

Measuring the Veracity of Alcohol and Drug Users' Self-Report of Sobriety

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Abstract: Countless people are afflicted with alcohol and drug use disorders. Those involved in sobriety maintenance programs are often subjected to alcohol and drug urine tests to measure the veracity of their self-reported claims of sobriety. To assess deception among alcohol and drug users, the Veracity TouchScreener™, and an alcohol and drug urine drug test was administered to 80 participants. The TouchScreener™, which is an interactive touchscreen that measures Significant Psychophysiological Responses (SPR) to sets of questions revealed an estimated 92% accuracy at classifying alcohol and drug user's self-report of sobriety. This study assists in adding to the burgeoning base of research indicating that psychophysiological measures are effective and show robust accuracy in assessing suspected deception in participant responses.

Keywords: Deception Detection, Psychophysiological Response, Drug and Alcohol Abusers, Veracity.

INTRODUCTION

The practice of assessing and determining deception has widespread applications in a post-911 world. Indeed from a public safety perspective with security screenings and background evaluations, the ability to discern deceptive responses, ulterior motives, and non-truths has governmental as well as civilian applications, from Transportation Security Administration to vetting the background of applicants for a variety of security sensitive positions.

Deception Detection

Historically, the reliable detection of deception by professionals is a charge that has had limited success, both in practical realms and in controlled studies [1-6]. Individuals trained in deception detection, namely law enforcement, FBI, psychologists, the United States Secret Service, and those purportedly skilled at determining the veracity of one's presentation, show inconsistency and poor reliability in the detection of deception [3]. A study conducted by the National Research Council [7] found among the available methods of assessment, psychophysiological measures i.e. polygraph examination and voice stress analysis, are the most reliable means of assessing deception, through the use of physiological indicators.

To assess deception among alcohol and drug users, treatment programs utilize external measures such as urinalyses, hair follicle, transdermal sweat

patches and monitoring devices, ignition interlock devices, and blood testing to determine the accuracy of clients' self-reports of sobriety [8]. Alcohol and drug users' deception while in treatment can serve multiple potential functions, from maintaining addictive behaviors to avoiding punitive consequences for persisting use. Despite negative consequence associated with continued alcohol and drug use, some are unable, ill-equipped, or unwilling to discontinue their use. With strong motivations to continue use alcohol and drugs, the incentive to be deceptive can be heightened; thereby external sources of validation regarding their reported claims of sobriety are needed. This need is punctuated by the fact that countless people are afflicted with alcohol and drug use disorders.

Substance Use Disorders according to the Diagnostic and Statistic Manual – Fourth Edition – Text Revision [9], the foremost resource for the classification of substance abuse and dependency, are characterized as: the use of intoxicating or illicit substances in a manner that interferes with activities of daily living, use of the substance to a greater degree and over a longer period of time than intended, increased tolerance to and withdrawal symptoms in the absence of the substance, and continued, compulsive use despite negative consequences, including physical, emotional, psychological, and legal.

In the general population, the lifetime prevalence of substance related disorders include estimates as high as 15% for alcohol dependence, 5% for cannabis dependence, 2% for cocaine, 1.5% for amphetamines, and approximately 2% for opioids [9]. The National Household Survey on Drug Abuse [10] estimated that

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22.5 million persons aged 12 or older in 2004 were classified with substance dependence or abuse in the past year (9.4 percent of the total population), with the highest percentages of use occurring among adults aged 18 to 25 years old.

While it is generally accepted by alcohol and drug counselors that an individual will volitionally underreport or deny illicit or prohibitive substance use when facing punitive sanctions, there is limited research to substantiate the prevalence of deception with substance use with adults [11]. Furthermore, the varying types of deception employed by respondents make the issue much more complex. Denial, exaggeration, or disavowing one's use, along with the motive(s) for doing so, all contribute to the practice of deception in reporting¹ [12, 13]. By assessing deception tied to substance use in a real-world setting, with an external, validating standard (urine alcohol and drug testing), prevalence rates can be examined and assessed for ecological validity with adults. Furthermore, the motives for using deception is of less importance than the verification that an individual is actively continuing to use, potentially violating the terms of their court supervision and continuing to engage in alcohol and drug use, which itself can lead to illegal behaviors. Utilizing alcohol and drug urine testing as a means to substantiate self-reports of sobriety that challenge and expose denial and dishonesty further facilitate treatment planning.

