HHS Public Access

Author manuscript

Drug Alcohol Depend. Author manuscript; available in PMC 2017 February 01.

Published in final edited form as:

Drug Alcohol Depend. 2016 February 1; 159: 61–65. doi:10.1016/j.drugalcdep.2015.11.007.

Visual and Verbal Learning Deficits in Veterans with Alcohol and Substance Use Disorders

Morris D. Bell[1,2], **Nicholas A. Vissicchio**[2], and **Andrea J. Weinstein**[1,2]

[1]Yale University School of Medicine, Dept. of Psychiatry, 300 George Street, Suite 901, New Haven, CT 06511 USA

[2]Department of Veterans Affairs, Rehabilitation Research and Development Service, 950 Campbell Ave, West Haven, CT 06516 USA

Abstract

Background—This study examined visual and verbal learning in the early phase of recovery for 48 Veterans with alcohol use (AUD) and substance use disorders (SUD, primarily cocaine and opiate abusers). Previous studies have demonstrated visual and verbal learning deficits in AUD, however little is known about the differences between AUD and SUD on these domains. Since the DSM-5 specifically identifies problems with learning in AUD and not in SUD, and problems with visual and verbal learning have been more prevalent in the literature for AUD than SUD, we predicted that people with AUD would be more impaired on measures of visual and verbal learning than people with SUD. Methods: Participants were enrolled in a comprehensive rehabilitation program and were assessed within the first 5 weeks of abstinence. Verbal learning was measured using the Hopkins Verbal Learning Test (HVLT) and visual learning was assessed using the Brief Visuospatial Memory Test (BVMT).

Results—Results indicated significantly greater decline in verbal learning on the HVLT across the three learning trials for AUD participants but not for SUD participants (F=4.653, df =48, p=. 036). Visual learning was less impaired than verbal learning across learning trials for both

Corresponding Author: Morris D. Bell, Psychology Service 116B, VA Connecticut Healthcare System, 950 Campbell Avenue, West Haven, CT 06516 USA, morris.bell@yale.edu.
Secondary Authors:
Nicholas A. Vissicchio- same mailing address as corresponding author, vissicch@yahoo.com
Andrea J. Weinstein- same mailing address as corresponding author, andrea.weinstein@yale.edu

Contributors

Morris Bell, Ph.D. is the principal investigator for this NIDA study, was responsible for its scientific integrity, performed some of the data analyses, interpreted results and was primary author of this manuscript.
Nicholas Vissicchio, BA participated in data analyses and manuscript preparation.
Andrea Weinstein, M.A., C.R.C. was project coordinator for the study, responsible for data integrity, participated in results interpretation and manuscript preparation.
All authors reviewed and approved this article.

Conflict of Interest

No conflict declared.

diagnostic groups (F=0.197, df=48, p=.674); there was no significant difference between groups on visual learning (F=0.401, df=14, p=.538).

Discussion—Older Veterans in the early phase of recovery from AUD may have difficulty learning new verbal information. Deficits in verbal learning may reduce the effectiveness of verbally-based interventions such as psycho-education.

Keywords

Verbal Learning; Visual Learning; Alcohol Use Disorders; Substance Use Disorders; Neurocognition

1. INTRODUCTION

The first few weeks of abstinence are particularly difficult for people in recovery from substance use disorders. In this early phase of a rehabilitation program, people are attempting to learn concepts and skills for sustaining sobriety by participating in psychoeducational classes and group experiences. These methods heavily rely on the capacity for new learning. Unfortunately, this new learning occurs at a time when verbal and visual learning deficits may interfere with these rehabilitation methods. In the current study, we examined these deficits in verbal and visual learning in a cohort of U.S. military Veterans first entering substance abuse rehabilitation programs. We determined the severity of these impairments as well as differences in the pattern of deficits between Veterans with alcohol use disorders and those with primarily cocaine or opioid use disorders.

1.1 Visual learning and memory deficits in AUD and SUD

Impairments in visual learning are consistently found in abusers of alcohol. One study from 1996 found that alcohol abusers had impaired spatial scanning and memory as compared to controls (Beatty et al., 1996). Another study from the same year found that deficits in visual learning were similar among short-term and long-term abstinent alcohol abusers, showing that deficits in visual learning persist throughout recovery (Schandler et al.,1996). Another more recent study found that women who abuse alcohol performed worse than age-matched controls on measures of visual learning and visuospatial construction (Fama et al., 2006). Two other studies performed by Sullivan and colleagues found similar results as well (Sullivan, 2000; Sullivan et al., 2002).

