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ANALYSIS PAPER

In response to Doug Voss, professor of logistics and supply chain management at UCA co-author of the report: Comparing Drug Testing Methods in the Trucking Industry: The Drug and Alcohol Clearinghouse V. Hair Testing.

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Introduction

The Owner-Operator Independent Drivers Association Foundation, Inc. (OOFI) offered its critique of the report issued by the University of Central Arkansas (UCA) that compared pre-employment urine and hair drug test results gathered from The Alliance for Driver Safety and Security (The Trucking Alliance; TA) with urine tests results from the Federal Motor Carrier Safety Administration's (FMCSA) Drug and Alcohol Clearinghouse (DAC).

Dr. Voss, in a rebuttal to *The Trucker Magazine*, stated that "OOFI did not carefully examine our past work or the current report and, ultimately, created a nameless, faceless document that argues semantics and ignores accepted research norms[1]" OOFI would like to correct their error that we did not carefully examine UCA's report by writing a peer review of the report based on "accepted research norms." OOFI did look for any Dr. Voss's past work as none was mentioned in the report nor was there any peer review information given. However, we were unable to find any. We would welcome the opportunity to examine any previous work and/or peer reviewed research.

Upon examining UCA's current report and the data they collected from the nine prominent trucking firms that are a part of the TA, OOFI noted that the two groups, TA and DAC, provided data from different time periods. TA provided hair and urine drug test data for 2019 and 2020. TA also provided previously collected data for 2017 and 2018. This creates some confusion because in 2018, the Department of Transportation (DOT) added additional drugs (hydrocodone, hydromorphone, oxycodone, and oxymorphone), to the testing requirements. UCA needed to account for this data prior to January 1, 2018 in order to compare the DAC urine test results from 2020 as this would skew the results. They must eliminate everything prior to 2018. Again, comparing four years of data from TA to one year of data from DAC creates several problems because the utilization of different years poses questions as to the construct of the research.

UCA's report lists six important findings. OOFI has presented these findings below followed by our subsequent peer review questions.

A) TA drivers are less likely to abuse drugs than DAC drivers. TA drivers pass urine tests 2.69x (269%) more frequently than DAC drivers.

OOFI agrees with Dr. Voss's statement that we are arguing over semantics in our critique of their research. The semantic we take exception with is Dr. Voss's use of the word "abuse." According to Dr. Voss's report, TA drivers are less likely to "abuse" drugs than DAC drivers. However, OOFI believes this word is a broad and unfounded statement.

First, Dr. Voss needs to define the term "abuse" as there is clearly a difference between the abuse of drugs and the "use" of drugs. For example, if a driver has a prescription for a drug and uses that drug exactly as

[1] https://www.thetrucker.com/trucking-news/the-nation/co-author-of-study-on-drug-usage-among-truckers-refutes-ooidas-criticism

their physician prescribes for acute/chronic pain following surgery, while they may test positive, they are definitely not abusing that drug. The driver may not have used that drug for several days or weeks in some cases, yet a positive hair test might show past use of the drug. The report however indicates that the driver is a drug abuser simply for testing positive.

Did Dr. Voss give any consideration in his research to how many drivers from each dataset may have been using a prescription drug? In fact, the regulations state that if a driver receives a positive test, they can present their prescription, as well as the physician who approved it, to the Medical Review Officer (MRO). If the drug is found to be within a set limit, then the MRO would not list the driver as positive. However, OOFI questions if Dr. Voss properly accounted for this in his report.