Beginning as early as 1971, a wealth of research has emerged on measures to assess deception. Particularly, the utility of psychophysiological voice stress analysis (PVSA) as a reliable and valid measure of deception, when contrasted against the polygraph examination has been examined [14]. Expanding on the application of psychophysiological markers indicative of deception, researchers with Veracity Security Solutions, LLC² sought to examine the utility of touch screen devices as valid alternatives to existent psychophysiological measures.

The Veracity TouchScreener™

The Veracity TouchScreener™ is capable of capturing psychometric information on how a person

emotionally reacts to a structured set of questions displayed on a specialized 3-D touch screen computer. The highly sensitive screen can be configured to measure minute, but significant variances in the touch used to answer yes or no questions.

This information is then analyzed using proprietary algorithms that process the participants' responses to the series of questions to determine which, if any, generated a heightened response, or Significant Psychophysiological Response (SPR). In general, the more reactive the person's response, the higher the SPR and the greater the correlation will be to a potential deception. Simply put, emotional and cognitive reactions to the psychological stimulus of highly structured and carefully crafted questions are manifested in involuntary physiological reactions measured through variables such as muscle tremors and answer latency, the results of which can be quantified and measured.

The questions are an admixture of background, baseline, and subject-relevant questions that are structured in a way that are designed to generate responses from participants who may be less than fully forthcoming in their answers.

Utility, Accuracy and Validation of SPR TouchScreener™

In one groundbreaking "Proof of Concept" study utilizing psychophysiological markers measured through touch-screen terminals, Veracity Security Solutions, LLC³ proposed that stress reactions associated with deception can be simply and non-intrusively screened, and followed up by ushering suspicious participants to a higher degree of scrutiny or investigative focus when flagged. This "Proof of Concept" was a pilot study that applied the Veracity TouchScreener™ in the real life setting of aviation security in 2010 in Lagos, Nigeria. Based on the results, the TouchScreener™ proved that the touch screen technology was able to successfully identify multiple participant passengers who posed viable threats to the safety of the airport, passengers, airport staff, and the airlines. Identified passengers' results on the touch screen technology revealed significant psychophysiological responses (SPR), which led these subjects to further investigative focus to enhance safety

¹Stein, L. A. R., Colby, S. M., Barnett, N. P., Monti, P. M., & Lebeau, R. Admitted under- and over-reported alcohol and marijuana use in incarcerated adolescents. Unpublished raw data 2006. University of Rhode Island.

²Veracity Security Solutions, LLC. Proof of concept and field acceptance testing: Investigative focus technology. Unpublished manuscript 2013.

³Veracity Security Solutions, LLC. Proof of concept and field acceptance testing: Investigative focus technology. Unpublished manuscript 2013.

and security, as well as providing additional external validation of the screener's potential in identifying deception.

While psychophysiological markers remain the strongest measures for deception assessment, these measures are not without skepticism, as no psychophysiological measure is uniformly accepted by the civil and criminal justice systems across jurisdictions and at the local, state, and federal levels. Adding further complexity to newly developed and applied measures are the issues of the Frye and Daubert standards, and whether the psychophysiological measures meets standards of court admissibility, rules of evidence and professional scrutiny. Yet, the use of psychophysiological measures as ancillary assessment tools post-sentencing in criminal cases, has been affirmed and supported at the federal judicial level (US v. Antelope, 2005; US v. Cope, 2008) to aid in treatment adherence and in release from custody supervision compliance [15, 16].

