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Who Attends Recovery High Schools after Substance Use Treatment? A Descriptive Analysis of School Aged Youth

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Abstract

Recovery high schools (RHSs) are an alternative high school option for adolescents with substance use disorders (SUDs), designed to provide a recovery-focused learning environment. The aims of this study were to examine the characteristics of youth who choose to attend RHSs, and to compare them with local and national comparison samples of youth in recovery from SUDs who were not enrolled in RHSs. We conducted secondary analysis of existing data to compare characteristics of youth in three samples: (1) adolescents with SUDs who enrolled in RHSs in Minnesota, Texas, and Wisconsin after discharge from treatment (RHSs; $n = 171$, 51% male, 86% White, 4% African American, 5% Hispanic); (2) a contemporaneously recruited local comparison sample of students with SUDs who did not enroll in RHSs ($n = 123$, 60% male, 77% White, 5% African American, 12% Hispanic); and (3) a national comparison sample of U.S. adolescents receiving SUD treatment ($n = 12,967$, 73% male, 37% White, 15% African American, 30% Hispanic). Students enrolled in RHSs had elevated levels of risk factors for substance use and relapse relative to both the local and national comparison samples. For instance, RHS students reported higher rates of pre-treatment drug use, past mental health treatment, and higher rates of post-treatment physical health problems than adolescents in the national comparison sample. We conclude that RHSs serve a population with greater co-occurring problem severity than the typical adolescent in SUD treatment; programming offered at RHSs should attend to these complex

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Declarations of Interest

Emily Tanner-Smith and Emily Hennessy declare that they have no conflicts of interest.

Statement of Human Rights

All procedures followed were in accordance with the ethical standards of the University of Minnesota Institutional Review Board, the Vanderbilt University Institutional Review Board, and with the Helsinki Declaration of 1975, as revised in 2000.

Informed Consent

Informed assent and parental consent was obtained from all RHS and local comparison sample participants included in the study.

patterns of risk factors. SUD service delivery policy should consider RHSs as an intensive recovery support model for the most high-risk students with SUDs.

Keywords

adolescents; continuing care; recovery schools; youth

1. Introduction

High schools are important social contexts in the lives of adolescents, but may be particularly risky environments for students with substance use disorders (SUDs) due to the presence of substance using peers and the perceived availability of substances on campus (Derzon, 2007; Mason, Mennis, Linker, Bares, & Zaharakis, 2014; Svensson, 2000; Wambeam, Canen, Linkenbach, & Otto, 2014). For instance, a recent national survey of U.S. high school students estimates that in 2015, 22% of students were offered, sold, or given an illegal drug on school property (Musu-Gillette, Zhang, Wang, Zhang, & Oudekerk, 2017). Traditional high school settings may thus fail to provide the social and therapeutic supports needed to effectively support adolescents with substance use problems, particularly those students in active recovery after having received formal substance use treatment (Spear & Skala, 1995).

Recovery high schools (RHSs, sometimes called “sober schools”) are an alternative high school option for adolescents with SUDs, created in response to the need for more intensive school supports for youth in recovery. Originally developed in the late 1970s, there are now approximately 40 RHSs operating in 16 U.S. states (ARS, 2016b), and the number of RHSs in existence has slowly increased over time (ARS, 2016c). RHSs are typically small: most schools have average enrollments of 30-40 students (ARS, 2016c; Finch, Karakos, & Hennessy, 2016; White & Finch, 2006). RHSs aim to promote recovery from SUDs by providing a safe and supportive learning environment that promotes sobriety and academic success (Finch & Frieden, 2014; Finch, Moberg, & Krupp, 2014). Although enrollment requirements vary across schools, most RHSs do not require students to have previously attended or completed substance use treatment. Rather, most RHSs simply require students to pledge their commitment to sobriety and recovery while enrolled in the school. RHS enrollment fees can also vary across schools. Whereas most RHSs are organizationally structured as charter or alternative schools that offer enrollment free of charge, other RHSs may require families to pay for tuition, books, and other services.

All RHSs meet state requirements for awarding secondary school diplomas and thus employ the administrative and teaching staff needed for academic programming (ARS, 2016c). In addition, RHSs provide therapeutic programming designed to foster strong peer and family support structures, both of which are key factors in the recovery process (Ramo & Brown, 2008; Ramo, Prince, Roesch, & Brown, 2012; White, 2009). The therapeutic programming provided in RHSs might include, for instance, daily group check-ins, on-site peer-support groups, self-help meetings such as Alcoholics Anonymous or Narcotic Anonymous, individual counseling sessions, group counseling sessions, and/or community service

requirements. Whereas some RHSs have dedicated counselors located on site, other schools may employ mental health staff to visit the school on a regular basis and/or refer students to community substance use treatment services for routine therapeutic care (Finch et al., 2014). RHSs therefore seek to improve adolescents' academic and behavioral adjustment by fostering social connectedness and social capital among supportive peers (Karakos, 2014), and can serve as a form of continuing care support for youth discharged from substance use treatment. Given high relapse rates after substance use treatment (Chung & Maisto, 2006; Dennis et al., 2004a; GAIN Coordinating Center, 2013a), and increasing recognition of addiction as a chronic relapsing condition (ASAM, 2011), continuing care services can be crucial for supporting adolescents' recovery process after treatment (Passetti, Godley, & Kaminer, 2016).