OOFI also takes exception to Dr. Voss's attempt to generalize the results between the TA and DAC datasets. It appears that Dr. Voss's justification for this is based solely on the statement, "Both test groups were sufficiently large to assume normality in their distribution.[2]" Dr. Voss indicated that the two datasets are comparable because they were both drawn from the same population of drivers. The nine motor carriers found in the TA dataset constitute some of the largest carriers in the trucking industry. They receive thousands of applications for employment, and employ a full-time staff dedicated solely to background checks. These carriers abide by much stricter guidelines for hiring than the vast majority of carriers. They have the resources to carefully pick experienced drivers with excellent commercial driving records. This is the advantage of being a successful carrier and makes good business sense. However, it is false to assume that the rest of the industry, which represents 98 percent of trucking and who does not have this same economic advantage, is made up of the same population of drivers as TA. The hiring standards for the DAC carriers will obviously be different. OOFI does not know if the authors considered this as a possible confound in their research.

The age of the driver population is another potential confound that might influence the results of the research. A careful literature review would demonstrate that younger drivers test positive more often for various drugs than older, more experienced drivers. Moreover, older, more experienced drivers have undergone several drug tests throughout their career, which gives them a greater history of data compared to younger drivers.

In statistical analysis, confounding is the distortion, or inaccuracy, in the estimated measure of association that occurs when the primary exposure of interest is mixed up with some other factor that is associated with the outcome.[3] For example, if the primary goal is to ascertain the strength of association between hair testing and drug use, then age is a confounding factor because it is associated with exposure, meaning that younger people are more likely to test positive for drugs. Therefore, if the age distribution is similar between the two exposure groups Dr. Voss is comparing, then age will not be a confounding factor.

[2] Voss and Cangelosi, *Comparing Drug Testing Methods In The Trucking Industry: The Drug And Alcohol Clearinghouse v. Hair Testing*, The Alliance for Driver Safety and Security (Oct 29, 2021), pg. 5.
[3] Wayne W. LaMorte and Lisa Sullivan, "Confounding and Effect Measure Modification," Boston University School of Public Health (Jun 3, 2016).

In order to better estimate the positivity rates of their drug and alcohol surveys, FMCSA provides positivity rates that are weighted by stratified samples. Did the authors stratify the TA data with DAC data in order to get a better estimation of positivity results?

B) Hair testing detects drugs 8.26x (826%) more frequently than urine testing. And C), TA drivers failed 6.11% of their hair tests.

Again, both B and C are problematic because one would have to accept the idea that the two datasets are similar or from the same population. Hence, it is neither reliable nor valid to assume that an additional 58,910 DAC drivers would have failed their pre-employment drug tests had they undergone a hair test. These assumptions are thereby premature until the authors address the confounds listed above and resolve the concerns regarding the accuracy of hair testing.

Before any reliable or valid study is undertaken, researchers must first conduct a literature review of previous research and information. This provides guidance for the current research and highlights potential concerns with previous findings. While the authors may have conducted a literature review, they did not present any in the report. There is plenty of past research on the value of hair testing and the concerns of hair testing. Most, if not all, of TA's members who sponsored this study have pursued hair testing for years. The authors ought to have presented this information as TA members have both sponsored other research and have actively lobbied for hair testing. Any good researcher would make these things known so that reviewers might be aware of any potential conflicts of interest. The authors could have easily conducted a quick literature review regarding past concerns associated with the utilization of hair testing for drug use.

According to the Omnibus Transportation Employee Testing Act of 1991, the DOT must follow the Health and Human Services (HHS) Mandatory Guidelines for the categories of drugs in which they require testing. HHS based its original guidelines on the incidence and prevalence rates of drugs in the general population, as well as on both the DOT and the Department of Defense's experiences in screening their workforces.

The Substance Abuse and Mental Health Services Administration (SAMHSA) division of HHS is responsible for researching both the various drugs themselves and the testing procedures for those drugs. SAMHSA recognizes that there are grave consequences for those drivers who are subject to these regulations and testing procedures. For years, the agency has carefully examined hair testing. They have concluded that there is no standard protocol for hair testing, nor is there any reliable or valid research that has tested hair samples while utilizing SAMSHA's proposed guidelines. SAMSHA has found that hair testing could adversely affect drivers because it lacks scientifically-based protocols, thereby purporting false information. It's important to note that there is no legislative mandate requiring commercial truck drivers to undergo hair testing. Instead, federal law required SAMHSA, in coordination with other federal agencies, to report its progress in developing guidelines that might potentially address the use of hair testing to Congress, which they did in 2020.