The current study examined the consistency between alcohol and drug users self-reported claims of sobriety through their responses on the Veracity TouchScreener™ and the external validation measure of a standard, eight-panel alcohol and drug urine test. The results of which will also provide validation data for the use of the Veracity TouchScreener™ in contexts where use of deception is suspected or anticipated. This validation will lend to the research base of psychophysiological assessment of deception and, with further industry scrutiny and investigation, support the use of non-intrusive, cost-effective measures for routine investigation of clients' self-presentation and reports.

METHODS

Participants

The participants consisted of 77 male and female alcohol and drug users who were currently involved in a sobriety maintenance program. Inclusion criteria consisted of involvement in a sobriety maintenance program, the ability to read English, and willingness to participate in a visually monitored alcohol and drug urine test. All participants were selected from two drug and alcohol sobriety maintenance programs in coastal Southern California. The demographic data related to age, gender, ethnicity, relationship status, and alcohol and drug urine test results were additionally gathered and are presented below (Table 1).

Procedure

Participants completed a demographic questionnaire and signed an informed consent to participate in the research. All participants agreed to the terms of the research participation and that all identifying information would be confidential and coded into a large database. Participants answered the 18 Yes or No questions on the TouchScreener™ measuring their self-reported sobriety (Appendix A). Subsequently, participants then provided a visually monitored urine specimen which was then sent to a laboratory for processing and the results were received *via* facsimile. In exchange for his or her participation in the study, each participant was provided with a small, financial incentive of \$20.00, \$15.00 of which covered the cost of the standard alcohol and drug urine test that participants would have otherwise been financially responsible for, and the remaining \$5.00 cash went to the participant.

Measures

Veracity TouchScreener™

The Veracity TouchScreener™ is an interactive touchscreen that measures Significant Psychophysiological Responses (SPR) to a set of questions. Participants in the present study answered 18 Yes or No questions by touching the area of the screen consistent with their response to each item. The innovative and proprietary device captures physiological indicators of deception by measuring latency to response, finger tremor, and pressure, consistent with previous research⁴ demonstrating psychophysiological correlates with deception. The algorithm used assesses psychological indicators for each test item, and indicates whether an individual admits to or denies the item at the semantic level, as well as assessing the number of psychophysiological indicators or SPRs of deception for relevant questions on the TouchScreener™. Furthermore, the proprietary software renders an opinion, based on the above factors, as to the veracity of one's presentation, determining admission of responsibility (positive result), deception based on significant psychophysiological responses (positive result), or an absence of psychophysiological indicators of deception (negative result). The TouchScreener™ device also addresses the validity of one's approach to the TouchScreener™

⁴Veracity Security Solutions, LLC. Proof of concept and field acceptance testing: Investigative focus technology. Unpublished manuscript 2013.

activity, presenting baseline items, orienting items, and response process items that can be easily verified to assess accuracy of self-presentation. Two targeted questions, items 12 and 16, ask respondents specifically about the alcohol and drug urine sample provided and whether the respondent believes it will test positive for alcohol or drugs. Significant psychophysiological responses (SPRs) to these items directly assessing the status of the participants' alcohol and drug urine samples are considered indicative of deception.

Eight Panel Urine Alcohol and Drug Test

The Eight Panel Alcohol and Drug Urine Test utilized is a standard method of urinalysis used in sobriety maintenance programs, occupational health, and probation, parole, and supervised release programs. The participants provided a visually monitored urine sample, in a vial, which is promptly labeled, sealed, and secured to ensure that the chain-of-custody is maintained. All samples were securely shipped to a private, contracted laboratory that utilized industry-standard enzyme assay (EA) and enzyme-immunoassay (EIA) alcohol and drug urine testing methods. Each sample was assessed for the presence of the following substances by utilizing established cutoffs by certified laboratory scientists: alcohol, amphetamines, barbiturates, benzodiazepines, cannabis, cocaine, opiates, and phencyclidine (PCP). The validity of each sample was additionally assessed for dilution or adulteration, suggesting whether or not the sample provided was both valid and interpretable. Each sample received a result of "detected" or "not detected" for each of the aforementioned, eight substances.