Although no randomized controlled trial to date has examined the effectiveness of RHSs, a few studies have examined academic and behavioral adjustment outcomes among youth attending RHSs. In one of the earliest evaluations of RHSs, Emrich and Green (1981) used a controlled quasi-experimental design to compare outcomes for 11 youth attending the Phoenix Pilot Drug Program (an RHS) and 10 matched comparison youth attending a local non-RHS school. The authors reported no significant differences between RHS and non-RHS students on measures of drug use, delinquency, or educational aspirations; however, RHS students had significantly higher grade point averages but lower school attendance rates than non-RHS students (Emrich & Green, 1981). In another study, Moberg and Finch (2008) used a single-group design with retrospective pretest data to examine changes in adjustment for 291 youth attending RHSs in California, Colorado, Minnesota, Pennsylvania, Tennessee, and Texas. Students reported significant improvements in substance use and mental health outcomes after attending RHSs, including reductions in alcohol use, cannabis use, depressive symptoms, and anxiety symptoms, and improved abstinence rates (Moberg & Finch, 2008). In a more recent evaluation study, Finch and colleagues (2018) used a controlled quasi-experimental design with propensity score adjustment to compare outcomes for 294 youth attending RHS and non-RHS schools in Minnesota, Texas, and Wisconsin. RHS students had higher rates of abstinence from alcohol, marijuana, and other drugs as well as decreased rates of absenteeism from school, relative to a comparison group of students with substance use disorders who did not attend RHSs (Finch, Tanner-Smith, Hennessy, & Moberg, 2018). Results from the same sample indicated that students enrolled in RHSs experienced improvements in mental health symptomatology over time, but there was no evidence that RHS students had significantly more (or less) improvements in mental health relative to the comparison group of non-RHS students (Tanner-Smith, Finch, Hennessy, & Moberg, 2018).

Given the potentially beneficial effects of RHSs on adolescents' academic and substance use outcomes, and the increasing number of RHSs in operation across the United States (ARS, 2016a), an important question is, who do RHSs typically serve? Namely, what kinds of youth choose to enroll in RHSs when one is available after substance use treatment? Prior descriptive studies suggest that many youth attending RHSs are White, male, from two-parent households, have high rates of substance use, prior treatment receipt, comorbid mental health conditions, histories of trauma, and criminal justice system involvement (Finch et al., 2014; Kochanek, 2008; Moberg & Finch, 2008; Moberg, Finch & Lindsley,

2014, Osgood, Eaton, Trudeau, & Katz, 2012; Vosburg et al., 2016), and many have parents or siblings with histories of substance use problems (Lanham & Tirado, 2011). To date, however, we are unaware of any empirical studies that have systematically compared the sociodemographic, treatment history, substance use history, and comorbid conditions faced by adolescents attending RHSs versus similar adolescents with substance use problems who do not attend RHSs.

Understanding the types of youth served by RHSs will provide valuable information for practitioners developing the therapeutic and academic programming offered at RHSs, for service delivery systems and treatment providers who may refer youth to RHSs, and for researchers examining the effects of RHSs as a form of continuing care for substance use among adolescents. The present study attempts to address this gap in the literature by comparing characteristics of adolescents who attended RHSs after SUD treatment (using data from Finch et al., 2018), relative to (1) a local comparison sample of adolescents with treated SUDs who chose not to enroll in RHSs, and (2) a national comparison sample of adolescents with treated SUDs (aGAIN Coordinating Center, 2013a). By using these two comparison samples, we explore both the local differences in the characteristics of students selecting RHSs (or not) when they are available, and the macro level differences in characteristics of RHS students relative to a national sample of adolescents in SUD treatment.

2. Methods

2.1 Samples

This study used data from three unique participant samples: (1) students who received SUD treatment and subsequently enrolled in an RHS in one of three states—Minnesota, Wisconsin, and Texas; (2) students who received SUD treatment in those same three states but who did not enroll in an RHS even though RHSs were available to them; and (3) students who received SUD treatment in the United States and were included in the national pooled GAIN data set.

The first two samples were comprised of students enrolled in a longitudinal quasi-experimental evaluation study designed to examine the effectiveness of RHSs for improving adolescent adjustment after SUD treatment (Finch et al., 2018). Participants were 294 adolescents who had recently enrolled in high school after receiving SUD treatment. Students who subsequently enrolled in an RHS for at least 28 days (i.e., approximately one month of school) during the 12-month study period were considered RHS students ($n = 171$) for the current analysis. The remaining local comparison sample of non-RHS students ($n = 123$) included those students who had the availability of an RHS after discharge from SUD treatment, but who chose not to enroll in RHSs for at least 28 days.

