent-child interactions, early intervention), also

influence the psychosocial adjustment of deaf youth [4]. Hearing status of parents predicts psychosocial adjustment [22]. Deaf children of deaf parents have better adjustment than deaf children of hearing parents [22, 23]. Deaf parents provide early access to sign language and promote independence and healthy coping among their deaf children. Deaf children of hearing parents may have less access to acquisition of social and emotion regulation skills via incidental learning [4]. Moreover, hearing parents with limited ability to communicate with their children lack the tools to socialize their deaf children through explanation and teaching and may compensate by being overprotective [4]. Having deaf parents may also provide an inroad to the Deaf community. Children who are members of the Deaf community have been found to have a greater sense of self-esteem and belongingness and are less likely to view their deafness as a disability [24].

Deaf children and adolescents may also display higher rates of emotional and behavioral disorders associated with the increased prevalence of abuse and trauma observed in this population. Deaf and hard of hearing children and adolescents are twice as likely as their hearing peers to experience emotional abuse and neglect [25]. Similarly, the prevalence rates of physical abuse are also higher in deaf children than in hearing children and the rates of sexual abuse in deaf children have been reported to be as high as 50 % [26].

Research on the Prevalence of Emotional and Behavioral Problems in Deaf Youth

Several studies (1994 and later) have examined the prevalence of emotional and behavioral problems in the general population of deaf children and adolescents living in the U.S., Britain, Europe, Australia and China [27–36]. Six studies compared deaf children and adolescents to hearing controls. In four of these studies, deaf children and adolescents had greater rates of mental health problems than hearing children and adolescents [30, 31, 34–36] although two studies found no difference [33, 35]. Recent studies document overall prevalence rates of mental health problems ranging between 19 and 77 %. This variability is attributable to methodological and cultural issues including the measures used, number of informants, whether or not the child was interviewed, language variables, degree of Deaf cultural knowledge of the investigators and the range of mental health issues assessed. Most studies obtained information on the deaf children's or adolescents' emotional functioning based upon parental or teacher ratings. Only two studies included a clinical interview with the adolescents being rated [27, 32] although four others included self-ratings from standardized questionnaires [31, 33–35]. However, all available rating scales were

developed and standardized on hearing children and adolescents. Moreover, past research found that more reliable ratings of emotional problems in deaf adolescents are obtained when questionnaires are presented in sign language versus written form [37]. Only two of the four studies that utilized self-administered questionnaires offered deaf adolescents a choice of signed versus written versions thereby allowing them to use their preferred language [33, 35]. Several studies' examined deaf and hard-of-hearing children and adolescents who used verbal speech as their primary mode of communication as opposed to sign language [27, 28, 34, 36]. Findings from studies of deaf children and adolescents who communicate via the dominant verbal and written language of their country of origin are difficult to generalize to sign language users as the cultural, social and educational experiences of these groups. May be quite disparate and contribute to differing levels of stress and adjustment problems. Several studies excluded deaf children and adolescents with intellectual or other disabilities [28, 30, 31, 35]. This exclusion decreases the overall generalizability of the findings to the larger populations of deaf children and adolescents as intellectual disabilities and developmental disabilities have been found to occur at higher rates in the deaf adult psychiatric population [38–40] and as deaf children with additional disabilities have been found to have more psychiatric comorbidities [41]. Despite methodological issues, it appears that deaf children and adolescents experience more emotional problems than their hearing peers however it is unclear if these problems later manifest as diagnosable psychiatric disorders.

Research on the Prevalence of Psychiatric Disorders in Deaf Youth

Numerous studies document an increased prevalence of psychopathology among deaf children and adolescents, but only one examined specific disorders. This is an important distinction as mental health *problems* may reflect transient distress versus mental health *disorders* that are likely to be long-standing and more impairing. In a study of 70 deaf adolescents (aged 13–17) in the Netherlands, 27 % had an emotional disorder (e.g. mood and anxiety disorders), 11 % had behavioral disorders (ADHD and disruptive behavior disorders), and 7 % had other disorders (psychosis, somatoform disorder, pain disorder) [32]. Although patients in this study were diagnosed based on parent report, teacher report and structured interviews with the adolescents themselves, several limitations are noted. First, over half (53 %) of the deaf adolescents used speech reading and verbal speech as their primary mode of communication as opposed to sign language. Participants who could not communicate via verbal speech were required to use an

interpreter and could not converse directly with the clinician. Second, the researchers intended to choose a sample comparable to previous studies and as such, deaf adolescents with intellectual disabilities were excluded. These sample characteristics limit generalizability to primary users of ASL and deaf children and adolescents with multiple disabilities.

