

Characteristics of Youths With Hearing Loss Admitted to Substance Abuse Treatment

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The purpose of this study is to provide a profile of youths with hearing loss admitted to substance abuse treatment facilities. Intake data on 4,167 youths (28% female; 3% reporting a hearing loss) collected via the Global Appraisal of Individual Need-I assessment was used for the analyses. Information on demographics, environmental characteristics, substance use behaviors, and symptoms of co-occurring psychological problems for youths with and without a hearing loss was analyzed via Pearson chi-square tests and effect sizes. The groups reported similar backgrounds and comparable rates of marijuana and alcohol use. However, youths in the hearing loss group reported substance use behaviors indicative of a more severe level of involvement. Across all measures of co-occurring symptoms, youths with hearing loss reported greater levels of distress and were more often victims of abuse. Results of this study will help inform treatment needs of youths with hearing loss and define a baseline for future research.

Illicit drug use and underage drinking are not uncommon among adolescents and young adults. Recent estimates of illicit drug use by youths in the community reveal past month rates of 9.8% for 12- to 17-year olds and 19.8% for 18- to 25-year olds, while past month underage drinking is estimated at 28.3% (Substance Abuse and Mental Health Services Administration [SAMHSA], 2007). By the time they leave high school, an estimated 48.2% of adolescents have used an illicit drug at least once in their lifetime and 72.7%

have used alcohol (Johnston, O'Malley, Bachman, & Schulenberg, 2007).

Not all youths who use alcohol or drugs go on to develop a substance use disorder, but for those who do, the personal and economic costs are staggering and measured in poor physical and mental health, decreased school and work performance, trouble with the law, and destroyed relationships (Bukstein, Brent, & Kaminer, 1989; Lynskey & Hall, 2000; Newcomb & Bentler, 1988; Tims et al., 2002). A consistent finding in the literature shows the earlier the age of onset of regular drug and alcohol use, the more likely use will continue or increase and develop into a full-blown substance use disorder (Dennis, Dawud-Noursi, et al., 2003; Hingson, Heeren, & Winter, 2006).

Co-occurring mental health problems are common among youth substance abusers, particularly depression, anxiety, posttraumatic stress, Conduct Disorder, and Attention Deficit Hyperactivity Disorder (ADHD) (Bukstein, Glancy, & Kaminer, 1992; Chan, Dennis, & Funk, 2008; Grant et al., 2004; Tims et al., 2002). In a study of 600 adolescents admitted to treatment for cannabis abuse (Tims et al.), 75% had at least one co-occurring disorder, and those with a more severe substance use disorder were more likely to have mental and physical health problems. Rates of trauma and victimization are also high in youth substance abusing populations (Giaconia, Reinherz, Paradis, & Stashwick, 2003; Titus, Dennis, White, Scott, & Funk, 2003)—especially among girls (Stevens, Murphy, & McKnight, 2003; Titus et al. 2003)—and

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having a history of victimization has been shown to interact with treatment outcomes (Funk, McDermeit, Godley, & Adams, 2003).

The prevalence and severity of drug and alcohol use, abuse, and its associated problems in adolescents and young adults varies by diverse factors such as gender, race, ethnicity, sexual minority status, homelessness, and disability status (Green, Ennett, & Ringwalt, 1997; Moore & Li, 1998; Ryan, 2003; SAMHSA, 2007; Winters, 1999). Young people who belong to some diverse communities are at higher risk than their nondiverse peers to use drugs and alcohol and, thus, to go on to develop a substance use disorder. Youths with disabilities are one such high-risk group (Hollar & Moore, 2004). However, among youths with hearing loss, very little factual knowledge is available to gauge the extent and severity of substance use, abuse, and their correlates.

Substance Use and Abuse Among People With Hearing Loss

The operating consensus in the literature has been that substance use and abuse among people with hearing loss—that is, those who are deaf or hard-of-hearing—is at least as prevalent as that among hearing people, though data from well-defined, controlled studies is lacking. Existing estimates of use are 10–30 years old, based on deduction, or are focused on usually small, restricted samples (Isaacs, Buckley, & Martin, 1979; Lipton & Goldstein, 1997; McCrone, 1994). In one of the earliest studies, Isaacs et al. (1979) found no differences in patterns of drinking among 39 adults with hearing loss (82% deaf) living in the community and treated at a single agency when compared with results from two hearing samples. Lipton and Goldstein reported that among 362 adults with hearing loss (79% deaf) living in communities around New York State, 25.7% were current (past month) marijuana users and 4.7% were current cocaine users. These estimates are much higher than those reported for the general population in the 1996 National Household Survey of Drug Abuse (SAMHSA, 1997), information collected at approximately the same time as Lipton and Goldstein's data. Based on national trends in drug and alcohol use in the United

States and Deaf population statistics, McCrone (1994) reasoned that in the early 1990s, there were approximately 5,105 deaf crack users, 3,505 deaf heroin users, 31,915 deaf cocaine users, and 97,745 deaf marijuana users in the United States.