RESULTS

A total of 80 volunteer participants were recruited for the study, each of whom signed an informed consent and received \$20.00 for their participation. Of these 80 participants, three (3) were excluded due to incomplete alcohol and drug urine test results leaving 77 in the total sample. Table 1 presents a breakdown of demographic data related to the participants in this study, with a majority self-identifying as Caucasian, male, and single.

Table 2 presents the results from the standard, eight-panel urinalysis conducted on each participant's voluntary urine sample. Sixteen (16) samples tested positive for one or more illicit or prohibited substance, a total of 20% of the overall participant sample.

Additionally, fifteen (15) respondents admitted to use of alcohol or drugs during the inclusionary period, a total of 19% of the sample. Forty-six (46) participant samples tested negative for any illicit or prohibited substance, a total of 60% of the overall sample.

Table 1: Demographic Information for Study Participants (N = 77)

Demographic Variables	Frequency	Percentage
Gender		
Male	58	75 %
Female	19	25 %
Ethnicity		
Caucasian/White	45	58 %
African-American/Black	8	11 %
Latino/a	19	25 %
Other	5	6 %
Relationship Status		
Single	48	61 %
Divorced	15	19 %
Married	8	11 %
Separated	4	5 %
Widowed	3	4 %

Table 2: Alcohol and Drug Urine Test Results for Study Participants (N = 77)

Alcohol and Drug Urine Test Results	Frequency	Percentage
Alcohol	1	1 %
Amphetamine	7	9 %
Amphetamine / THC	1	1 %
Benzodiazepine	2	3 %
Cocaine	1	1 %
Marijuana / THC	3	4 %
Benzodiazepines + Opiates	1	1 %
Negative Urinalysis Results	46	60 %
Participant Admitted Use ^a	15	19 %

^aInformation regarding substance used in participants' admission via TouchScreener™ was not gathered.

Table 3 presents the results of the Veracity TouchScreener™ and the classification of respondents' suspicion of deception based on their cumulative responses to the 18 TouchScreener™ questions. Participants were classified as: suspected deception

based on multiple, significant psychophysiological responses (SPRs) to targeted items, affirmative admission of substance use *via* the TouchScreener™ questions, or negative (non-deceptive). SPR-positive classifications and admissions of alcohol or substance use were considered indicative for the Veracity TouchScreener™ with negative classifications as non-indicative respondents.

Table 3: Veracity Results for Study Participants (N = 77)

Veracity Results	Frequency	Percentage
SPR Positive	5	6.5 %
Admission to Use	28	36.4 %
Negative	44	57.1 %

To assess the consistency between the classification of respondents using the Veracity TouchScreener™ with the external criterion variable of the alcohol and urine drug test, Table 4 presents the goodness-of-fit using a Chi-Square analysis and kappa values, demonstrating the statistical concordance between alcohol and urine drug test and the TouchScreener™, as well as the classification accuracy between both measures. Using the alcohol and urine drug test as the determinant, the classification accuracy of the Veracity TouchScreener™ demonstrates both high sensitivity and specificity in identifying respondents either admitting to use or utilizing deception when confronted about their consumption of alcohol or drugs. Furthermore, the chi-square and kappa analyses indicate degree of agreement between the two assessment tools.

Table 4: Classification Table Study Participants (N = 77)

		UA Results	
		Positive	Negative
Veracity Results	Positive	29	4
	Negative	2	42
Chi-Square		16.436; $p < .001$	
Kappa		.405	
Sensitivity		93.5 %	
Specificity		91.3 %	
Overall Hit Rate		92.2 %	
Positive Predictive Power		87.9 %	
Negative Predictive Power		95.5%	

DISCUSSION

The current study measured the veracity of alcohol and drug users self-report of sobriety. By utilizing a psychophysiological measure, the Veracity TouchScreener™ and alcohol and urine drug testing, this research demonstrated that alcohol and drug users' self-report can be accurately measured for the presence of deception. The results revealed high degree of agreement and statistically similar results between the Veracity TouchScreener™ and the external validating measure of the alcohol and urine drug test results, suggesting both measures are assessing similar constructs.