Purpose of the Current Research

Although there has been an increased emphasis upon early detection of hearing loss in infants and children in the U.S. as well as increased availability of early intervention programs, there has not been a corresponding increase in identification of mental health issues and accessible mental health services for deaf children. As reviewed above, deaf youth are more vulnerable to mental health problems than hearing youth as a result of the presence of additional disabilities and the sequelae of an inability to communicate effectively with others (e.g. disrupted parent–child interactions, limited access to incidental learning, poor emotion management skills, limited social interactions and academic underachievement). Deaf youth from hearing families who communicate primarily via ASL are at the greatest risk for mental health problems as a result of these secondary effects of deafness yet remain one of the most underserved groups in the mental health field.

The assessment and treatment of deaf youth is particularly challenging for clinicians. The variability in deaf children's communication modes and language fluency along with a lack of assessment measures normed on deaf children makes evaluation of the mental health of deaf children and adolescents quite problematic. Access to quality mental health care is particularly difficult for deaf youth who use ASL as their primary mode of communication due to the lack of ASL fluent providers and the dearth of mental health programs specialized to be linguistically accessible and culturally appropriate for deaf youth [3]. Prevalence studies of psychiatric illness in the deaf adult psychiatric population, demonstrate that the lack of assessment by culturally competent, ASL fluent clinicians limits accurate psychiatric assessment [38–40]. In studies utilizing assessors unfamiliar with Deaf cultural norms and ASL, the range of diagnoses given to ASL-using deaf patients was restricted and "not otherwise specified" diagnoses were assigned more frequently than in hearing patients [40]. Inaccurate or ill-defined diagnoses can result in less targeted or even inappropriate treatment and intervention.

Studies examining the prevalence rates of mental illness and associated characteristics of deaf children and adolescents by culturally informed and ASL fluent clinicians are needed as very limited data exists to address the needs of

these underserved deaf youth [42]. This study examined prevalence rates and types of psychiatric illnesses among ASL-using deaf children and adolescents served by a community mental health center with specialized services for the deaf. Mental health services were provided by deaf clinicians or hearing clinicians with cultural competence and ASL fluency. Prevalence of diagnoses among deaf children and adolescents were compared to rates of psychiatric illnesses among hearing children and adolescents. Demographics, time in treatment, areas of risk and major areas of dysfunction across life domains of deaf children and adolescents in outpatient psychiatric care are reported.

Methods

Participants

Archival data of deaf and hearing children and adolescents aged 4–17 were retrieved from the electronic medical record system at a Midwestern community mental health center. All children and adolescents received outpatient psychiatric treatment between 2002 and 2010. All procedures were reviewed and approved by a university based institutional review board. Informed consent was not obtained from participants due to the archival nature of the data.

Study participants were subdivided into four groups for comparison. First, the children and adolescents were divided by hearing status. Any youth with a diagnosis of deafness or hearing loss on Axis III who received psychiatric services through a specialized program for the deaf was included in the deaf group ($N = 160$). A comparison group comprised of a random sample of children and adolescents without diagnoses of hearing loss or deafness who received mental health services were included in the hearing group ($N = 148$). Second, the deaf and hearing groups were further subdivided by age into a child group (ages 4–12) and adolescent group (ages 13–17). The four final comparison groups were: deaf child ($n = 84$), hearing child ($n = 91$), deaf adolescent ($n = 76$) and hearing adolescent ($n = 57$).