When it comes to youths with hearing loss, even less is known and that which is known presents an inconsistent picture. In a sample of 46 deaf 11th and 12th graders in a residential school (Locke & Johnson, 1981), 56% of the students reported they usually drank alcohol and 70% said they drank occasionally in the past, and of those, 91% started drinking at age 14 or younger and were drunk as much as once per week. Further, 59% had used drugs in their lifetime, 33% reported they were current drug users, and all were age 14 or younger when they started. Lifetime marijuana use (including use of hashish and hash oil) was reported by 46% of the students, with 22% reporting narcotic use, 20% reporting depressant use, 9% reporting use of stimulants, and 4% reporting use of hallucinogens. Kafer (1993) investigated attitudes and behaviors of 414 6th–12th grade mainstreamed youths with hearing loss (ages 13–21) regarding their intent to and actual use of drugs and alcohol. Youths with hearing loss reported less intent and less actual use of substances when compared with youths in the general school population, but they also reported numerous high-risk factors associated with more frequent substance use. In a study of 77 deaf and hard-of-hearing students from residential and mainstreamed programs (ages 14–21 years; 50% deaf), Dick (1996) reported that the students with hearing loss used alcohol and drugs less frequently than a comparison group of hearing peers ($N = 2,992$). In addition, students with hearing loss from residential schools used marijuana more frequently than mainstreamed students, and those who had greater interaction with hearing peers used substances more frequently than their peers who had less interaction.

Several factors put youth with hearing loss at risk for drug and alcohol use. Communication difficulties in family systems with a deaf member are not unusual since at least 90% of all parents of deaf children are hearing (Gallaudet Research Institute, 2005; Mitchell & Karchmer, 2004; Moores, 1996). Thus, family discussion and incidental learning about the dangers of

drug use are limited. Children and adolescents with hearing loss who are unable to communicate freely or easily with their hearing peers often experience isolation in mainstreamed settings (Angelides & Aravi, 2007; Oliva, 2004). Their desire to fit in with hearing peers, even those who use drugs, may influence their decision to use drugs (Dick, 1996; McCrone, 1982). Youths with hearing loss face limited access to prevention materials or materials that they understand (Guthmann & Sandberg, 1998b). In a recent study, deaf and hard-of-hearing young adults who did not have access to prevention materials during adolescence believed such materials would be helpful to adolescents with hearing loss, especially if they were available in sign language (Mason & Schiller, 2006). Materials of this nature are not widely available.

Substance Abuse Treatment and People With Hearing Loss

Although not well documented in the empirical literature, substance abuse problems clearly exist among people with hearing loss. Unfortunately, for those seeking treatment, numerous barriers must be contended with, especially among those who communicate primarily through sign language: treatment agencies and providers with inadequate knowledge about the unique linguistic and cultural needs of deaf and hard-of-hearing individuals, lack of qualified interpreters for service, societal prejudices about people with disabilities, lack of appropriate materials, and assessment tools not created or normed for individuals who use sign language as their primary mode of communication (Guthmann & Blozis, 2001; Guthmann & Graham, 2004; Guthmann & Sandberg, 1995, 1998a; Harmer, 1999; Steinberg, Sullivan, & Loew, 1998). There is a widespread misconception among treatment professionals that providing an interpreter is all that is needed to assure accessible treatment. Indeed, issues presented by this community are complex and, in many respects, similar to those posed by other minority groups. This complexity is believed to contribute to the under utilization of substance abuse treatment by people with hearing loss and other disabilities (Guthmann & Graham, 2004; Krahn, Farrell, Gabriel, & Deck, 2006).

Information on treatment outcomes for people with hearing loss is limited to two studies. Among 100 youth and adult treatment completers (ages 17–72; 47% deaf) of an inpatient substance abuse program tailored for people with hearing loss, three variables were associated with posttreatment general improvement and abstinence: attendance at self-help recovery group meetings (i.e., Alcoholics Anonymous, Narcotics Anonymous), having family members to talk to about sobriety, and being employed (Guthmann, 1996). In a study describing the demographics and achievement of treatment goals among substance users (average age 36.6) in New York State, Moore and McAweeney (2007) found that clients with hearing loss (the majority of whom were hard-of-hearing) reported equivalent or slightly higher rates of progress toward treatment goals when compared with hearing clients. No empirical studies have thus far examined substance abuse among a treatment population of youths with hearing loss.

The purpose of this study is to provide a profile of youths with hearing loss who were admitted to a wide range of mainstream substance abuse treatment facilities across the United States since 1997. Information on substance use behaviors, symptoms of co-occurring psychological conditions, and a collection of social and environmental characteristics will be presented. In addition, results from the youths with hearing loss will be compared with those of their hearing peers. The information presented is unique and will provide a first and thorough look at how substance abuse and its correlates in a treatment population of youths with hearing loss compare to those of their hearing peers.