Studies have shown that abusers of a variety of illicit substances are usually more impaired than controls on measures of visual learning and memory. However, visual learning deficits in AUD are more prevalent in the literature than deficits in SUD. Since most of the people in this study abused cocaine and opiates, only these two substances were taken into consideration when searching the literature. One study found that abusers of cocaine performed worse than controls on the Rey Complex Figure Test (RCFT), a measure of visuospatial construction (Meade et al., 2011). As for opiates, one study showed that people that abused opiates performed more poorly than controls on a measure assessing visual learning because they required more trials than controls to master the visual memory task (Ersche et al., 2006). Another study demonstrated that opiate dependent individuals performed worse than controls on a measure of visual learning (Messinis et al., 2006). A

third study found that abstinent opioid abusers and current methadone users performed worse than controls on the BVRT, a measure of visual memory (Prosser et al., 2006).

1.2 Verbal learning and memory deficits in AUD and SUD

Deficits in verbal learning are consistently observed in abusers of alcohol. One early study found that abusers of alcohol performed worse than age-matched controls on the California Verbal Learning Test (CVLT), a measure of verbal learning and memory (Kramer et al., 1989). In 2009, Loeber and colleagues found a significant correlation between duration of lifetime dependence on alcohol and performance on a verbal learning task (Loeber et al., 2009). A recent study conducted by Sneider and colleagues found that binge drinkers performed significantly worse than light drinkers on the CVLT (Sneider et al., 2013).

Deficits in verbal learning are common in abusers of cocaine. An older study from 1993 (Mittenberg and Motta, 1993) determined that cocaine abusers had impaired verbal learning when compared to controls, as demonstrated by poor performance on trial 5 of the CVLT. Gillen and colleagues found that cocaine abusers performed more poorly than controls on measures of verbal memory (Gillen et al., 1998). Another more recent study demonstrated again that cocaine abusers performed worse than controls on trial 5 of the CVLT (Reske et al., 2010). Less research has been done on opiates and verbal learning, but opiate users tend to do worse than controls on neuropsychological measures (Rogers and Robbins, 2001). The study cited previously about opiate users and visual learning found verbal learning deficits when comparing opiates to controls (Messinis et al., 2006).

1.3 Comparisons of AUD and SUD on visual and verbal learning and memory

Studies comparing visual learning performance in long-term alcohol abusers to abusers of other substances have yielded inconsistent findings. A study done by Hanson et al. (2011) revealed that heavy stimulant use predicted poorer visual learning and memory during a 10-year longitudinal study. Alcohol use did not have this predictive effect. A study that compared alcohol abusers to heroin addicts after three weeks of detoxification in an inpatient unit found that alcohol-abusing subjects were more impaired on measures of visual learning (Fishbein et al., 2007). Beatty and colleagues compared alcohol abusers that also abused other substances to abusers of alcohol alone on measures of visual learning. There were no significant differences in visual learning between people that abused only alcohol and people that abused alcohol and other drugs (Beatty et al., 1996).

Only a few studies have compared verbal learning deficits in chronic alcohol abusers to abusers of other substances, and these studies have yielded mixed results as well. One study (Selby and Azrin, 1998) comparing abstinent alcohol abusers to abstinent cocaine abusers and abstinent polysubstance abusers found that people in the alcohol dependence group performed significantly worse on the Rey Auditory Verbal Learning Test (RAVLT) trial 5 and delay trial than people who were dependent on cocaine. Length of abstinence from alcohol was also correlated with performance on the RAVLT, whereas length of abstinence from cocaine was not. Polysubstance abusers performed significantly worse on the RAVLT than both the cocaine and alcohol abusers. One study that contradicted these findings (Bolla et al., 2000) reported a significant negative correlation between lifetime cocaine abuse and

performance on the RAVLT. Lifetime alcohol abuse was not correlated with performance on the RAVLT. A third study (Bondi et al.,1998) compared polysubstance abusers with concurrent alcohol abuse to abusers of alcohol alone in the early phase of a drug treatment program. The polysubstance abusers performed significantly worse than the alcohol abusers on the CVLT total recall and trial 5 recall. However, there was no significant difference in the learning slopes between the two groups.