Demographic Variables

Variables from the electronic medical record included: demographic characteristics, hearing status and deafness related variables (e.g. communication mode, age at onset of deafness). Sixty-eight percent of the deaf child sample was male; 66 % of the hearing child sample was male. The mean age of the deaf child group was 8.7 ($SD = 2.4$) while the mean age of the hearing child group was 8.2 ($SD = 2.5$). Among the children in the deaf child group, 79 (94 %) were deaf, and 5 (6 %) were identified as hard-of-

hearing. The onset of deafness was prelingual for 37 (44 %) children in the deaf sample, postlingual for 1 (1.2 %) child and not reported for 46 (54.8 %) children. Sixty-three deaf children (75 %) used ASL as their primary mode of communication, 8 children (9.5 %) used impoverished ASL and 3 children (3.6 %) used verbal speech. Preferred communication mode was not reported for 10 (11.9 %) of the deaf children. Etiology of deafness was known for 23 (27.4 %) children and unknown for 61 (72.6 %) children. Fifty-one percent of the deaf adolescent sample was male while 49 % of the hearing adolescent sample was male. The mean age of the deaf adolescent group was 14.8 ($SD = 1.4$) and the mean age of the hearing adolescent group was 14.7 ($SD = 1.4$). Among the deaf adolescents, 69 (91 %) were deaf, 5 (6 %) were identified as hard-of-hearing and 2 (3 %) were identified as deaf-blind. The onset of deafness was prelingual for 32 (42 %) adolescents in the deaf sample, postlingual for 2 (3 %) adolescents and not reported for 42 (55 %) adolescents. Fifty-five deaf adolescents (72 %) used ASL as their primary mode of communication, 8 adolescents (11 %) were identified as using impoverished ASL and 5 adolescents (6 %) used verbal speech as their primary mode of communication. Preferred communication mode was not reported for 8 (11 %) of the deaf adolescents. Etiology of deafness was reported for 9 (12 %) adolescents in the sample and unknown for 67 (88 %).

Diagnostic and Treatment Variables

The Diagnostic and Statistical Manual–IV-TR (DSM-IV-TR) [43] Axis I–II diagnoses of each patient were obtained from the medical record. Youth were initially diagnosed via structured clinical interviews with the child and family informants by master's level clinicians. Diagnoses were finalized by mental health center psychiatrists. In the Deaf Services program, the master's level clinicians consisted of one deaf clinician and two hearing clinicians, one of whom was a child of deaf adults (CODA). All three of the clinicians were fluent in American Sign Language (ASL) and familiar with the social and cultural norms of the Deaf community. Dates of mental health service were also obtained from the medical record to determine length of time in treatment.

Measures

Child Assessment of Needs and Strengths-Comprehensive (CANS) [44]

The CANS is a clinician-rated assessment that is designed for service planning by identifying and prioritizing areas of need and resources over the past 30 days. The measure

consists of five domains, two of which were examined for the current study: life functioning and risk behaviors. Scores on the items range from 0 to 3. Higher scores indicate greater levels of clinical need. All clinician raters previously participated in a state-wide training on the administration and scoring of the CANS. Reliability of the CANS is reported as ranging from .80 to .90. The CANS was completed at intake for each child and adolescent presenting for mental health services from 2009 to 2010 resulting in a subsample of 42 deaf children and adolescents. The mean age of the sample participants was 11.9 years ($SD = 3.79$) and the gender composition of the sample was 36 (71.4 %) males and 12 (28.6 %) females.

Results

Demographic Analyses

The four groups (deaf child, hearing child, deaf adolescent and hearing adolescent) were analyzed for differences in gender composition and age. Gender composition was examined with two-way contingency table analysis. No significant differences in gender were found between the deaf child group and the hearing child group ($\chi^2 = .07$, $df = 1$, $p = .87$) or between the deaf adolescent group and the hearing adolescent group ($\chi^2 = .06$, $df = 1$, $p = .86$). Age was analyzed with independent groups *t* tests. No significant differences were found for the deaf child and hearing child groups [$t(131) = .32$, $p = .75$] or between the deaf adolescent and hearing adolescent groups [$t(173) = 1.36$, $p = .18$]. Due to missing data, other demographical variables (e.g. ethnicity) were not analyzed.

Diagnoses on Axis I and Axis II

Axis I and Axis II diagnoses were grouped into major diagnostic categories. Two way contingency table analyses utilizing Fisher's Exact Tests were conducted to evaluate the prevalence of psychiatric disorders across the four comparison groups.