Methods

Participant Characteristics

The data set used in the analyses is from a collection of 58 adolescent and young adult treatment studies performed over the past 9 years funded by the SAMHSA's Center for Substance Abuse Treatment. The data set is part of a much larger set of 100 adolescent and youth treatment studies but was limited to only those studies that collected information on hearing status. Treatment environments included a wide range of largely outpatient and residential settings. All

data reported here was collected as part of a treatment intake interview using the Global Appraisal of Individual Needs (GAIN; Dennis, Titus, et al., 2003), to be described further below.

Data from 4,167 (28% females) youths entering substance abuse treatment was used for the analyses. Of these, 118 (2.8%) reported having some degree of hearing loss. The primary groups for analysis—youths indicating some degree of hearing loss and those not—were formed based on the following GAIN item appearing in the Physical Health section: “Do you have any physical problems with your vision, hearing, limbs, or any other problems communicating or getting around?” Among the list of response choices offered, those participants selecting “deaf” (2%) or “limited hearing or other hearing problems” (98%) were selected for inclusion in the hearing loss group ($N = 118$; 35% female). Those youths not choosing either of those choices were selected for inclusion in the hearing group ($N = 4,049$; 28% female).

Youths in the hearing loss group were on average 15.7 years at intake (range 11–24 years; 93.4% between 12 and 18 years). Most described themselves as White (50%), followed by Native American/Alaska Native (15%), African-American (13%), Multiracial (13%), Hispanic (8%), and Other (1%); there were no Asian youths in the hearing loss group. Nearly half of the youths (49%) were from a single parent home. Characteristics of the hearing group were very similar. The average age at intake was 15.7 years (range 11–24 years; 97.2% between 12 and 18 years), most described themselves as White (47%) followed by African-American (18%), Multiracial (13%), Hispanic (12%), Native American/Alaska Native (7%), Other (2%), and Asian (1%). Nearly half (49%) reported being from a single parent home. Additional information on the demographic and social characteristics of the youths will be discussed in the Results section.

Measures

The GAIN (Dennis et al., 2002; Dennis, Titus, et al., 2003) is a set of instruments designed to integrate the collection of clinical and research data for substance abuse treatment. The GAIN-I—the intake version of the GAIN instruments—is a comprehensive, stan-

dardized biopsychosocial assessment battery covering eight life domains (Background and Treatment Arrangements, Substance Use, Physical Health, Risk Behaviors and Disease Prevention, Mental and Emotional Health, Environment and Living Situation, Legal, and Vocational). Data collected via the GAIN-I provides diagnostic impressions based on the American Psychiatric Association’s (APA, 1994, 2000) *Diagnostic and Statistical Manual of Mental Disorders (IV and IV-TR* [text revision]) and the American Society of Addiction Medicine (ASAM, 1996 [second edition], 2001 [second revised edition]) patient placement criteria. The GAIN-I is typically interviewer administered in approximately 90 min and is used with both adolescents and adults. Copies of the actual GAIN instruments and items, the syntax for creating scales and problem-specific group variables, and a comprehensive list of supporting studies are publicly available at <http://www.chestnut.org/li/gain>.

The GAIN-I’s main scales have good internal consistency (alpha over .90 on main scales and .70 on subscales) and test-retest reliability (rho over .70 on number of days and problem counts and kappa over .60 on categorical measures) in both adolescent and adult populations. The scales are also highly correlated with measures of use from timeline follow-back measures, urine tests, collateral reports, treatment records, and blind psychiatric diagnosis (rho of .70 or more and kappa of .60 or more) (Dennis, Scott, & Funk, 2003; Dennis et al., 2002, 2004; Dennis, Titus, et al., 2003; Godley, Godley, Dennis, Funk, & Passetti, 2002; Shane, Jasiukatis, & Green, 2003).

A wide range of GAIN-I items and scales were used in the analyses. Most behaviors were measured using dichotomous (yes/no) items. If a score was a composite of several items, the composite was recoded into a categorical variable by applying validated cut-points. Items to assess diagnostic impressions of psychological conditions—including the probable presence or absence of a substance use disorder—were composed of symptom counts based on diagnostic criteria defined in the *DSM-IV/DSM-IV-TR* (APA 1994, 2000). Item responses were combined, and categorical values were assigned via scoring rules to designate the presence or absence of each psychological condition.

Table 1 Internal consistency estimates of selected GAIN scales by hearing status

	Hearing loss (<i>N</i> = 108)	Hearing (<i>N</i> = 3,815)	Total (<i>N</i> = 3,923)
Substance use severity	0.75	0.75	0.75
Any internalizing disorder	0.94	0.94	0.94
Depression	0.79	0.82	0.82
Anxiety	0.82	0.82	0.83
Suicidal/homicidal thoughts ^a	0.72	0.78	0.78
High traumatic stress ^b	0.93	0.92	0.92
Any externalizing disorder	0.94	0.94	0.94
Conduct problems	0.87	0.84	0.84
Inattention	0.92	0.92	0.92
Hyperactivity	0.84	0.87	0.87

Note. Sample sizes for the internal consistency analyses were slightly smaller than those used in the main analyses due to missing data.