The present study attempts to shed light on these inconsistent findings by examining visual and verbal learning deficits in a cohort of Veterans with substance use disorders within the first two months of abstinence. A recent review (Ridley et al., 2013) of alcohol- related dementia points out that verbal and visual learning are both commonly impaired, and that visual learning may take longer to recover from after sustained abstinence than verbal learning. The DSM-5 includes the diagnosis of substance-induced major or mild neurocognitive disorder with criteria that includes persistence of the deficit beyond acute withdrawal, and in the case of alcohol use disorders, it specifically identifies problems in memory and learning (American Psychiatric Association, 2013). The DSM-5 specifically cites problems with learning in alcohol use disorders and not in abusers of cocaine or opiates, which are the primary substances of abuse in the SUD group. There is also an extensive literature for visual and verbal learning deficits in alcohol use disorders, and the literature is much sparser for abusers of other substances, especially for opiates and verbal learning deficits. Given the extent of previous research on neurocognitive impairment in AUD as well as the DSM-5 statements about learning deficits in AUD specifically, we hypothesized that Veterans who abused alcohol would be impaired on measures of verbal and visual learning relative to published norms and that their impairments would be significantly greater than abusers of cocaine and opiates.

2. MATERIALS AND METHODS

2.1 Participants

US Veterans 18 years of age and older (Table 1) were recruited for a randomized clinical trial of cognitive training and work therapy (NCT 01410110) by referral from clinicians at a VA substance abuse program, including a 21 day substance abuse day program and a 30 day residential program. Recruitment began in January, 2011 and was completed in March, 2014. Eighty-seven participants were assessed for eligibility and consented. Exclusion criteria included untreated psychotic disorder, current use of opioids or benzodiazepines, a legal case that might lead to incarceration, a living arrangement that would interfere with participation and the presence of a developmental disability or medical illness that might significantly compromise cognition or prevent work activity. Ten did not meet inclusion criteria, 6 declined to complete the intake, and 23 were excluded for other reasons such as moving away or participating in other vocational programs that were not part of the study. Forty-eight participants were included in the study. Twenty-nine participants primarily abused alcohol, 14 primarily abused either opiates or cocaine, and the remaining 5 participants were polysubstance abusers that had more than one primary drug of abuse in addition to alcohol.

2.2 Measures

2.2.1 Mini International Neuropsychiatric Interview (MINI)—The MINI is a short diagnostic structured interview used to diagnose different types of Axis I psychiatric disorders using the DSM-IV criteria, as well as suicidality and antisocial personality disorder. The interviewer asks the participants a series of yes or no questions to determine the presence of a disorder (Sheehan et al., 1998).

2.2.2 Addiction Severity Index (ASI)—This is used to determine the extent to which alcohol and drug abuse has affected the participant's life. There are seven different aspects of everyday life: medical, employment, alcohol, drug, legal, family/social, and psychiatric problems. Frequency of use of alcohol and drugs of abuse are recorded for the prior 30 days and throughout the lifetime of the participants (McLellan et al., 1980).

2.2.3 Wechsler Test of Adult Reading (WTAR)—This is a neuropsychological assessment used as a baseline test of intelligence. In the test, the examiner asks the participant to pronounce 50 irregularly-spelled words. Each of these words does not follow grammatical rules, and thus cannot be sounded out. The test is discontinued following twelve consecutive incorrect pronunciations of words or until all 50 words are sounded out. This is an excellent test of verbal ability as well as a good measure of IQ (Holdnack, 2001).

2.2.4 Hopkins Verbal Learning Test Revised (HVLT)—The HVLT is a test used to assess verbal learning and memory. The test consists of a list of twelve nouns that come from three different semantic categories. The tester reads the list of twelve words aloud to the participant. The participant then attempts to recall as many words as possible from this list. The list is then read aloud two more times, and each time the participant tries to recall as many words as possible, including words that have already been mentioned previously. There is a total of three learning blocks (Brandt et al., 2001).

2.2.5 Brief Visuospatial Memory Test (BVMT)—The BVMT is a test of visual learning abilities and visual memory. The participant is shown a piece of paper that includes six geometric figures for 10 seconds. The participant is then asked to draw each of the six figures from memory in their correct locations on the page. This process is repeated two more times for a total of three learning blocks. For the purposes of this study, neither the delay trial nor the recognition trial were administered (Benedict, 1997).