For the outpatient deaf and hearing child groups, no significant differences were found in the rates of Mood Disorders (19 vs. 14 %), Anxiety Disorders (14 vs. 20 %) or Intellectual Disabilities (12 vs. 6 %). Nevertheless, outpatient deaf children were found to have significantly higher rates of ODD/Conduct Disorders (42 vs. 19 %, $p = .003$), Attention-Deficit Hyperactivity Disorder (71 vs. 51 %, $p = .001$), Bipolar Disorders (7 vs. 1 %, $p = .001$) and Pervasive Developmental Disorders (20 vs. 7 %, $p = .001$) than outpatient hearing children. Deaf children demonstrated significantly lower rates of Adjustment Disorders (11 vs. 35 %, $p = .001$) and Impulse Control

Disorders (4 vs. 21 %, $p = .001$) than their hearing counterparts.

Among the outpatient deaf and hearing adolescent groups, no significant differences were found in rates of Mood Disorders (41 vs. 32 %), ODD/Conduct Disorders (30 vs. 28 %), Anxiety Disorders (22 vs. 11 %), Impulse Control Disorders (11 vs. 21 %), Adjustment Disorders (16 vs. 28 %) or Intellectual Disabilities (13 vs. 12 %). Deaf adolescents were significantly more likely to be diagnosed with Bipolar Disorders (12 vs. 2 %, $p = .02$), Attention-Deficit Hyperactivity Disorder (42 vs. 21 %, $p = .008$) and Pervasive Developmental Disorders (11 vs. 0 %, $p = .01$) than those in the hearing group. Deaf adolescents were significantly less likely to be diagnosed with Substance Use Disorders (4 vs. 21 %, $p = .002$) than hearing adolescents.

Time in Treatment

Independent groups *t* tests were utilized to compare length of treatment of the child deaf and hearing groups and the adolescent deaf and hearing groups. Treatment length was measured in months. The deaf child group was in treatment significantly longer ($M = 45.9$ months) than the hearing child group ($M = 13.6$ months), $t(173) = 7.54$, $p < .01$. Likewise, the deaf adolescent group spent a significantly longer time in treatment ($M = 31.5$ months) than the hearing group ($M = 10.1$ months), $t(131) = 5.26$, $p < .01$.

Child Assessment of Needs and Strengths

The CANS was completed for a subsample ($n = 42$) of the deaf children and adolescents (i.e. those presenting for mental health services from 2009 to 2010). With regard to risk behaviors, the primary area in which moderate to severe risk was present was in disruptive social behavior (33.3 %). Also notable was the presence of moderate to severe risk for suicidal behavior at intake in 14 % of the clinical sample. Frequencies for the subscale items are presented in Table 1. In areas of major life functioning, over half the sample (54.8 %) was experiencing moderate to severe disruption in social functioning at intake and 42.9 % was experiencing school dysfunction at the moderate to severe level. Over one-third of the sample presented at intake with moderate to severe clinically significant problems in family relationships, functioning in the current living situation, communication skills, judgment and co-morbid physical conditions.

Discussion

A much neglected area of study is the mental health of deaf children who utilize ASL and/or have multiple disabilities.

Table 1 Identified areas of risk on the CANS in the child/adolescent deaf group subsample (n = 42)

Areas of risk	Low risk (%)	Moderate-high risk (%)	Combined risk (%)
Suicide	11.9	14.3	26.2
Self-mutilation	9.5	2.4	11.9
Other self-harm	7.1	7.1	14.2
Danger to others	9.5	4.8	14.3
Sexual aggression	.0	.0	.0
Runaway	4.8	2.4	7.2
Delinquency	2.4	.0	2.4
Fire setting	.0	.0	.0
Social behavior	21.4	33.3	54.7
Bullying	7.1	7.1	14.2

Although a relatively small subgroup of deaf youth, these children are at highest risk for mental health issues and, at least anecdotally, have high utilization of mental health services for extended periods. This study is the first to examine the prevalence of various psychiatric disorders among this subgroup of deaf children and adolescents who are seeking outpatient mental health services from a culturally and linguistically accessible program for primary users of ASL.