^aInternal consistency estimates for the suicidal/homicidal thoughts scale would be notably improved by eliminating one item. However, clinicians who assisted with the construction of the scale preferred to maintain the item given it provided useful clinical information.

^bHigh traumatic stress includes behaviors indicative of PTSD, Acute Stress Disorder, or Disorders of Extreme Stress Not Otherwise Specified.

Demographic and social environment measures. Information on the youths' everyday living situations was gathered via a broad collection of GAIN-I social environment and behavioral items. Areas assessed include family and peer environments with an emphasis on current drug and alcohol use, current attendance at school and work, current experience in the criminal justice system, engagement in criminal activity during the past year, current behaviors related to sexual activity and HIV risk, lifetime and past year victimization, and lifetime running away or being otherwise homeless.

Substance use measures. A broad range of substance use-related information was collected to provide a thorough description of the youths' behavior. Areas assessed include age of first use, at least weekly use of a variety of substances, lifetime substance use severity, the presence of any past year substance abuse-related diagnoses, lifetime withdrawal, current treatment placement and history of treatment, and the youths' beliefs regarding whether she/he had a problem with alcohol or drug use. Lifetime substance use severity was measured using *DSM-IV* criteria for a Substance Use Disorder, then recoded dichotomously to reflect abuse versus dependence/physiological dependence. Internal consistency estimates (Cronbach, 1951) of the substance use severity scale scores (prior to di-

chotomizing) for the hearing loss, hearing, and total sample groups are shown in Table 1.

Psychological characteristics measures. Measures of psychological functioning were also measured by "yes/no" responses to individual items or by whether or not a scale score reached criteria for a probable psychological diagnosis. Both internalizing (e.g., depression, anxiety, suicidal ideation, high traumatic stress) and externalizing (e.g., conduct problems, attention deficit [AD], hyperactivity disorder [HD]) problems were assessed.

The presence of *depression* was determined by a collection of past year items that mapped onto the *DSM-IV* diagnosis of Major Depressive Episode. If the adolescent answered "yes" to at least five of the items, including several specific items required for meeting criteria, the adolescent was scored as experiencing depression. The presence of *anxiety* was determined in a parallel fashion using seven past year items that mapped onto the *DSM-IV* criteria for Generalized Anxiety Disorder. *Suicidal/homicidal thoughts* were measured by the endorsement or nonendorsement of a collection of five items from a suicide risk assessment created by mental health professionals at Chestnut Health Systems. Endorsing at least one item was required for meeting criteria. *Traumatic stress* was measured by criteria based on a total count of

13 past year symptoms or memories related to past trauma (e.g., Posttraumatic Stress Disorder [PTSD]), current trauma (e.g., Acute Stress Disorder), or other Disorders of Extreme Stress (e.g., on-going childhood maltreatment, complex PTSD). The presence of *any internalizing condition* was a dichotomous measure indicating at least one internalizing condition was present.

The presence of a *conduct problem* was determined by meeting criteria based on a count of 15 past year *DSM-IV* symptoms of Conduct Disorder (e.g., starting fights, using weapons in fights, being physically cruel to animals or people, destroying property, lying, stealing, truancy, etc.). Endorsing three or more items, including at least one endorsed for the past 90 days, yielded a "yes" score for the presence of problematic conduct. *DSM-IV* criteria that indicate at least one behavior should have occurred during the past 6 months rather than the past 90 days, but the GAIN does not have an item to assess such behaviors during the past 6 months. Thus, the presence or absence of conduct problems as measured on the GAIN approximates but is not equivalent to that described by *DSM-IV*. AD and HD were each measured by a count of past year *DSM-IV* symptoms for each condition. Six or more past year items endorsed, with at least one item endorsed for the past 6 months, indicated ADHD-inattentive type. Similarly, six or more past year hyperactivity/impulsivity items endorsed, with at least one item endorsed for the past 6 months, indicated ADHD-hyperactive type. The presence of AD, HD, or both was a dichotomous measure, indicating the adolescent was positive for at least AD or HD. The presence of *any externalizing condition* was a dichotomous measure indicating at least one externalizing condition was present.

Internal consistency estimates (Cronbach, 1951) of the psychological characteristics scale scores (prior to dichotomizing) for the hearing loss, hearing, and total sample groups are shown in Table 1.

Procedures

Trained and certified GAIN administrators collected data from treatment study clients during a one-on-one treatment intake interview. All research data collection

methods were approved by the Institutional Review Boards associated with each treatment study and included the provision of informed consent prior to any information's inclusion in an analytic data set.

The GAIN-I is typically administered orally in English or Spanish. No information was available on possible accommodations made for clients who may have preferred alternative administration methods such as some form of signed communication. There are no signed versions of the GAIN instruments.