2.3 Procedures

Following consent procedures approved by the local IRB, 48 participants were assessed on a battery of neurocognitive tests at baseline including the HVLT and BVMT. Substance use was determined based upon chart review, MINI structure interview and the ASI. Participants were administered urine toxicology screens and breathalyzer tests, and were asked about substance abuse in the prior week. They were not administered baseline assessments if they used substances in the previous 7 days. The HVLT and BVMT, as well as the other assessments, were scored using standard scoring procedures. For the baseline data, the raw scores from each block of these tests were converted to age corrected T-scores to compare performance to an age-matched healthy sample.

2.4 Analyses

Two-way repeated measures ANOVAs were performed on the baseline HVLT data to compare the two substance abuse groups (alcohol, cocaine/opiates) across the three learning blocks to test for a group-by-block linear interaction. This procedure was repeated for the BVMT. Separate analyses looking at each substance abuse group separately were then used to examine the learning slopes within each group for HVLT and BVMT. Alpha was set at .05 and all tests were two-tailed.

3. RESULTS

Repeated Measures ANOVAs for the HVLT looking at between-group effects revealed a significant two-way interaction of time by drug abuse group (F=4.653, df =48, p=.036; see Figure 1). The alcohol abusers showed a linear negative slope across the three time points of the HVLT, while the other substance abusers did not. The same analysis using BVMT scores did not show a significant effect of time by drug abuse group (F=0.197, df=48, p=.674).

Separate analyses to determine within-group effects revealed that the alcohol group demonstrated a significant decline in T-scores (Time effect) across the three learning blocks when HVLT and BVMT scores were both included in the model (F=6.727, df= 34, p=.002); and there was a significant time by test linear interaction (F=4.328, df=34, p=.045). The Alcohol group showed a significant linear decline for HVLT when tested alone (F=13.641, df= 34, p=.001). Their scores on the first learning block of the HVLT were on average approximately 1 SD below age-corrected norms. Verbal learning for the AUD group was so profoundly impaired that by the third block this group was performing almost 2 SD's below age-corrected norms. The SUD group did not show a significant decline across the 3 learning blocks of the HVLT (F=0.020, df=14, p=.890); and there was no difference between HVLT and BVMT slopes (F=0.401 df=14, p=.538). For the BVMT, norm-based T-scores did not show a significant decline across the three training blocks for either group.

The analyses used in this paper included the 5 polysubstance abusers in the alcohol group. Analyses were also run excluding polysubstance abusers. The interaction of time by drug abuse group for HVLT remained significant (F=5.200, df=43, p=.028), and alcohol abusers still displayed a linear negative slope. After excluding the polysubstance abusers, the BVMT data still did not yield a significant group difference. Separate analyses for AUD alone and SUD alone on their HVLT and BVMT scores excluding the polysubstance abusers yielded the same pattern of results as when they were added to the alcohol group.

4. DISCUSSION

4.1 Conclusions

In this study, participants with AUD in the early phase of recovery were found to have profound deficits in verbal learning as measured by the HVLT. The disparity in learning between the AUD and SUD groups was much less pronounced for learning in the visual modality as assessed by the BVMT. Participants with SUD showed approximately the same performance on the first learning block of the HVLT as those with AUD, but they did not

demonstrate the profound learning deficit over the next two learning blocks that were observed for those with AUD.

These findings have important treatment implications, especially for older Veterans in the early phase of recovery from AUD. Individuals recovering from long histories of alcohol abuse and dependence will have considerable difficulty remembering new verbally-presented information, such as the kind of material usually presented in psychoeducational approaches. Learning is central to rehabilitation, and learning can occur in ways other than verbally-presented information. The implicit learning that occurs through social modeling and role-playing can be effective even when verbal learning is impaired. AA has long used mnemonics and catchy phrases to convey more complex concepts (e.g., T-T-T: Things take time; Let go, let God; etc…) because of an intuitive understanding of the need to teach in ways that do not rely exclusively on verbal learning.

In our current research, we are examining the impact of cognitive remediation strategies to facilitate recovery of verbal learning and other impaired cognitive processes that may accompany substance use disorders. Cognitive remediation may be able to enhance verbal learning in people in the early phase of treatment for substance use disorders, and thus may help provide the cognitive skills required for recovery and long-term abstinence.