The third (national comparison) sample was comprised of adolescents included in the pooled GAIN data set, a de-identified multisite data set managed by Chestnut Health Systems. The national pooled GAIN data set includes intake and follow-up data for patients enrolled in SUD treatment programs across the United States between 2002 and 2012 (Dennis, Titus, White, Unsicker, & Hodgkins, 2003; GAIN Coordinating Center, 2017). To maximize

comparability with the RHS and local comparison samples, the current manuscript uses data only from the pooled GAIN for adolescents who were ages 14-18 at the time of intake into substance use treatment, who were enrolled in formal school prior to intake into SUD treatment, and who were subsequently discharged from SUD treatment. Furthermore, to ensure the comparability of post-discharge assessment timing with the RHS and local comparison samples, the GAIN national comparison sample was restricted to adolescents who had at least one follow-up assessment available after discharge from treatment. A total of 12,967 adolescents met these criteria and were included in the GAIN national comparison sample.

2.2. Data Collection Procedures

For the RHS and local comparison samples, study data were collected between December 2011 and May 2016 in three states: Minnesota, Wisconsin, and Texas. These locations were selected due to convenience: namely, several RHSs were operating in each of these states at the time of study recruitment (with a particularly high initial concentration of RHSs in Minnesota) and collaborating research teams were available to manage recruitment and interviewing at each of these sites. The Institutional Review Board at the University of Minnesota approved all data collection procedures. Student assent and parent consent was secured for all research participants; and all participants received Target gift cards at each assessment period to incentivize study participation.

The baseline data collection period occurred when participants were recruited upon discharge from 10 SUD treatment facilities in Minnesota, Wisconsin, or Texas (regardless of their intent to enroll in an RHS or not), or were recruited directly from RHSs. After discharge from SUD treatment, families were free to enroll adolescents in any type of formal schooling; some elected to enroll in RHSs whereas others enrolled in non-RHSs (i.e., traditional, charter, or alternative schools without a recovery focus). As described elsewhere (Finch et al., 2018), participants were initially recruited only from SUD treatment facilities, but this recruitment strategy yielded a smaller than expected number of RHS enrollees. Thus, the recruitment strategy was supplemented with direct recruitment from 12 RHSs, where youth who had received substance use treatment within the past year were recruited. Participant recruitment occurred over several years to maximize the sample size of RHS students. Staff at the participating SUD treatment programs and RHSs provided potentially eligible participants with study recruitment information; however, it is not possible to calculate a response rate because it is unknown how many potentially eligible individuals the program staff initially approached.

For the GAIN national comparison sample, study data were collected between 2002 and 2012 using Global Appraisal of Individual Needs (GAIN) instruments (Dennis et al., 2003; GAIN Coordinating Center, 2017). All data were collected as part of general clinical practice or specific research studies. All research studies were conducted under the supervision of the institutional review boards for their respective institutions. Both practice and research studies were conducted with general consents under federal guidelines (42 CFR Part 2) that allow record abstraction for program evaluation and development as long as data are de-identified and kept confidential. For the current manuscript, all secondary analysis

procedures were approved by the Institutional Review Board at Vanderbilt University, and conducted under a data sharing agreement with Chestnut Health Systems to ensure individual participants' privacy and confidentiality.

2.3. Materials and Measures

We compared the three samples on a range of substance use, mental health, and social/emotional adjustment measures that are important predictors of SUD treatment needs and outcomes (e.g., Tanner-Smith, Wilson, & Lipsey, 2013; Tanner-Smith & Lipsey, 2014). To facilitate comparisons across the RHS, local comparison, and GAIN national comparison samples, the data collection instruments used in the RHS study intentionally included numerous GAIN measures that could be harmonized across the three samples (see Table 1). All measures were categorized as measuring functioning at either pre-SUD treatment or post-SUD discharge, given the variability in measurement timing across the samples (described below).

For the RHS and local comparison samples, study data were collected during extensive youth assessments via in-person computer-assisted interviewing by a team of trained, master's level data collectors (Finch et al., 2018). The current manuscript only uses data collected during the baseline interviews, at which point adolescents had been discharged from SUD treatment and re-enrolled in high school. Thus, all pre-SUD treatment measures in the RHS and local comparison samples were assessed retrospectively, asking participants about the period prior to enrollment in SUD treatment. All post-SUD treatment measures in the RHS and local comparison samples were assessed at the baseline study period, at which point the participants had been discharged from treatment and re-enrolled in high school.