Data was entered into the GAIN data collection and reporting system (Assessment Building System), either directly through computer administration or after the fact. Individual treatment programs sent their de-identified data to a central data management system at Chestnut Health Systems. All handling of data, including de-identification of protected health information and transmission of such, was in compliance with Health Insurance Portability and Accountability Act standards. Information in the aggregated data set is available for analysis by staff at the participating treatment and evaluation sites as well as by technical assistance staff at Chestnut Health Systems through data-sharing agreements.

Analytic Methods

The percent of client endorsement was computed for all study variables. The chi-square statistic (all 2×2 tests) was used to examine differences between youths with and without a hearing loss. Given the large sample size and thus the risk of overpowered tests, the more conservative Monte Carlo significance level denoting the exact test p value was used to determine the probability of statistical difference. In addition, Cohen's effect size measure for the difference between two proportions ($h = 2\arcsin \times (\text{sqrt } P_1) - 2\arcsin \times (\text{sqrt } P_2)$, where $P_1 =$ proportion 1 and $P_2 =$ proportion 2) was used to judge the magnitudes of observed differences using the following guidelines: small = 0.20, moderate = 0.50, and large = 0.80 (Cohen, 1988). Given effect size is not dependent on sample size (as are the results of more traditional statistical tests such as the chi-square), it offers an alternative definition of the significance of results, focusing more on practical significance than statistical significance.

Table 2 Demographic and social characteristics of youths by hearing status

	Percent of adolescents		<i>p</i> Value ^a	Effect size ^b
	Hearing loss (<i>N</i> = 118)	Hearing (<i>N</i> = 4,049)		
Basic Demographics				
Female	35	28	.12	0.15
Age at intake 15–17 years	76	80	.35	0.10
Minority status	50	53	.51	0.06
Family				
Single parent home	49	49	1.00	0.00
Weekly alcohol use in home	29	25	.33	0.09
Weekly drug use in home	17	12	.08	0.14
Social peer use of substances				
Alcohol to intoxication weekly	58	52	.22	0.12
Any drugs P90	78	69	.06	0.20
Environment				
In school P90	90	88	.44	0.06
Employed P90	35	31	.42	0.09
Current criminal justice involvement	65	64	.85	0.02
Controlled environment P90	35	32	.62	0.06
Ever been victimized	74	60	.00	0.30
Victimized PY	44	34	.03	0.21
High severity victimization	54	43	.01	0.22
Ever runaway/homeless	37	29	.05	0.17
Crime and violence				
Any illegal act PY (not drugs)	66	60	.18	0.12
Physical violence PY	68	65	.56	0.06
Property crime PY	51	42	.07	0.18
Interpersonal crime PY	45	38	.15	0.14
Drug crime PY (not use)	46	39	.18	0.14
Risk behaviors				
Sexually active P90	65	64	.85	0.02
Unprotected sex P90	24	22	.64	0.05
Multiple sex partners P90	33	28	.25	0.11
Pregnant/made pregnant PY	3	5	.38	0.10

Note. PY, past year, P90, past 90 days.

^aReported *p* value is the Monte Carlo exact test value.

^bEffect size is measured by Cohen's *d*.

Results

Demographic and Social Environment

Table 2 presents information on the demographic characteristics and social environments of the youths by hearing status.

No statistically significant differences in demographics and social environment between the two groups were observed for gender; age at intake; minority status; living in a single parent home; use of substances in the home; peer weekly alcohol or drug use; current school, work, or criminal justice status;

past year physical, property, interpersonal, or drug crime; past year illegal activity; current sexual activity; and lifetime pregnancy. Significant differences appeared in the living environment, with adolescents in the hearing loss group significantly more likely to have ever been victimized (physical, emotional, or sexual abuse) (74% versus 60%), to have experienced a high level of lifetime victimization (54% versus 43%), and to have been victimized in the past year (44% versus 34%). Youths in the hearing loss group were also more likely to have ever run away or otherwise been homeless (37% versus

Table 3 Substance abuse characteristics of youths by hearing status

	Percent of adolescents		p Value ^a	Effect size ^b
	Hearing loss (<i>N</i> = 118)	Hearing (<i>N</i> = 4,049)		
First use under age 15	89	80	.02	0.25
Weekly any alcohol or drug use	57	55	.64	0.04
Weekly alcohol use	9	14	.18	0.16
Weekly marijuana use	49	42	.11	0.14
Weekly crack/cocaine use	4	1	.03	0.20
Weekly heroin/opioid use	2	2	1.00	0.00
Weekly other drug use	4	8	.10	0.17
Outpatient treatment placement ^c	78	84	.06	0.15
Prior substance abuse treatment	32	27	.17	0.11
Dependence (lifetime severity)	63	50	.01	0.26
Past year substance use diagnosis	81	81	1.00	0.00
Past year dependence	52	42	.03	0.20
Past year abuse	28	38	.02	0.21
Any lifetime withdrawal	49	39	.04	0.20
Perception of no AOD problem	73	77	.38	0.09

Note. AOD, alcohol and other drugs.