Internalizing Disorders

Overall, deaf children and adolescents were found to be diagnosed at the same rates as hearing children and adolescents with internalizing disorders (e.g. depressive and anxiety disorders). This is somewhat surprising given that four of the six applicable previous studies on the child and adolescent deaf population reported higher rates of anxiety and depression symptoms in deaf than hearing youth [30–32, 36]. In these past studies, the prevalence of internalizing symptoms in the borderline to clinical range on standardized measures ranged from 19 to 42 % in deaf children and adolescents versus 8–17 % in hearing normative samples. However, only one of these studies involved an interview and diagnostic classification by a psychiatrist [32]. In the other three studies, a single symptom measure was the sole means of evaluation and specific diagnoses were not reported. As such, these studies may have identified children with sub-clinical emotional problems rather than clinically significant, diagnosable disorders. The results of this study suggest that, in clinical samples, rates of anxiety and depressive disorders are equivalent in deaf and hearing youth.

Externalizing Disorders

With regard to externalizing disorders, in the present study, deaf children but not deaf adolescents were found to have

higher rates of behavior disorders than hearing youth. Three previous studies [30–32, 36] have found higher rates of externalizing behaviors in deaf children and adolescents (12–38 %) than in hearing children and adolescents (7–18 %) but another three studies found no difference [32, 33, 35]. These mixed results are hard to interpret in light of the current findings, however, it should be noted that past research utilized school-based population samples and not specifically samples of deaf children whose problems have reached a level of severity to necessitate psychiatric treatment. Moreover, much of the past research excluded deaf youth with additional disabilities and/or language dysfluency whereas the present study did not. The presence of intellectual disabilities and impoverished ASL in 12 and 10 % of the deaf child sample, respectively, may have contributed to the higher rates of behavior disorders in comparison to hearing children that were found in this study. As previously mentioned, children with disabilities are at greater risk for emotional and behavioral problems. Children with co-morbid intellectual disabilities can be expected to have more difficulties with frustration tolerance and emotion regulation and as such may act out behaviorally. Moreover, delayed access to language either from neurological or environmental causes renders deaf children unable to adequately express their needs and understand the needs of others thereby contributing to greater behavioral problems. Targeted early intervention efforts should be directed at assessment and amelioration of language deficits and delays in deaf children to reduce the risk for future behavioral disorders.

It is unclear why a significant difference in conduct related problems was not found in the deaf adolescent group as 11 % of the deaf adolescents were identified as using impoverished ASL and 13 % were identified as having intellectual disabilities. Interestingly, deaf adolescents were more likely to be diagnosed with bipolar disorder. Although purely speculative at this point, the externalizing behaviors in deaf adolescents may have been more likely to be viewed by clinicians as manifestations of mania rather than as purely conduct-related problems. A second possible explanation for the reduction in externalizing disorders in deaf adolescents as opposed to deaf children may be that by adolescence, some deaf youth have developed coping skills to compensate for limited communicative abilities.

Attention Deficit Hyperactivity Disorder

The prevalence of attention deficit hyperactivity disorder (ADHD) in the deaf child and adolescent sample was quite high, with nearly two-thirds of the deaf children and slightly less than half of the deaf adolescents presenting for treatment receiving a diagnosis of ADHD. As noted earlier,

research has documented an association between hyperactivity and attentional problems with deafness etiologies that impact the central nervous system [14]. However, other research has found striking differences in attentional measures of deaf youth with normal intelligence and no additional disabilities as compared to hearing peers [28]. Between 44 and 85 % of deaf children and adolescents were found to score in the borderline to abnormal ranges on performance measures of impulsivity, vigilance and distractibility as compared to 0–16 % of hearing children and adolescents. As such, it appears that deaf youth both with and without additional disabilities may be vulnerable to attentional disorders and this may contribute to the high rates of ADHD observed in this study.

Pervasive Developmental Disorders

The finding of higher rates of pervasive developmental disorders (PDD) in deaf children and adolescents is less surprising. The co-occurrence of autism and deafness has been speculated to be linked to the etiology of a child's deafness (e.g. brain injury or congenital disorders); however, empirical verification of this assumption is still needed. Higher rates of PDD in people who are deaf (6.4–10 %) than people who are hearing (0–2.2 %) have been documented in inpatient studies from the adult literature [39, 40]. Moreover, there is evidence from the child and adolescent literature that deafness and PDD co-occur with prevalence rates ranging from 3.5 to 5 % [11–13]. Prevalence rates in the current clinical sample were much higher, however, as 20 % of the deaf children and 11 % of the deaf adolescents had an autism-spectrum diagnosis. This finding may be attributable to the use of a clinical sample but may also reflect better detection due to the use of ASL-fluent and culturally informed clinicians. Deaf youth with autism are generally diagnosed later than hearing youth [11] with the likely cause being “diagnostic overshadowing.” Clinicians experienced with the Deaf community and the unique social and environmental issues this population faces are more likely to make an earlier differentiation between delayed language and social development due to lack of language models and inconsistent exposure from the language and social deficits associated with autism.