For the GAIN national comparison sample, data were collected in-person by trained interviewers using standardized GAIN assessments (Dennis et al., 2003). The current manuscript uses data collected during the intake period (for pre-SUD treatment measures), and during the follow-up period (3-, 6-, 9-, or 12-month) corresponding to the time at which adolescents had been recently discharged from treatment (for post-SUD discharge measures). Adolescents in the GAIN national comparison sample were enrolled in treatment for variable durations (*Mean* days = 115.47, *SD* = 95.05, *Range* 1-1074) but follow-up data collection corresponded to 3-, 6-, 9-, and 12-month follow-ups after SUD-treatment intake (not discharge). We thus defined "recent discharge" using 3-month follow-up data for adolescents with a length of stay in treatment up to 135 days; 6-month follow-up data for adolescents with a length of stay between 136-225 days; 9-month follow-up data for adolescents with a length of stay between 226-315 days; and 12-month follow-up data for adolescents with a length of stay of 316 or more days. This allowed for comparison of both pre-SUD treatment and post-SUD discharge measures across the three samples.

2.4. Data Analysis

We used descriptive statistics (means, proportions) to summarize the demographic, background, and behavioral and social adjustment characteristics of adolescents who attended RHSs after SUD treatment ($n = 171$); the local comparison sample of students with SUDs who did not choose to attend RHSs ($n = 123$); and the national comparison sample of

adolescents who received SUD treatment ($n = 12,967$). We then estimated a series of linear regression models to compare the levels of each continuously measured characteristic (e.g., high school grade point average) across the three groups; and a series of logistic regression models to compare the log odds of an event for each binary characteristic (e.g., lifetime amphetamine use) across the three groups. All regression models additionally adjusted for students' age, sex, and race/ethnicity.

We used Wald tests to assess for group differences across the three samples (after adjusting for students' age, sex, and race/ethnicity). Given the large sample size of the national comparison group, we used a conservative a priori value of $\alpha < .01$ to assess statistical significance. To quantify the magnitude of mean differences between groups on continuous measures, we present standardized mean difference effect sizes (d), estimated as the difference in adjusted means between two groups (i.e., the unstandardized regression coefficient from the linear regression model, b) divided by the pooled standard deviation across groups. To quantify the magnitude of differences between groups on binary measures, we present adjusted odds ratio effect sizes (OR) estimated as the exponentiated logit coefficient from the logistic regression model ($\exp(b)$).

We used multiple imputation (Graham 2009; Schafer & Graham, 2002) to handle the small amount of missing data present due to survey nonresponse. We created 20 imputed datasets based on all analytic variables, with imputations estimated separately for the three samples. Pooled estimates and inferential statistics were calculated using Rubin's rules (1987), implemented in Stata version 14.2 (StataCorp, 2015).

3. Results

3.1. Pre-SUD Treatment Characteristics

Table 2 compares the RHS, local comparison, and national comparison samples on a range of pre-SUD treatment characteristics including background, family, substance use history, and treatment service history. Relative to the local comparison sample, the RHS sample was older, more likely to be female, White, and have a past year mental health diagnosis; however, none of these pairwise group contrasts were statistically significant. Students attending RHSs were significantly older than students in the national comparison sample: 54% of RHS students were ages 17-18 vs. 26% of students in the national comparison sample. Relative to students in the national sample, RHS students were also significantly less likely to be male, more likely to be White, and reported higher grade point averages in the past school year. Although RHS students were slightly more likely than the national comparison sample to have a mental health diagnosis in the past year (60% vs. 55%), this difference was not statistically significant after adjusting for student age, sex, and race/ethnicity.

In terms of family characteristics, there were no significant differences between the RHS and local comparison samples. However, relative to the national comparison sample, RHS students were significantly more likely to report having health insurance, living in single parent households, having family histories of substance use treatment, and family histories of mental health problems.

As shown in the next section of Table 2, students attending RHSs reported significantly higher odds of lifetime substance use, higher levels of recent substance use frequency, and higher odds of past year substance use disorders relative to the national comparison sample. For instance, students attending RHSs were significantly more likely than those in the national comparison sample to report ever having used alcohol to intoxication (95% vs. 64%; adjusted OR = 9.09), marijuana (100% vs. 78%; Fisher's Exact $p < .001$), and opioids or narcotics (78% vs. 13%; adjusted OR = 16.67). Relative to the national comparison sample, students attending RHSs also reported significantly more days of alcohol use, marijuana use, and other illicit drugs prior to SUD treatment; as well as higher levels of past year tobacco dependence, alcohol use disorders, and substance use disorders. Compared to the local comparison sample of non-RHS students, RHS students also reported significantly higher levels of amphetamine use (adjusted OR = 2.13), inhalant use (adjusted OR = 2.13), days of illicit drug use (adjusted $d = 0.92$), and past year tobacco dependence (adjusted OR = 2.44).