4.2 Limitations

There are several limitations to this study. The sample size is small and limited primarily to older, treatment-seeking Veterans who were interested in a comprehensive rehabilitation program that included work therapy. Such Veterans have many co-morbidiites such as post-traumatic stress disorder (Richardson et al., 2010), which were not controlled for. Since most of these participants were men, generalizability is restricted. There was no matching for age, years of use or gender and the AUD group was older than the SUD group; however age-corrected norms were used, and matching for gender was not possible because there was only one female in the AUD group and two in the SUD group. The SUD population was a heterogeneous group in terms of substances abused, and the small size of the group did not allow us to compare the various drugs of abuse within this group. There was no control group, however age-corrected norms were used to compare scores to a healthy, age-matched population. There was also some variation in length of sobriety before beginning testing although there was no difference between AUD and SUD groups on that variable. Similarly level of fatigue or the time of day of test administration may have had some effect on individual performance but such variance is at random and should have no differential effect by group or by type of test.

Another limitation is that assessments are based on a single measure of verbal learning and a single measure of visual learning. The HVLT and BVMT are well accepted measures of the underlying constructs of verbal and visual learning, but these instruments do not provide context for memory acquisition, as is the case with story recall (episodic memory) tasks. However, there is no standardized test available that repeats a story three times asking for details after each presentation, so we cannot know to what extent these deficits in verbal learning might be reduced by story context. Nevertheless, it is important to recognize that the severity of the deficits is most apparent on the third presentation of the HVLT, and that

the standard practice of reporting HVLT in terms of the total of the three trials obscures just how discrepant verbal learning really can be from normal performance.

4.3 Future Directions

We hope that this study will increase scientific interest concerning these verbal learning deficits. The HVLT provides a number of versions so that repeated assessments over time will be less influenced by previous exposure to the test. Future studies may examine the extent of improvement over time with abstinence, predictors of such improvement, and the role that cognitive training programs may play in speeding up or increasing the recovery of lost verbal learning ability.

Acknowledgments

Role of Funding Source

This study was funded by a grant from the National Institute for Drug Abuse (NIDA) and is registered on Clinicaltrials.gov (NCT 01410110).

Morris Bell, Ph.D. is supported by a Senior Research Career Scientist Award from the Rehabilitation Research and Development Service, Department of Veterans Affairs.

References

American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. APA; Arlington: 2013. p. 650

Beatty WW, Hames KA, Blanco CR, Nixon SJ, Tivis LJ. Visuospatial perception, construction and memory in alcoholism. J Stud Alcohol. 1996; 57:136–143. http://dx.doi.org/10.15288/jsa.1996.57.136. [PubMed: 8683962]

Benedict, RH. Brief Visuospatial Memory Test-Revised Professional Manual. Psychological Assessment Resources; Odessa, FL: 1997.

Bolla KI, Funderburk FR, Cadet JL. Differential effects of cocaine and cocaine alcohol on neurocognitive performance. Neurology. 2000; 54:2285–2292. http://dx.doi.org/10.1212/wnl.54.12.2285. [PubMed: 10881254]

Bondi MW, Drake AI, Grant I. Verbal learning and memory in alcohol abusers and polysubstance abusers with concurrent alcohol abuse. J Int Neuropsychol Soc. 1998; 4:319–328. [PubMed: 9656605]

Brandt, J.; Benedict, RH. Hopkins Verbal Learning Test Professional Manual. Psychological Assessment Resources, Inc; Lutz, FL: 2001.

Ersche KD, Clark L, London M, Robbins TW, Sahakian BJ. Profile of executive and memory function associated with amphetamine and opiate dependence. Neuropsychopharmacology. 2006; 31:1036–1047. http://dx.doi.org/10.1038/sj.npp.1300889. [PubMed: 16160707]

Fama R, Pfefferbaum A, Sullivan EV. Visuoperceptual learning in alcoholic Korsakoff syndrome. Alcohol Clin Exp Res. 2006; 30:680–687. http://dx.doi.org/10.1111/j.1530-0277.2006.00085.x. [PubMed: 16573587]