The following consists of a quick literature review conducted by OOFI concerning some of the issues regarding the use of hair testing:

The authors never addressed issues relating to laboratory error and/or laboratory contamination of assayed samples.

First, there are problems of comparison. Hair preparation procedures adopted prior to testing itself vary widely, and laboratories regularly develop new ones without citing conclusive evidence of superiority. Laboratories select forensic tests from an assortment of different options, each one with its own varying ability to detect the presence of various substances. Further, organizations do not always report cut-off points, which are crucial in determining the ratio of false positives to false negatives. And when they do report them, they are not always similar.

Next, there are occasionally exists problems of credibility associated with hair testing. Of the five English language reports OOFI identified concerning forensic testing for MDMA use, one analyzed hair from somebody "known to be a drug user," a second analyzed hair posted from overseas where it had been harvested from "MDMA abusers," and a third analyzed a sample from somebody "known to be a stimulant abuser." Röhrich & Kauert (1997) and Rothe, *et al.*, (1997) were the only reports which came anywhere near having the appropriate sample size or sampling techniques that would permit any acceptable generalizations.

Researchers have found a number of problems with hair testing procedures, but no one has calibrated precise parameters in order to resolve the issues. The first issue is the rate of hair growth. Currently, it is normal to assume a growth rate of 1 centimeter per month, which is what OOFI used in the technical analysis of this peer review. Not so long ago however, most assumed the growth rate of half an inch per month. In other words, the current assumption would indicate that it takes 12-months to grow twelve centimeters of hair, whereas the old assumption believes it would take 9.5 months. In addition, researchers believe that the rate of hair growth varies from person to person. By one estimate, hair growth was assumed to vary between 0.6 and 3.36 cm/month (Harkey, 1993). For an individual at the low end of this scale, 12 cm of hair would reflect 20 months of hair growth. For one at the high end, 12 cm of hair would imply just over 3.5 months of hair growth. This is a major, yet typically unaddressed problem. Other problems with hair testing exist by:

- by race (Caucasian hair grows faster than Asian hair);
- by sex (scalp hair in women grows faster than in men);
- by age (hair growth generally decreases with age);
- by position on the scalp (hair grows faster in the vertex region than elsewhere);
- by general location (compared to scalp hair, pubic hair grows more slowly, and beard hair more slowly still);
- by hair color (darker hair is more likely to reveal substances or their metabolites); and
- possibly by hair texture (whether "coarse" or "fine").

In addition, a certain proportion of head hair - usually estimated at 15 percent - is dormant at any one time, and could not, thus, be any sort of calendrical record of consumption.

Surprisingly, "hair is a very complex part of the anatomy whose biology is only partially understood" (Harkey, 1993: 9). This leads to two more problems. First, many believe that rates at which substances

are incorporated into hair vary by many of the same dimensions that affect the rates of hair growth as noted above. Kidwell & Blank (1996: 39) suggest the cocaine incorporation ratio for Africans/Whites is 2.9:1, and 6.8:1 for Koreans/Whites, 6.8:1. Second, which is more immediately relevant, is the possibility of external contamination of hair (Pötsch & Moeller, 1996). Harkey (*ibid*.: 16) comments: "the hair shaft is exposed directly to sebaceous secretions before it emerges from the skin. Scalp hair is also exposed to sweat secretions as well as contaminants in air, water, or dust."

The washing problem is akin to the cut-off problem noted above. Too much washing might lead to too many false negatives, and too little washing, might to too many false positives. Blank & Kidwell (1993: 149) noted that, even after "substantial washing," two cocaine spiked samples still retained 211 ng of cocaine or its metabolites/10mg hair, which is equivalent to the same amount of cocaine found in the hair of those classified as heavy cocaine users. Finally, the degree of external contamination will relate to the mechanism and context of the original drug delivery. Drugs which are smoked or chased will, presumably, stand a greater chance of externally contaminating hair than those which are consumed orally or by injection.