As shown in the bottom section of Table 2, RHS students reported a higher number of prior substance use disorder treatment episodes than students in both the local comparison sample (adjusted $d = 0.91$) and the national comparison sample (adjusted $d = 0.95$). Relative to the local comparison sample, RHS students were significantly more likely to have received SUD treatment in a residential setting (adjusted OR = 2.17). However, relative to the national comparison sample, RHS students were less likely to have received SUD treatment in a residential setting (adjusted OR = 0.30) and more likely to have received SUD treatment in an intensive outpatient or outpatient setting (adjusted ORs = 10.00, 6.25, respectively).

3.2. Post-SUD Discharge Adjustment Characteristics

Table 3 compares the RHS, local comparison, and national comparison samples on a range of social support, academic and employment, physical health, and delinquency and risk behavior adjustment characteristics measured after discharge from SUD treatment.

Relative to the national comparison sample, students attending RHSs reported significantly lower levels of spiritual social support (adjusted $d = -0.38$), but higher levels of general social support (adjusted $d = 0.32$). There were no significant differences between the RHS and local comparison samples on the two measures of social support.

As shown in Table 3, students attending RHSs reported significantly more days of school attendance than both the local and national comparison samples (adjusted $ds = 0.55, 0.23$, respectively). Otherwise, there were minimal differences across the three samples in terms of post-SUD discharge academic and employment characteristics.

In terms of physical health characteristics, students attending RHSs reported consistently higher levels of physical health problems than students in the national comparison sample. For instance, RHS students reported more days bothered by health problems, days where health problems affected their responsibilities, and days where they took a prescribed medication for a health problem. Students enrolled in RHSs also reported more frequent trips to outpatient health providers, and more frequent outpatient surgical procedures. Relative to the local comparison sample, RHS students also reported significantly more days

bothered by health problems (adjusted $d = 0.51$), but fewer days spent in the hospital (adjusted $d = -0.43$).

As shown in the last panel of Table 3, there were differences across the three samples in reported rates of delinquency and risk behavior, but only minimal differences in levels of involvement with the criminal justice system. Relative to the local comparison sample, students attending RHSs reported significantly fewer days of illegal activity to obtain drugs (3 vs. 6 days; adjusted $d = -0.43$), fewer days of intoxicated illegal activity (3 vs. 7 days; adjusted $d = -0.62$), and fewer arrests (0.08 vs. 0.30 days; adjusted $d = -0.31$). Relative to the national comparison sample, students attending RHSs reported significantly more days of illegal activity (8 vs. 4 days; adjusted $d = 0.31$) and more days of illegal activity to obtain drugs (3 vs. 1 day; adjusted $d = 0.41$), but significantly fewer days on probation (12 vs. 45 days; adjusted $d = -0.60$). There were no other statistically significant differences between the RHS sample and national comparison sample in terms of days on parole, days in juvenile detention, days in jail/prison, days on house arrest, or days on electronic monitoring.

4. Discussion

This study examined the demographic, family background, social support, and adjustment characteristics of 171 adolescents who enrolled in recovery high schools (RHSs) after substance use disorder (SUD) treatment. We compared the characteristics of those RHS students to a local sample of 123 adolescents who could have attended RHSs but chose not to, as well as a national comparison sample of 12,967 U.S. adolescents who received SUD treatment. Students who chose to enroll in RHSs had high levels of risk for substance use and substance use relapse – these adolescents lived in families with histories of substance use and mental health problems, had high rates of prior substance use and prior treatment for substance use and mental health conditions, and had high rates of physical health problems. Indeed, students attending RHSs often had starkly elevated levels of risk relative to the national comparison sample (and in some cases, the local comparison sample). These findings document the characteristics of youth who choose to enroll in RHSs when they are available in the community, and demonstrate how RHS students may vary (or not) from other adolescents in recovery from SUDs. As such, these study findings should provide valuable information for substance use treatment providers, educators, and researchers interested in continuing care options for adolescents in recovery from SUDs.

Providers tasked with developing and implementing therapeutic programming offered at RHSs must attend to the unique relapse risks faced by their adolescent clients (Tims et al., 2002). For instance, this sample of RHS students reported high rates of physical and mental health problems, tobacco dependence, and unprotected sexual activity. Thus, RHSs may want to consider incorporating activities and services aimed at promoting youth's overall well-being, such as providing routine wellness exams, referral to community health services, use of integrated care models (Butler et al., 2008), sexual risk reduction programming (Prendergast, Urada, & Podus, 2001; Tross et al., 2008), and tobacco cessation programming (Hall & Prochaska, 2009). Indeed, despite the high prevalence of co-occurring tobacco use and substance use disorders, tobacco use is not always adequately addressed in adolescent treatment settings (Chun, Guydish, & Chan, 2007; Knudsen, 2009), and thus youth may

need additional supports for tobacco cessation after they leave treatment. Because RHSs serve as an important continuing care option for adolescents in recovery from SUDs, such integrated and holistic care models are likely needed to effectively address the myriad issues facing these youth.