^aReported *p* value is the Monte Carlo exact test value.

^bEffect size is measured by Cohen's *h*.

^cBased on sample sizes of *N* = 107 for hearing loss group and *N* = 3,737 for hearing group.

29%), though the effect size was just below Cohen's cut-off for a small effect. Social environment characteristics approaching significance were peer current use of drugs (78% versus 69%; $p < .06$, with a small but meaningful effect size) and engagement in past year property crimes (51% versus 42%, $p < .07$ with an effect size approaching the cut-off for a small effect).

Substance Abuse Characteristics

Table 3 presents information on the substance abuse characteristics of the youths by hearing status.

Youths with and without a hearing loss did not differ in their overall weekly use of drugs or alcohol. That is, whether a youth did or did not use any illegal substance or alcohol at least once a week did not differ by hearing status. Similarly, the groups did not differ in their weekly use of marijuana, heroin, or other less-often reported drugs (inhalants, phencyclidine, hallucinogens, amphetamines, or depressants). Current treatment placement (outpatient versus residential) and experience with prior treatment episodes did not differ by group, though a trend was observed for proportionally fewer youths with hearing loss assigned to

outpatient treatment (and thus more to residential; $p < .06$, with an effect size approaching Cohen's definition of a small effect). Youths with and without a hearing loss were equally likely to report behaviors that met criteria for a substance use diagnosis during the past year; they were also equally likely to believe they did *not* have a substance use problem.

On the other hand, youths with hearing loss initiated substance use at a significantly younger age on average than their hearing peers. They also reported using crack/cocaine on at least a weekly basis significantly more often than the hearing youths. The youths with hearing loss reported a greater severity of use, with significantly more reporting lifetime and past year symptoms indicative of substance dependence as well as lifetime withdrawal. Hearing youths were more likely to report past year symptoms indicative of substance abuse (rather than dependence).

Co-occurring Psychological Characteristics

Table 4 shows that in all areas of psychological functioning measured, youths with hearing loss were at a greater disadvantage. The effect sizes for any internalizing ($h = 0.34$) or externalizing ($h = 0.33$)

Table 4 Psychological characteristics of youths by hearing status

	Percent of adolescents		<i>p</i> Value ^a	Effect size ^b
	Hearing loss (<i>N</i> = 118)	Hearing (<i>N</i> = 4,049)		
Any internalizing disorder	56	39	.000	0.34
Depression	47	32	.001	0.31
Anxiety	20	12	.016	0.22
Suicidal/homicidal thoughts	30	21	.021	0.21
High traumatic stress ^c	34	21	.001	0.30
Any externalizing disorder	70	54	.001	0.33
Conduct problems	62	45	.000	0.34
AD, HD, or both	56	39	.000	0.34

Note. Time frames are past year for depression, anxiety, suicidal/homicidal thoughts, and high traumatic stress; past 6 months for AD, HD, or both; and past 90 days for conduct disordered behavior.

^aReported *p* value is the Monte Carlo exact test value.

^bEffect size is measured by Cohen's *h*.

^cHigh traumatic stress includes behaviors indicative of PTSD, Acute Stress Disorder, or Disorders of Extreme Stress Not Otherwise Specified.

conditions approached a moderate level. Depression, traumatic stress, conduct problems, and behaviors indicative of ADHD were particularly noteworthy. Differences between the groups in anxiety and suicidal/homicidal thoughts were statistically significant with small but meaningful effect sizes.

Discussion

In many ways, the youths with and without hearing loss admitted to treatment were very similar to each other. They shared similar demographic backgrounds, including comparable levels of peer and family substance use, school and criminal justice involvement, histories of crime and violence, and a variety of sexual risk behaviors. Similar proportions of youths from each group reported weekly use of alcohol and a variety of illicit drugs. They reported comparable substance abuse treatment careers and were similar in whether or not their behavior reached *DSM-IV* criteria for a past year substance abuse diagnosis. The groups even paralleled each other in their belief that they did not have an alcohol or drug problem.

Even with these similarities, the groups diverged in several important and disconcerting ways. Young people who abuse drugs and alcohol often have a history of victimization or other potentially trauma-inducing experiences (Giaconia et al., 2000). However, the youths with hearing loss in this sample reported

more lifetime, past year, and high severity histories of victimization than their hearing peers. They were also more likely to report a variety of substance abuse behaviors indicative of a more severe level of involvement, including earlier age of onset, past year and lifetime dependence, and lifetime withdrawal; greater proportions of youths with hearing loss reported weekly use of crack/cocaine. Trends were identified for proportionally more youths with hearing loss being placed in residential treatment and having peers who are current drug users. A history of running away or being otherwise homeless was more frequently reported among the youths with hearing loss. Across all measures of co-occurring psychological problems, proportionally more youths with hearing loss reported clinically meaningful levels of distress.