Hair follicles are highly vascularized, and as the blood circulates, drugs are absorbed into the growing hair. The growing phase, the antegen phase, lasts 2 to 6 years. Blood supply to the hair shaft stops during the catagen phase, which lasts 1 to 2 weeks. The final stage, when the separation from the blood supply is complete, is known as the telogen stage or the resting phase. Approximately 2% to 3% of head hair is in the catagen stage and 10% to 15% in the telogen stage at any point in time. Therefore, drug concentrations will differ between hairs within one location and between locations such as scalp hair, pubic hair, and arm or leg hair (Cone et al. 2007: Gallardo and Queiroz 2008). For hair drug testing however, specimens are typically collected from the back of the head.

Another disadvantage is the interference of cosmetic treatment on the analysis of hair. Because of cultural differences in ethnic grooming, some groups tend to wash their hair less often than others. Some researchers have suggested that the lower frequency of hair washing causes less leaching of the drug out of the hair as a result of washing, which results in a potential increase of positive tests. Conversely, because most cosmetic treatment involves oxidation of the hair, it may reduce the availability of drugs for detection in hair testing, which results in a potential increase of negative tests.

Finally, hair drug testing cannot detect recent drug use. It typically takes three to five days for hair to emerge from the skin surface. During that time, the drug may be detected in the sweat bathing the hair, but washing procedures can make detection unlikely. Hence, hair testing is can only be used for certain drug tests such as pre-employment testing. While it might be useful for random testing, there is no guarantee that a positive test would indicate current use. Therefore, a person might be deemed ineligible to drive even though it was months since they last used the drug. The same scenario could be true for a driver who is going through the return-to-duty drug testing process. In this process, after the driver receives a prescribed amount of counseling, they could again potentially test positive via a hair test and be rendered ineligible to return-to-work even though they are free of drugs.

SAMSHA recommended a two-test approach as part of their proposed guidelines, which has yet to be adopted, suggesting that if a person were to test positive for drugs under the hair testing method, they

must also take a urine test. Dr. Voss is correct in assuming that OOFI agrees with SAMSHA that urine testing is superior to hair testing in that it detects more recent drug use and that hair testing is subject to legal challenges because of its potential for bias, its lack of standardized procedures, and its lack of secure testing labs. SAMSHA's proposed guidance protects the driver from hair bias and afford the driver the benefit of the doubt.

There has been one notable court case (Jones v. City of Boston—845 F.3d 28 (1st Cir. 2016) whereby 8 black police officers who tested positive for drug use utilizing hair testing and were terminated from their jobs. Pursuant to Title VII of the Civil Rights Act of 1964, these officers filed claims against discrimination by the use of a racially discriminatory hair drug test. ISSUE: In a disparate impact claim under Title VII of the Civil Rights Act of 1964, was defendant police department's hair drug test requirement racially discriminatory to black police officers? Answer: YES. The Court explained that the record contained sufficient evidence from which a reasonable factfinder could conclude that hair testing plus a follow-up series of random urinalysis tests for those few officers who tested positive on the hair test would have been as accurate as the hair test alone at detecting the non-presence of cocaine metabolites while simultaneously yielding a smaller share of false positives in a manner that would have reduced the disparate impact of the hair test.

SAMSHA by requiring that any positive hair test undergo an additional urine test in their guidelines is offering some protection for those using hair testing as their sole testing procedure from a discriminatory law suit.

OOFI strongly agrees that the use of any drug that may negatively impact a driver's ability to make safety critical decisions should be tested for, and that a driver who tests positive for said substance should be removed from any safety sensitive position. However, OOFI believes that hair testing with its many potential bias should not brand the driver as a drug abuser any more than defining a driver that drinks alcohol on their days off as an alcoholic.