Fishbein DH, Krupitsky E, Flannery BA, Langevin DJ, Bobashev G, Verbitskaya E, Augustine CB, Bolla KI, Zvartau E, Schech B, Egorova V, Bushara N, Tsoy M. Neurocognitive characterizations of Russian heroin addicts without a significant history of other drug use. Drug Alcohol Depend. 2007; 90:25–38. http://dx.doi.org/10.1016/j.drugalcdep.2007.02.015. [PubMed: 17382488]

Gillen RW, Kranzler HR, Bauer LO, Burleson JA, Samarel D, Morrison DJ. Neuropsychologic findings in cocaine-dependent outpatients. Prog Neuropsychopharmacol Biol Psychiatry. 1998; 22:1061–1076. http://dx.doi.org/10.1016/s0278-5846(98)00057-8. [PubMed: 9829288]

Hanson KL, Medina KL, Padula CB, Tapert SF, Brown SA. Impact of AdolescentAlcohol and Drug Use on Neuropsychological Functioning in Young Adulthood: 10-Year Outcomes. J Child

Adolesc Subst Abuse. 2011; 20:135–154. http://dx.doi.org/10.1080/1067828x.2011.555272. [PubMed: 21532924]

Holdnack, HA. Wechsler Test of Adult Reading: WTAR. The Psychological Corporation; San Antonio, TX: 2001.

Kramer JH, Blusewicz MJ, Preston KA. The premature aging hypothesis: old before its time? J Consult Clin Psychol. 1989; 57:257–262. http://dx.doi.org/10.1037//0022-006x.57.2.257. [PubMed: 2708614]

Loeber S, Vollstädt-Klein S, Von Der Goltz C, Flor H, Mann K, Kiefer F. Attentional bias in alcohol-dependent patients: The role of chronicity and executive functioning. Addict Biol. 2009; 14:194–203. http://dx.doi.org/10.1111/j.1369-1600.2009.00146.x. [PubMed: 19291010]

McLellan AT, Luborsky L, Woody GE, O'Brien CP. An improved diagnostic evaluation instrument for substance abuse patients. The Addiction Severity Index. J Nerv Ment Dis. 1980; 168:26–33. http://dx.doi.org/10.1097/00005053-198001000-00006. [PubMed: 7351540]

Meade CS, Conn NA, Skalski LM, Safren SA. Neurocognitive impairment and medication adherence in HIV patients with and without cocaine dependence. J Behav Med. 2011; 34:128–138. http://dx.doi.org/10.1007/s10865-010-9293-5. [PubMed: 20857187]

Messinis L, Lyros E, Andrian V, Katsakiori P, Panagis G, Georgiou V, Papathanasopoulos P. Neuropsychological functioning in buprenorphine maintained patients versus abstinent heroin abusers on naltrexone hydrochloride therapy. Human Psychopharmacol. 2009; 24:524–531. http://doi.org/10.1002/hup.1050.

Mittenberg W, Motta S. Effects of chronic cocaine abuse on memory and learning. Arch Clin Neuropsychol. 1993; 8:477–483. http://dx.doi.org/10.1093/arclin/8.6.477. [PubMed: 14591987]

Prosser J, Cohen LJ, Steinfeld M, Eisenberg D, London ED, Galynker II. Neuropsychological functioning in opiate-dependent subjects receiving and following methadone maintenance treatment. Drug Alcohol Depend. 2006; 84:240–247.10.1016/j.drugalcdep.2006.02.006 [PubMed: 16545923]

Reske M, Eidt CA, Delis DC, Paulus MP. Nondependent stimulant users of cocaine and prescription amphetamines show verbal learning and memory deficits. Biol Psychiatry. 2010; 68:762–769. http://dx.doi.org/10.1016/j.biopsych.2010.04.021. [PubMed: 20605137]

Richardson LK, Frueh BC, Acierno R. Prevalence estimates of combat-related PTSD: a critical review. Aust NZ J Psychiatry. 2010; 44:4–19. http://dx.doi.org/10.3109/00048670903393597.