The findings from this study also indicated that students enrolled in RHSs often had family members with substance use and/or mental health problems, which are important risk factors for subsequent substance use and relapse rates (Stone, Becker, Huber, & Catalano, 2012). However, RHS students also reported high levels of social support from families, friends, and coworkers, which could be a protective factor to help promote recovery and reduce relapse. Thus, in addition to providing programming designed to bolster supportive connections within families, RHSs may want to consider collaborating with community mental health and substance use treatment providers to enhance family services. Particular emphasis should be placed on evidence-based family-centered treatment approaches that have been shown to be effective such as Brief Strategic Family Therapy, Family Behavior Therapy, Functional Family Therapy, Multidimensional Family Therapy, or Multisystemic Therapy (Hogue, Henderson, Ozechowski, & Robbins, 2014; Tanner-Smith et al., 2013; van der Stouwe, Asscher, Stams, Dekovi, & van der Laan, 2014).

Despite the fact that approximately 40 RHSs are currently operating in the United States (ARS, 2016b), and the RHS model has been adapted internationally (Lin, Lu, & Wu, 2017), limited empirical research documents the types of students who attend RHSs after SUD treatment. While earlier research has described general characteristics of RHS students (Moberg & Finch, 2007; Moberg et al., 2014), to our knowledge, this is the first study to compare RHS students with local and national comparison samples of adolescents who received SUD treatment. The strengths of this study are therefore the large sample size of RHS students (one of the largest samples of RHS students to date), the wide range of background and social functioning characteristics examined, and the use of both local contemporaneous and national comparison samples of adolescents.

Nonetheless, there are several limitations to the current study that should be acknowledged. First, the samples in this study were not intended to be representative of all U.S. adolescents in recovery from SUDs. Students in the RHS and local comparison samples were only recruited from three U.S. states (Minnesota, Texas, and Wisconsin, representing about 30% of all RHSs in the US); thus, these are not a representative sample of all RHS students in the United States or in other countries. The GAIN national comparison sample was not a nationally representative sample either, and was largely collected in public sector agencies (see Hunter, Griffin, Booth, Ramchand, & McCaffrey, 2013). Indeed, students of color and students of lower socioeconomic status were underrepresented in the RHS and local comparison samples, but over-represented in the GAIN national comparison sample. Thus, it is premature to conclude that the findings from this study will generalize to more diverse samples of RHS students. Despite the limited generalizability of these three samples, the findings from the current study are nonetheless instructive given the overall dearth of prior empirical literature on RHSs. Future studies will be needed to examine results with larger and more diverse groups of RHS students and non-RHS comparison samples.

Another limitation of the current study is the difference in measurement assessment timing in the local and national samples. In the RHS and local comparison samples, measurement occurred after discharge from SUD treatment and thus all pre-treatment characteristics were based on students' retrospective reports of periods prior to treatment entry. In the GAIN national comparison sample, pre-treatment characteristics were measured at the time of entry into SUD treatment but also reflect the period prior to that date. The period of reference for the post-discharge measures could also vary across the two samples, given variability in treatment duration across participants. We attempted to address these issues by categorizing variables as either pre-treatment or post-discharge measures, but acknowledge the differences in measurement timing across the two samples. Future research will be needed to examine these issues using more consistent measurements and outcome time frames across samples.

Finally, because this study relied on secondary analyses of existing data, we were unable to compare the three samples on all relevant adjustment and functioning characteristics. Because we only examined the pre-treatment and post-discharge measures that could be harmonized across samples, we may have failed to examine other important client characteristics such as lifetime psychiatric comorbidities, trauma history, and readiness to change.

Despite these limitations, the current study is the first to provide an in-depth comparison of adolescents attending RHSs with (1) a local comparison sample of students who had the opportunity but did not attend an RHS and (2) a national comparison sample of youth receiving SUD treatment. The findings from this study should assist practitioners by highlighting the complex set of relapse risk factors faced by adolescents enrolled in RHSs, and thus the unique continuing care needs of these youth. These results should also advance the field's understanding of who participates in adolescent SUD specialty services, and may thus contribute to future policy development regarding optimal treatment and recovery support services.

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Andrew Finch declares that he is a non-voting unpaid board member for the Association of Recovery Schools, but he will receive no financial benefit from the findings published in this article. D. Paul Moberg declares that he is an unpaid board member for a private nonprofit recovery high school, but he will receive no financial benefit from the findings published in this article.

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Highlights

- Recovery high school (RHS) students report higher rates of pre-treatment drug use compared to local and national samples of youth who received treatment for substance use disorders.
- RHS students report higher rates of mental health treatment compared to a national sample of youth in treatment for substance use disorders.
- RHS students report more post-treatment health problems compared to a national sample of youth in treatment for substance use disorders.
- RHS students report less criminal justice involvement but more criminal activity compared to a national sample of youth in treatment for substance use disorders.