This study assists in adding to the burgeoning base of research indicating that psychophysiological measures are effective and show robust accuracy in assessing suspected deception in participant responses. Alcohol and drug urine testing is the standard employed in sobriety maintenance programs. Yet, the costs, the physically intrusive nature, and lengthy turnaround times for test results can hinder treatment interventions, forcing clinicians to delay their confrontations and treatment plans when using alcohol and drug urine tests. Utilizing the Veracity TouchScreener™ to assist in sobriety maintenance is a pioneering concept that, with further validation, can prove to be a solid alternative or adjunctive tool to alcohol and drug urine testing. Based on the results of this study, using the Veracity TouchScreener™ alone revealed an estimated 92% accuracy in determining the veracity of alcohol and drug users' self-report of sobriety. With only an 8% misclassification possibility, the Veracity TouchScreener™ revealed promising accuracy in capturing participants' self-reported substance use. The instantaneous feedback from the TouchScreener™ can then facilitate immediate interventions, limiting relapse cycles, ancillary damage to alcohol and drug users' lives, and encourage greater honesty in self-reports.

Demographic limitations in the present study are the sample composite was nearly two-thirds Caucasian, geographically constrained to one location, and was comprised of 75% single, males. In addition, the limitations that were observed with the Veracity TouchScreener™ were that a large portion of the sample made admissions regarding their alcohol and drug use, rather than being identified as deceptive *via* SPRs. As such, the inferences of participants' responses made using only SPRs were a small subsample of positive cases. Obtaining an increased

sample of SPR-indicative deception and the correlated accuracy with alcohol and urine drug testing will contribute to the validation of the Veracity TouchScreener™. Furthermore, obtaining samples with increased SPR respondents will further elucidate the mechanism behind the effectiveness of the TouchScreener™ i.e. if the mere act of self-reporting substance use *via* a touch screen increases accuracy.

In classifying participants' determination of deception, two additional categories, "weak-negative" and "weak-positive" were assigned to respondents who despite receiving multiple SPRs, approached the test in a manner that created excess variability in response latency. Researchers acknowledged that this could be a conscious effort to manipulate the assessment and subsequent SPRs. Efforts are currently underway to address this inconsistency on the next incarnation of the TouchScreener™ software.

Future areas of research would include addressing a larger, female, and multi-ethnic sample of participants from other geographic areas with a larger sample size to replicate this research and assess the similarity of the results. Also, further applications of the Veracity TouchScreener™ in groups and settings where information about the use of deception is important or even anticipated is needed, including forensic settings (polygraph, compliance with probation / parole), treatment program compliance, and civil settings assessing accuracy of self-presentation (job applicants, child / elder care providers). Conducting correlative and validation studies with existent measures of deception would further bolster the strength and accuracy of the Veracity TouchScreener™ results, paralleling polygraph results or voice stress analysis.

APPENDIX A - VERACITY TOUCHSCREENER™ QUESTIONS

1. Are you a citizen of this country?
2. Are you a living with someone 17 years of age or younger?
3. Are you a living with another adult?
4. Do you understand that you must answer every question concerning alcohol and drugs truthfully?

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(Control/Relevant Issue)

5. Do you know the current day of the week?

6. Do you intend to neglect or violate any part of your treatment program?
7. Do you intend to try and fake or alter your alcohol or drug test?
8. Have you attempted to obtain any information on how to fake or alter an alcohol or drug test?

~~~~~  
(Alcohol Relevant Issue)

9. Do you know the current month?
10. Have you consumed any alcohol in the past month?
11. Have you consumed any alcohol in the past month that you have not discussed with your counselor?
12. Do you believe that sample you are providing today be positive for alcohol?

~~~~~  
(Drugs Relevant Issue)

13. Do you know the current year?
14. Have you ingested or consumed any drugs in the past month?
15. Have you ingested or consumed any drugs in the past month that you have not discussed with your counselor?
16. Do you believe that sample you are providing today be positive for illegal drugs?

17. Do you know what the current day of the week it is?
18. Have you taken this touch screen test for the use of alcohol and illegal drugs before?

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