Ridley NJ, Draper B, Withall A. Alcohol-related dementia: an update of the evidence. Alzheimers Res Ther. 2013; 5:3. http://dx.doi.org/10.1186/alzrt157. [PubMed: 23347747]

Rogers RD, Robbins TW. Investigating the neurocognitive deficits associated with chronic drug misuse. Curr Opin Neurobiol. 2001; 11:250–257. http://dx.doi.org/10.1016/s0959-4388(00)00204-x. [PubMed: 11301247]

Schandler SL, Clegg AD, Thomas CS, Cohen MJ. Visuospatial information processing in intoxicated, recently detoxified, and long-term abstinent alcoholics. J Subst Abuse. 1996; 8:321–333. http://dx.doi.org/10.1016/s0899-3289(96)90179-0. [PubMed: 8934437]

Selby MJ, Azrin RL. Neuropsychological functioning in drug abusers. Drug Alcohol Depend. 1998; 50:39–45. http://dx.doi.org/10.1016/s0376-8716(98)00002-7. [PubMed: 9589271]

Sheehan DV, Lecrubier Y, Sheehan KH, Amorim P, Janavs J, Weiller E, Hergueta T, Baker R, Dunbar GC. The Mini-International Neuropsychiatric Interview (M.I.N.I.): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. J Clin Psychiatry. 1998; 59:22–33. [PubMed: 9881538]

Sneider JT, Cohen-Gilbert JE, Crowley DJ, Paul MD, Silveri MM. Differential effects of binge drinking on learning and memory in emerging adults. J Addict Res Ther Suppl. 2013; 7

Sullivan EV. Neuropsychological vulnerability to alcoholism: evidence from neuroimaging studies. NIAAA Res Mono No. 2000; 34:473–508.

Sullivan EV, Fama R, Rosenbloom MJ, Pfefferbaum A. A profile of neuropsychological deficits in alcoholic women. Neuropsychology. 2002; 16:74–83. http://dx.doi.org/10.1037//0894-4105.16.1.74. [PubMed: 11853359]

Highlights

- Studied visual and verbal learning in Veterans with substance use disorders
- Compared alcohol abusers to abusers of cocaine and opiates
- Deficits in verbal learning were specific to Veterans with alcohol use disorders
- Visual learning was less impaired for both abusers of alcohol and other substances
- Alcohol treatment programs should not use strategies that rely on verbal learning