Intellectual Disabilities

Contrary to findings from the literature examining adult deaf people with psychiatric disorders [39, 40], in this study, no significant difference was found between the deaf youth groups and the hearing youth groups in rates of diagnosis of intellectual disabilities (ID). In the adolescent groups, both the deaf and the hearing had similar

prevalence rates of ID (13 vs 12 %). Nevertheless, in the child groups, deaf children were twice as likely to be diagnosed with an ID as children in the hearing group (12 vs. 6 %) although this difference did not reach statistical significance in this small sample. As a caveat, it should be noted that diagnoses of ID were not made by the assessing clinicians on the basis of intellectual and developmental testing but were historical diagnoses that were “carried over” from collateral information. As such, these findings involving the prevalence of ID need to be interpreted cautiously.

Substance Use Disorders

Deaf adolescents had lower rates of substance use diagnoses than their hearing peers (4 vs. 21 %). Although no comprehensive, well-controlled epidemiological studies have been conducted to date, the consensus in the literature that substance use disorders are as prevalent in the Deaf community as in the hearing community [45]. In the only study of adolescents seeking substance use treatment, adolescents with self-identified hearing loss endorsed using substances at an earlier age, having more severity of use and reported more symptoms consistent with dependence than hearing adolescents [45]. However, data were collected from mainstream substance use treatment facilities and only 2 % of the sample identified as “deaf” whereas 98 % identified as having “limited hearing.” As such, these results may not generalize to the primarily ASL-using, self-identified “deaf” sample used in this study and may explain the divergent findings. ASL-using, deaf adolescents attending residential schools can be more isolated and have smaller social circles and networks of information that may insulate them from mainstream peer pressures. Conversely, lack of information may prevent deaf youth from recognizing substance use as problematic and family members may underreport substance use in an effort to protect their “disabled” adolescent [46].

Time in Treatment

Examination of the time in treatment revealed significant differences between the deaf and hearing groups. Deaf children and deaf adolescents were in treatment three times longer than hearing children and adolescents. The reasons for this difference are unclear. One possible explanation is that deaf children and adolescents were more likely to present with severe disorders such as bipolar disorder and PDD which may contribute to the length of time in psychiatric treatment. Moreover, the presence of additional disabilities (e.g. blindness, health problems related to congenital disorders), dysfunction in multiple systems (e.g. family, school, social) and communication deficits in the

deaf youth in this sample may also be a contributing factor to increased time in treatment.

Functional Deficits

Lastly, CANS ratings of a subsample of deaf children and adolescents were examined. With regard to areas of risk, suicidal behavior and disruptive social behavior were notable. The high rates of disruptive social behavior on the CANS were consistent with the observed high rates of externalizing behavioral disorders in the deaf child sample. Suicidal behavior (i.e. suicidal ideation, gesture, intent, or attempt) had a lifetime prevalence rate of 26.2 % in this small subsample. Within the 30 days prior to intake, 14 % of the deaf child and adolescent subsample endorsed suicidal behavior. By way of comparison, a representative national school-based survey of teens in grades 9–12 found prevalence rates of suicidal ideation of 20 % and prevalence rates of suicide attempts in the range of 5–8 % in the general population of hearing adolescents [47]. Overall, the results of this study in this small subsample of deaf children and adolescents appear consistent with reports of suicidal behavior in the general youth population.

With regard to areas of life functioning, deaf youth needing mental health care present with widespread impairments across multiple domains. These diffuse areas of psychosocial clinical need may also help explain why deaf youth with mental health problems are spending significantly longer periods in psychiatric treatment than their hearing peers.