The youths with hearing loss in this study appear to be arriving at treatment in a more severe or progressed state. It is possible the results could indicate a threshold effect, a phenomena whereby youths' substance abuse and co-occurring problems have to reach a more severe state before systems or families will refer them to treatment. Guthmann and Sandberg (1995) describe the tendency of family members, friends, and professionals to take care of or protect individuals with a disability. This can result in the individual not being held accountable for their behavior. Perhaps the youths with hearing loss are being sent to treatment only after their behavior reaches a threshold such that

enabling is no longer tenable. It is also possible that the youths with hearing loss have had more time to progress given, on average, they started using substances earlier than their hearing peers. Increased efforts at prevention using materials targeted at children with hearing loss could potentially impact or at least delay onset of experimentation with substances.

Several distinctive features of the results for the hearing loss group resemble a profile of youths presenting to treatment with trauma in their backgrounds: earlier age onset, elevated psychological profile, greater severity of use (in this case, use of a harder drug, greater lifetime and past year severity of use, and lifetime withdrawal), trends toward placement in a residential setting and criminal activity such as property crime, and more severe victimization histories. Research evidence indicates an increased prevalence of abuse and neglect among children and youth with hearing loss (National Child Traumatic Stress Network [NCTSN], 2006; Sullivan & Knutson, 1998b), especially sexual abuse (Kvam, 2004; Sullivan, Vernon, & Scanlon, 1987). In a study of abused deaf and hard-of-hearing children and youth who were alcohol or chemically dependent, Sullivan and Knutson (1998a) noted significantly more behavior problems than those among the nonabused peers, including problems with attention, delinquency, aggressiveness, withdrawal, and PTSD-related behaviors.

In the existing literature, rates of mental health problems among children and youth with hearing loss—both in the community and in clinical samples—vary widely but are typically above those of their hearing peers (Roberts & Hindley, 1999; van Eldik, 2005; Willis & Vernon, 2002) and have been observed in families with poor parent-child communication (van Eldik, Treffers, Veerman, & Verhulst, 2004). That observation coupled with a preexisting high rate of mental health problems in substance abuse populations helps to explain the distressing results of the hearing loss group. Anxiety and depression can set in under circumstances in which youths with hearing loss feel isolated or inadequate, and the use of drugs or alcohol is one way to self-medicate psychological pain (McCrone, 2003; Schiller, 2000). It is possible that elevated externalizing problems could be related in part to ongoing frustrations with attempts to effec-

tively connect and communicate with a hearing world, frustrations that hearing youths typically do not encounter. Youths who attend schools in which they are one of only a few youths with hearing loss experience less incidental learning and, subsequently, may be delayed in psychosocial development.

Limitations

The results should be considered in light of several limitations. First, although the data collection instrument was individually administered by trained interviewers, it is unknown if adaptations were made for youths who may have preferred a signed administration. Most of the youths reported being hard-of-hearing rather than deaf and may have been primary English users. However, because there is not a one-to-one correspondence between severity of hearing loss and preferred communication method, it is possible that some youths who were hard-of-hearing may have preferred administration with the help of an interpreter. In the event information was gathered orally rather than visually when a visual (or dual visual/oral) administration would have been clearer, the information may not be an accurate reflection of the youths' histories. Unfortunately, as yet there are no comprehensive biopsychosocial substance abuse treatment assessments that have been translated to sign language or even validated on a population of youths with hearing loss.

Information on several descriptive factors associated with hearing loss—such as age of onset, identification and intervention, severity of hearing loss, preferred communication mode, and educational setting—were not collected as part of the GAIN interview. Having this information could provide a clearer snapshot of the youths with hearing loss as well as additional information through which to interpret the results. For example, among children with significant hearing loss, earlier age of identification and intervention is associated with improved language and socioemotional development (Yoshinaga-Itano, 2003). One testable question is whether youths with earlier intervention are at lower risk to use substances, a relationship possibly mediated by a host of communicative factors. Having descriptive information on

hearing loss would also provide the means to investigate additional questions about the relationship between youths with hearing loss and substance abuse (e.g., would youths educated in mainstream settings have more or less severe substance abuse problems than youths educated in residential settings?).

Looking across the collection of substance abuse research studies involving people with hearing loss, most individuals included in the studies were deaf rather than hard-of-hearing. This is in contrast to this article, where the majority of the sample (98%) is composed of youths who described themselves as having "limited hearing or other hearing problems" rather than as "deaf." Although no information was available on the youths' audiological severity of hearing loss, preferred communication methods, or functioning, it is likely that the majority of the youths in this article's sample were hard-of-hearing and/or primary English users. Possible conclusions about the characteristics of youths with hearing loss that are generated from this study's results should consider the composition of the sample as results for individuals who are severely or profoundly deaf could very well be different.

Data collection was limited to self-report data. Future studies might benefit from including caregiver reports or urine test data as a validation of reported recent use. However, even with the aforementioned limitations, the methods used in this study are comparable-to-better than those used when collecting information from mainstream populations that include people with hearing loss. The data set itself is unique in that it is the only known collection of substance abuse information on a treatment population of youths with hearing loss. Addressing the limitations raised above would further strengthen the fields' ability to more clearly understand the problem of substance abuse among youths with hearing loss, which in turn could lead to improved treatment and policy to close the gap between need and suitable resources.