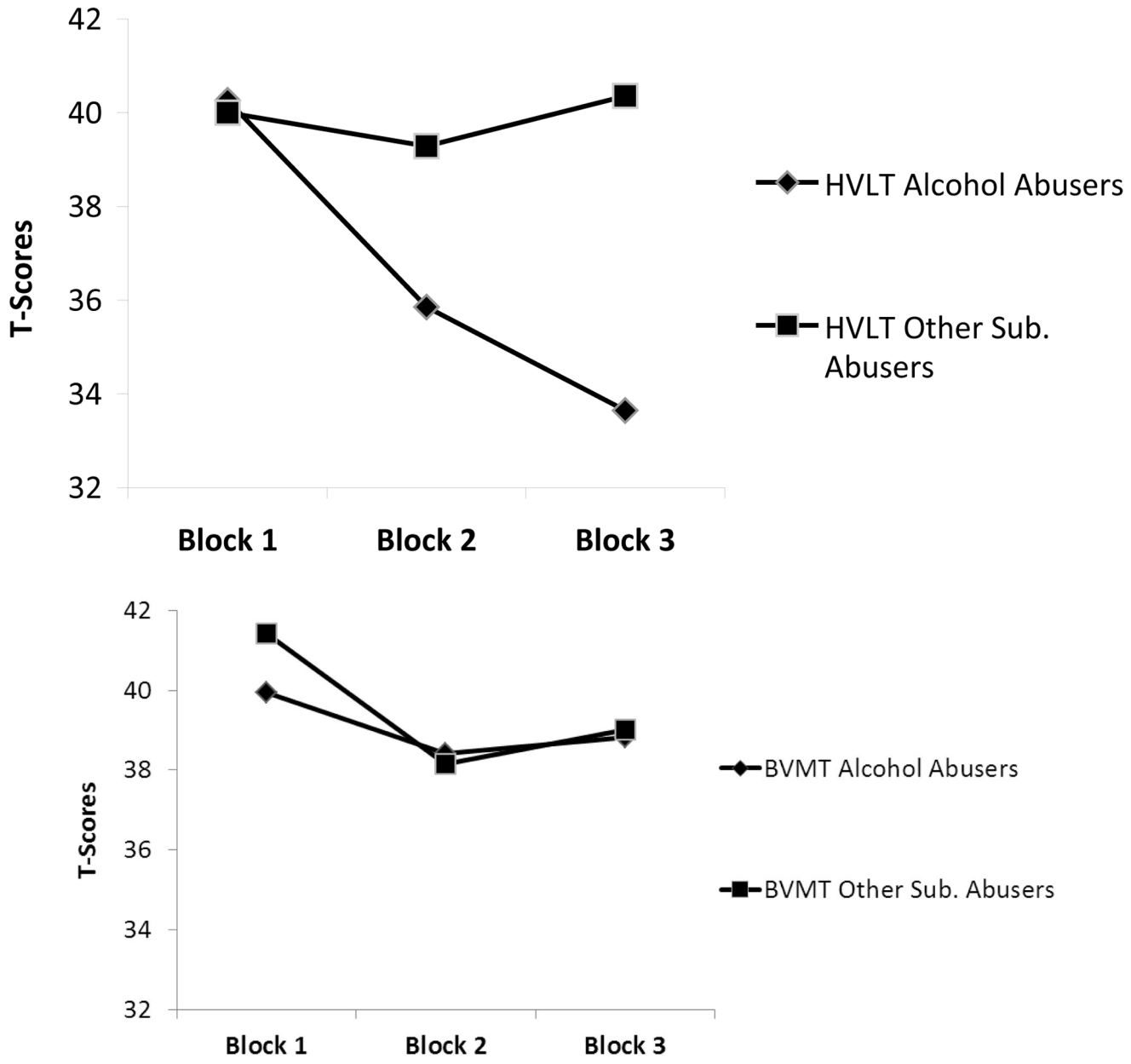

Figure 1.

HVLT and BVMT T-Scores for AUD and SUD groups across the three learning blocks. For the HVLT, the AUD group showed a significant linear decline across the three learning blocks, while the SUD group exhibited less of a decline (F=4.653, df =48, p=.036). There were no significant differences between the AUD and SUD groups for the BVMT ((F=0.197, df=48, p=.674).

Table 1

Baseline Characteristics

Baseline Characteristic	Alcohol Abusers (N=34)	Other Substance Abusers (N=14)	All Participants Included (N=48)
Males N (%)	33 (97.06%)	12 (85.71%)	45 (93.75%)
Age (years) Mean (SD)	55.18 (5.02)	46.14 (11.93)	52.54 (8.62)
Race N (%)			
White	16 (47.06%)	4 (28.57%)	20 (41.67%)
Black	14 (41.18%)	10 (71.43%)	24 (50.00%)
Other	4 (11.76%)	0	4 (8.33%)
Education (years) Mean (SD)	12.74 (1.69)	12.57 (1.45)	12.69 (1.61)
Ever Married N (%)	26 (76.47%)	9 (64.29%)	35 (72.92%)
Primary Axis I			
Diagnosis N (%)			
AUD	29 (85.29%)	0	29 (60.42%)
Cocaine SUD	0	6 (42.86%)	6 (12.50%)
Opioid SUD	0	6 (42.86%)	6 (12.50%)
Other SUD	0	2 (14.29%)	2 (4.17%)
Poly SUD	5 (14.71%)	0	5 (10.42%)
Months of Sobriety Mean (SD)	1.32 (2.14)	1.892 (2.81)	1.49 (2.34)
Convicted of A Felony N (%)	15 (44.12%)	8 (57.14%)	23 (47.92%)
Receiving SSDI N (%)	9 (26.47%)	3 (21.43%)	12 (25.00%)
GAF Mean (SD)	46.56 (5.67)	46.07 (2.90)	46.42 (4.99)
BSI Depression Subscale Mean (SD)	42.62 (9.07)	48.14 (8.88)	44.23 (9.27)
WTAR Mean (SD)	96.11 (11.42)	94.25 (9.14)	95.53 (10.47)

Note: No significant differences between groups on baseline characteristics

AUD= Alcohol Use Disorder, Cocaine SUD= Cocaine Use Disorder, Opioid SUD= Opioid Use Disorder, Other SUD= Other Substance Use Disorder (substance use disorder other than AUD, Cocaine SUD, or Opioid SUD), Poly SUD= Polysubstance Dependence, SSDI= Social Security Disability Income; BSI= Brief Symptom Inventory; WTAR=Wechsler Test of Adult Reading (used as a measure of baseline IQ)