Table 1

Descriptions of Study Measures

Measure	Description
Background Characteristics (Pre-Treatment)	
Age	Age group in years (13-14, 15-16, 17-18)
Sex	Male, Female
Race/ethnicity	Non-Hispanic African-American, Hispanic, Non-Hispanic White, Other
High school grade point average (GPA)	Past year GPA: 0 = Mostly Fs, 1 = Mostly Ds, 2 = Mostly Cs, 3 = Mostly Bs, 4 = Mostly As
Any mental health diagnosis	Past year psychiatric mental health diagnosis: Yes, No
Family Characteristics (Pre-Treatment)	
Health insurance status	Any vs. none; Private insurance vs. not
Single parent household	Current family structure: Yes, No
Family history of: substance use, substance use treatment, mental health problems	Any family history: Yes, No
Substance Use History (Pre-Treatment)	
Ever used: alcohol to intoxication, marijuana, amphetamines, cocaine/crack, opioids/narcotics, hallucinogens, PCP, inhalants	Any lifetime history: Yes, No
Days used: alcohol, marijuana, other illicit drugs	Number of days used in 90 days prior to treatment; collected using Timeline Followback method.
Tobacco dependence	Past-year diagnosable disorder based on DSM-IV criteria: Yes, No
Alcohol use disorder	Collected in the RHS and local comparison samples using the M.I.N.I. Structured Clinical Interview (Sheehan, Janavs, Baker, Harnett-Sheehan, Knapp, & Sheehan, 1999); collected in the GAIN national comparison sample using the Global Appraisal of Individual Needs – Initial (GAIN-I).
Substance use disorder	
Treatment Service History (Post-Discharge)	
Number of SUD treatment episodes	Lifetime number of treatment episodes
Ever received: residential SUD treatment, intensive outpatient SUD treatment, outpatient SUD treatment, treatment for mental health or psychological problems	Any lifetime history: Yes, No
Social Support (Post-Discharge)	
Spiritual Social Support Index	Summative index of seven items ($ICC = .856$, GAIN Coordinating Center, 2013b), collected using the GAIN-90.
General Social Support Index	Summative index of nine items ($ICC = .642$, GAIN Coordinating Center, 2013b), collected using the GAIN-90.
Academics and Employment (Post-Discharge)	
Days: attended school, absent from school, employed/worked, absent from work	Days out of the past 90 days. Collected using the GAIN-90.

Measure	Description
Physical Health (Post-Discharge)	
Times: in emergency room, saw a doctor in an office or outpatient clinic, had an outpatient surgical procedure	Times/days out of the past 90 days. Collected using the GAIN-90.
Days: bothered by health problems, health problems affected responsibilities, spent in hospital, on a prescribed medication for a health problem	
Delinquency and Risk Behavior (Post-Discharge)	
Days involved in: illegal activity, illegal activity to obtain alcohol or other drugs, illegal activities while intoxicated	Times/days out of the past 90 days. Collected using the GAIN-90.
Times arrested	
Days on or in: probation, parole, juvenile detention, jail/prison, house arrest, electronic monitoring	
Times had unprotected sex	

Table 2

Adjusted Group Contrasts									
	Recovery High School (<i>n</i> = 171)		Local Comparison (<i>n</i> = 123)		National Comparison (<i>n</i> = 12,967)		Wald Test	RHS vs. Local	RHS vs. National
	Mean or %	(SE)	Mean or %	(SE)	Mean or %	(SE)	<i>F</i>	OR or <i>d</i>	OR or <i>d</i>
Background Characteristics									
Age 13-14	2.92	%	9.84	%	15.28	%	8.33*	0.28	0.18*
Age 15-16	42.69	%	48.36	%	58.22	%	9.83*	0.81	0.54*
Age 17-18	54.39	%	41.80	%	26.49	%	32.64*	1.61	3.13*
Male	51.46	%	59.84	%	73.23	%	16.15*	0.71	0.44*
African-American	4.09	%	4.88	%	15.07	%	9.86*	0.87	0.26*
Hispanic	5.26	%	12.20	%	29.95	%	21.96*	0.43	0.15*
White	85.96	%	77.24	%	36.51	%	80.78*	1.69	9.09*
Other race/ethnicity	4.68	%	5.69	%	18.48	%	15.61*	0.79	0.20*
High school grade point average (past year)	2.50	(0.08)	2.37	(0.09)	2.07	(0.01)	9.25*	0.08	0.29*
Any mental health diagnosis (past year)	59.65	%	54.10	%	55.48	%	0.48	1.20	1.01
Family Characteristics									
Any health insurance	97.34	%	90.12	%	76.55	%	9.92*	3.57	7.69*
Private health insurance	72.51	%	67.21	%	37.36	%	9.66*	1.11	2.70*
Single parent household	49.12	%	53.28	%	47.88	%	6.84*	0.94	1.52*
Family history of substance use	85.96	%	90.16	%	72.14	%	8.98*	0.61	1.75
Family history of substance use treatment	52.05	%	56.56	%	21.68	%	51.41*	0.80	3.13*
Family history of mental health problems	70.76	%	73.77	%	34.97	%	41.63*	0.74	3.03*
Substance Use History									
Ever used alcohol to intoxication	95.32	%	92.62	%	63.85	%	32.28*	1.52	9.09*
Ever used marijuana	100.00	%	100.00	%	78.06	%	nc		