As would be anticipated within the framework of the bioecological model, deaf children experiencing dysfunctions in multiple domains would be at greater risk for social and emotional maladjustment [4, 5]. It is therefore not surprising that we found high rates of dysfunction within multiple systems (e.g. peer relationships, family, school) in deaf youth utilizing mental health services. Over half the sample had moderate to severe disruption in social relationships and over 40 % were struggling with school attendance, achievement and behavior at the moderate to severe levels. Over one-third presented at intake with moderate to severe clinically significant problems in family relationships including domestic violence in the home. Functioning in the home was moderately to profoundly impaired in a third of the sample indicating significant problems in the residence or impending risk of removal from the home. Over one-third had limited or absent receptive and expressive and communication skills as well as impaired judgment and co-morbid physical conditions.

The case for early intervention with deaf children and their families to prevent dysfunction in multiple areas of functioning is clear. Assessment and early identification of hearing loss in infants remains crucial. Once a child with

hearing loss is identified, maximizing language access and acquisition via early exposure to ASL, use of assistive technologies, cochlear implants, etc. should be a high priority target for early intervention programs to prevent the development of social and emotional difficulties. In addition to targeting language, early interventions need to address multiple systems (e.g. parent training interventions, social skill building programs, occupational and physical therapies and academic programs) in order to promote healthy emotional and social development in at-risk deaf youth.

Limitations

Several limitations of the present study should be noted. First, this study used archival data from the electronic medical record of a community mental health center. As such, many factors such as interviews and measures used could not be controlled, full demographic data was not available on all participants and possible misreporting are limitations of the data set used. Second, and relatedly, deafness-specific data on language fluency, objective measures of degree of hearing loss, age of identification of deafness and the interventions provided were not available. These variables impact language acquisition which in turn impacts the trajectory of a child's social, emotional and intellectual growth [48]. Co-morbid language deficits and the emotional and social developmental delays that arise as a result of inadequate access to language can confound existing psychiatric problems and make differential diagnosis challenging even for ASL-fluent clinicians. Lastly, this study utilized a clinical sample of predominately ASL-using deaf children and adolescents and their hearing peers and therefore these findings may not be generalizable to the wider population of deaf youth.

Suggestions for Future Research

Prospective, wide-scale studies of the prevalence of psychiatric disorders in deaf children and adolescents are needed. These studies need rigorous controls for deafness-related variables such as preferred language, cultural identification, age of onset and identification of deafness, as well as a detailed history of language exposure, early intervention efforts and educational history. A standardized, developmentally appropriate measure of ASL-fluency for deaf children and adolescents needs to be developed and utilized in all future research examining psychiatric disorders in this population. Ideally, future studies will utilize information from multiple informants (e.g. child/adolescent, caregiver report, teacher report), behavioral observation and diagnostic interviews with each of these assessments administered in the preferred and most fluent

language of the child and informants. Clinicians with specialized training and experience with Deaf Culture and ASL would also be essential to minimize the impact of cultural and linguistic bias.

Summary

Deaf youth are at the greater risk for mental health problems as a result of the secondary effects of deafness yet remain one of the most underserved groups in the mental health field. The aim of this study was to examine the characteristics, prevalence of psychiatric disorders and psychosocial needs of deaf children and adolescents presenting for outpatient mental health treatment in comparison to their hearing peers. Archival data from the medical records (i.e. demographics, diagnoses and service dates) of deaf and hearing children (aged 4–12) and deaf and hearing adolescents (aged 13–17) who received outpatient psychiatric treatment between 2002 and 2010 were retrieved and analyzed. CANS ratings were analyzed for a subsample of 42 deaf children and adolescents presenting for treatment from 2009 to 2010. In comparison to hearing peers, deaf children and adolescents had greater rates of ADHD, conduct, autism-spectrum and bipolar disorders and treatment duration was three times longer. The low prevalence of substance use in deaf adolescents indicates that this clinical issue may be under-assessed. Deaf youth also present with moderate to severe risks and deficits in multiple life domains that impact functioning and complicate or extend treatment course. Prevention of mental health issues in vulnerable deaf youth necessitates increased early intervention services to target language acquisition, social and family functioning, academic achievement and additional disabilities.

Conflict of interest Dr. Landsberger, Dr. Sheward, Dr. Spring and Charleen Sculley have no biomedical financial interests or potential conflicts of interest to disclose. Dr. Diaz was on the speakers' bureau for Eli Lilly and Co and Forest Pharmaceuticals within the past 3 years.

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