Implications for Treatment and Research

Treatment. The results of this study support the need for additional efforts focused on prevention, assessment, and early intervention. The youths with hearing loss initiated use somewhat earlier on average than their

hearing peers. It is possible this could be partly related to minimal prevention exposure. Youths with hearing loss do not have the same opportunities for incidental learning on the dangers of drug use as their hearing peers, and targeted prevention materials are not the norm. Only a handful of substance abuse screening assessments for people with hearing loss exist, and none are targeted to young people. Focusing on prevention and early intervention once a substance abuse or mental health problem is identified may head off the progression to a full-blown substance use disorder.

Having a history of victimization is common among youths in substance abuse treatment (Shane, Diamond, Mensinger, Shera, & Wintersteen, 2006; Titus et al., 2003); however, trauma-informed substance abuse treatment for adolescents is only recently getting attention in the field. Among children and youth with hearing loss, an increased prevalence of abuse and neglect has been observed (NCTSN, 2006; Sullivan & Knutson, 1998b), especially for sexual abuse (Kvam, 2004; Sullivan, Vernon, & Scanlon, 1987). In this article, 74% of the youths with hearing loss reported being victimized in their lifetime and more than half reported high severity victimization, rates significantly above those of their hearing peers. There is clearly a need to screen for and address victimization as part of substance abuse treatment for deaf and hard-of-hearing youths.

The results of this study also underscore the urgency of addressing the needs of hard-of-hearing youths, a largely neglected population. A hearing loss of any kind—even minimal—puts a child at risk for learning and psychosocial difficulties (Bess, Dodd-Murphy, & Parker, 1998; Davis, Elfenbein, Schum, & Bentler, 1986). Even so, very little behavioral or educational research focuses on hard-of-hearing children; the majority of what is known about the functioning of children with hearing loss refers to those who are deaf. As one of very few studies whose sample is composed of primarily hard-of-hearing youths, worrisome results such as these may remind professionals to be more alert to attending to the needs of both deaf and hard-of-hearing youths.

Research. The research arena for exploring questions about substance abuse and treatment among youths

with hearing loss is wide open. As one of very few studies broaching the topic, this study contributes information to this largely unexplored area and also prompts more questions. These results provide only one snapshot of substance use in a mainstream treatment population. Future efforts should focus on providing larger sample estimates in the population at large and in various educational settings, such as in residential and mainstream settings. Analyses by level of severity of hearing loss would provide a fuller picture of the characteristics of youths with hearing loss who enter treatment. Another area sorely in need of exploration is treatment outcomes among youths with hearing loss. Given a treatment entry profile possibly indicative of more severe need, how do these youths fare over time, in both initial response to treatment and throughout the recovery process? Would treatments tailored more to the needs of youths with hearing loss—especially youths who are primary users of sign language—provide better outcomes? Exploring questions related to prevention and early intervention may provide at least partial answers to why the youths are showing up at treatment in a seemingly more severe state.

Another major area of research focus should be the creation and implementation of substance abuse-related assessments that are tailored to the range of linguistic and cultural needs of youths with hearing loss. Currently, very few assessments exist that were created for and normed on populations of people with hearing loss, so there is a clear need for early intervention, screening, treatment intake, and monitoring assessments. Because people with hearing loss vary in the degree to which they depend on spoken versus manual communication, assessments created to serve youths with hearing loss would need to be responsive to this range of communication preferences.

Some youths with hearing loss will require assessments delivered in some form of signed communication. Administration of signed assessments relies on an interpreter's skill at translating, and variations in skill can lead to unreliable administration that negatively impacts the validity of data. In addition, some of the English terminology used in the substance abuse treatment field does not have easily interpretable equivalents in sign language. Advances in technology during

the past decade have provided additional options for assessment administration to youths whose language preferences include signed communication. Self-administrations using current technology provide one of the best options for reliable, culturally appropriate administrations (Alexander, 2005; Lipton, Goldstein, Fahnbulleh, & Gertz, 1996). Web-based administrations that capture data through touch screen technology could broaden the reach of assessment options, making them easily accessible to any agency with access to the internet.

Conclusion

The past 30 years have witnessed very little progress in substance abuse treatment for people with hearing loss. Recommendations written decades ago are still being offered as strategies to reduce barriers and improve the state of substance abuse treatment (Boros, 1981; Guthmann, 1998; McCrone, 1982). Despite the lack of scientifically solid estimates of the prevalence of substance abuse problems, youths with hearing loss are not only showing up in treatment but also they appear to be showing up in a more severe state than their hearing peers. Until efforts are focused more seriously on the problem of substance abuse among deaf and hard-of-hearing people, they will continue to have limited access to the full continuum of treatment, especially the numerous evidence-based treatments available to the hearing population.

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