Notes. SE = standard error of mean; F = omnibus test for equality of regression coefficients contrasting RHS, local comparison, and national comparison groups; d = standardized mean difference effect size for pairwise group contrast shown in italics; OR = odds ratio effect size for pairwise group contrast; ne = model not estimable due to perfect prediction/complete separation. All adjusted group contrasts estimated from logistic or linear regression models controlled for age, sex, and race/ethnicity, pooled across 20 multiply imputed datasets.

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Table 3

Adjustment Characteristics of Recovery High School, Local Comparison, and National Comparison Samples after Treatment Discharge

	Adjusted Group Contrasts					
	Recovery High School (<i>n</i> = 171)			National Comparison (<i>n</i> = 123)		
	Mean	(SE)	Mean	(SE)	Mean	(SE)
Social Support						
Spiritual Social Support Index	1.17	(0.16)	1.84	(0.20)	2.31	(0.04)
General Social Support Index	8.17	(0.09)	8.08	(0.11)	7.28	(0.04)
<i>Academics and Employment (past 90)</i>						
Days attended school	44.35	(1.52)	32.57	(2.10)	40.58	(0.21)
Days absent from school	5.08	(0.65)	8.32	(1.29)	5.31	(0.10)
Days worked	13.20	(1.47)	13.61	(1.63)	8.54	(0.15)
Days absent from work	0.93	(0.53)	0.40	(0.05)	0.34	(0.02)
<i>Physical Health (past 90)</i>						
Times in emergency room	0.23	(0.05)	0.26	(0.05)	0.11	(0.01)
Days bothered by health problems	21.31	(2.35)	14.16	(2.36)	4.06	(0.12)
Days health affected responsibilities	4.02	(0.86)	3.29	(0.91)	1.34	(0.05)
Days in hospital	0.22	(0.07)	0.49	(0.17)	0.04	(0.01)
Days on prescribed medication	16.71	(2.43)	13.60	(2.53)	5.73	(0.18)
Times saw outpatient providers	1.42	(0.25)	1.09	(0.18)	0.69	(0.02)
Times had outpatient surgery	0.08	(0.02)	0.05	(0.03)	0.02	(0.00)
<i>Delinquency and Risk Behavior (past 90)</i>						
Days of illegal activity	8.20	(1.28)	11.97	(1.88)	4.42	(0.14)
Days of illegal activity to get drugs	3.06	(0.78)	5.59	(1.39)	0.71	(0.05)
Days of intoxicated illegal activity	2.87	(0.74)	7.36	(1.52)	1.26	(0.07)
Times arrested	0.08	(0.03)	0.30	(0.07)	0.20	(0.01)
Days on probation	12.28	(2.28)	23.73	(3.47)	45.48	(0.42)

	Adjusted Group Contrasts					
	Recovery High School (<i>n</i> = 171)		Local Comparison (<i>n</i> = 123)		National Comparison (<i>n</i> = 12,967)	
	Mean	(SE)	Mean	(SE)	Mean	(SE)
<i>Social Support</i>						
Days on parole	0.53	(0.53)	0.74	(0.74)	0.95	(0.09)
Days in juvenile detention	0.99	(0.49)	1.84	(0.70)	2.95	(0.11)
Days in jail/prison	0.09	(0.08)	0.06	(0.06)	0.75	(0.06)
Days on house arrest	0.44	(0.23)	1.60	(0.85)	1.84	(0.10)
Days on electronic monitoring	0.23	(0.14)	1.34	(0.81)	1.06	(0.08)
Times had unprotected sex	5.43	(0.97)	6.15	(1.57)	2.72	(0.11)
					<i>F</i>	<i>d</i>
					0.28	-0.03
					0.54	-0.04
					0.98	0.00
					0.80	-0.09
					0.57	-0.12
					5.51	-0.09
						0.16

Notes. *SE* = standard error of mean; *F* = omnibus test for equality of regression coefficients contrasting RHS, local comparison, and national comparison groups; *d* = standardized mean difference effect size for pairwise group contrast shown in italics; *ne* = model not estimable due to perfect prediction/complete separation. All adjusted group contrasts estimated from linear regression models controlled for age, sex, and race/ethnicity, pooled across 20 multiply imputed datasets.

* $p < .01$.