Assessing Real-Time Impairment Using the DRUID® App Following Alcohol and Cannabis Use in a Controlled Study.

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Disclaimer!

- I serve on the Advisory Board of Impairment Science Inc.

Introduction

Background: The need for a rapid, objective, and mobile tools to assess impairment.

Problem with Existing Methods:

- Traditional toxicology tests detect presence, not performance.
- Standardized Field Sobriety Tests (SFSTs) are subjective and can be time-consuming.

New Solutions: Several new technologies in recent years focusing on filling this gap

- Based on cognitive assessment
- Retinal scans

Research Objective

Primary Goal:

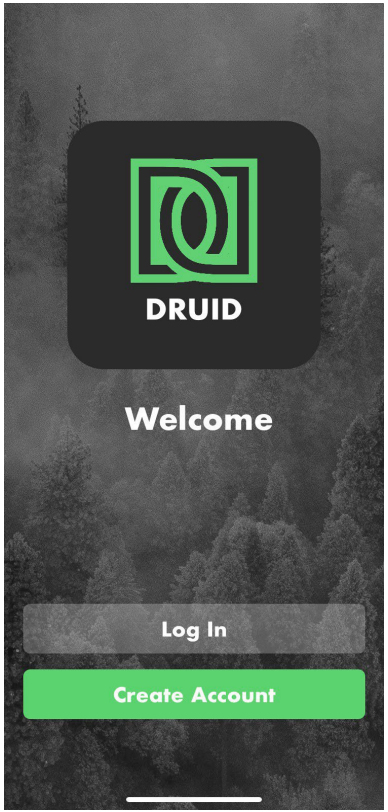
To evaluate the DRUID® mobile app's ability to detect substance-induced impairment.

Specific Objectives:

- Test DRUID's effectiveness following controlled alcohol consumption.
- Test DRUID's effectiveness following controlled cannabis use.
- Compare DRUID results to established impairment metrics (BAC and DRE).

The DRUID App:

- Neuroscience base test that combines cognitive, psychomotor and body movement testing into a single app
- Objective, quantitative test for impairment, regardless of cause
- Quick (1-minute), inexpensive, portable, operates like a video game, for all iOS and Android devices



How Druid Works

Each Druid test takes several hundred measurements of **key neurophysiological indicators**:

- Reaction time
- Hand-eye coordination
- Decision-making
- Time estimation
- Balance

All tasks other than balance are **divided-attention** tasks:

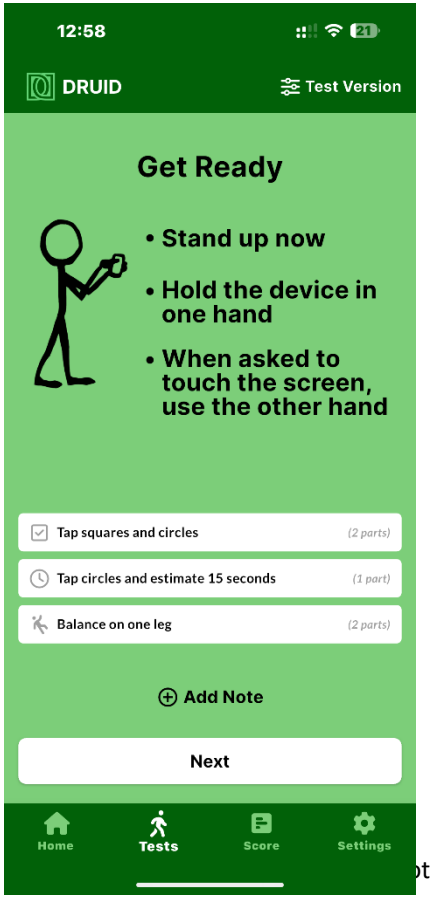
Users are required to do two things simultaneously

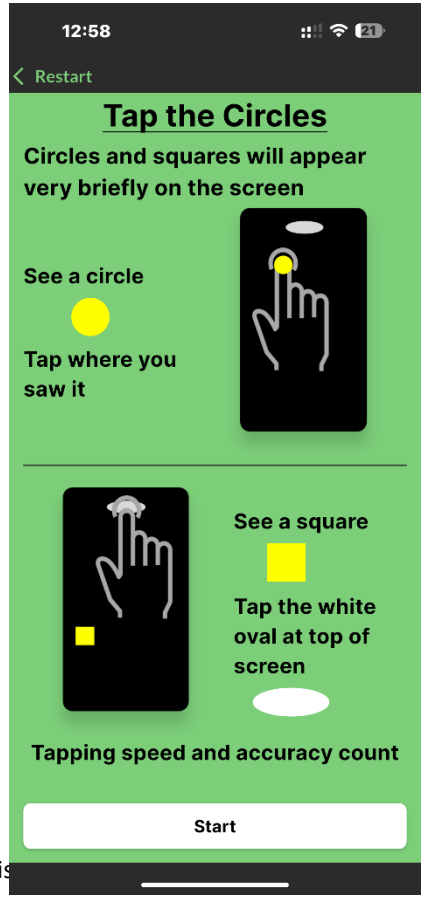
Data is statistically integrated to calculate a single, overall **impairment score** that measures impairment in two ways:

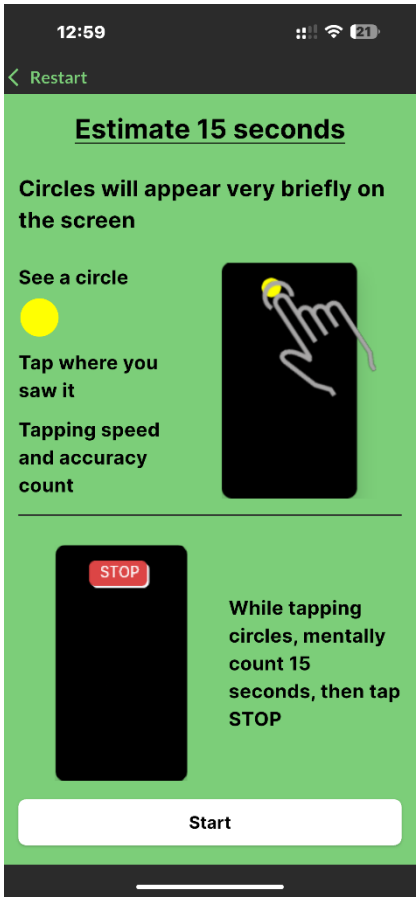
Personal Assessment - Comparing current score to the user's baseline score

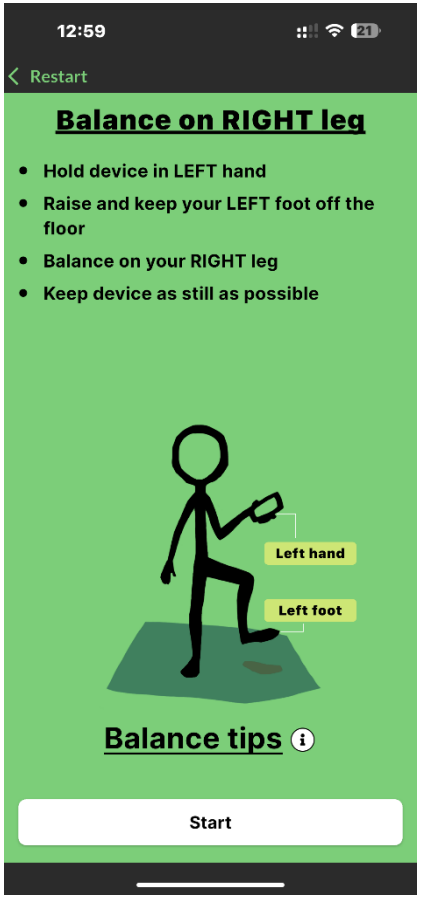
Objective Assessment - Interpreting current score as a blood alcohol concentration (BAC) impairment equivalent

Druid Tasks – Screen Shots

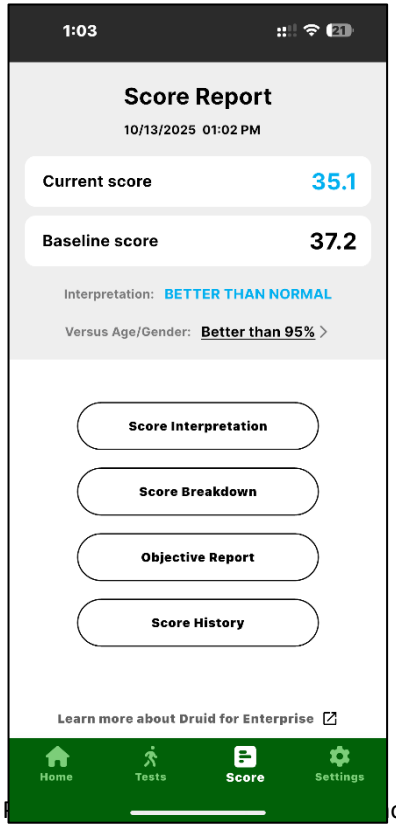


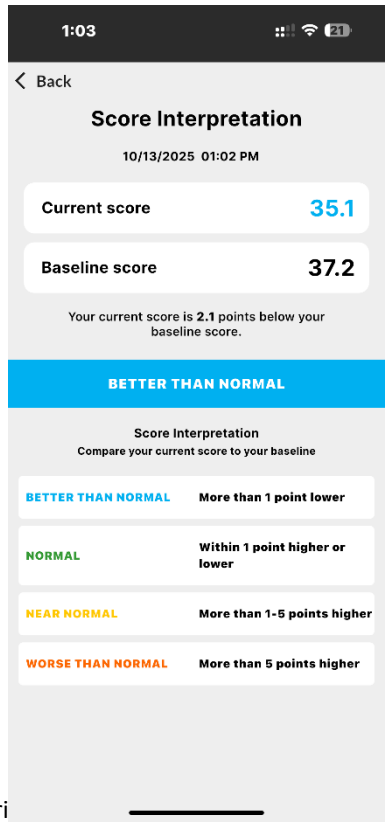


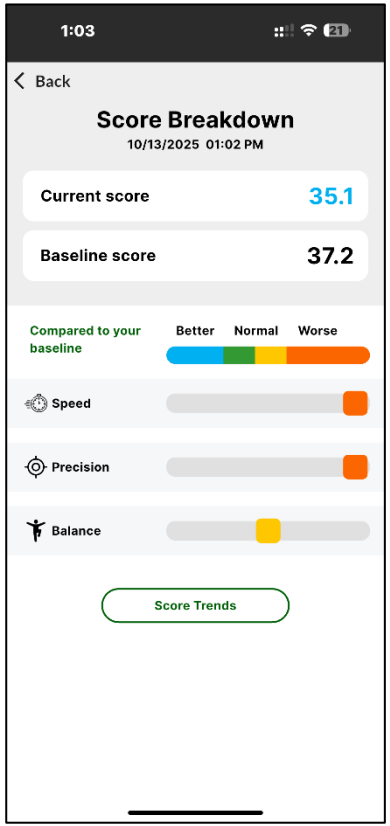


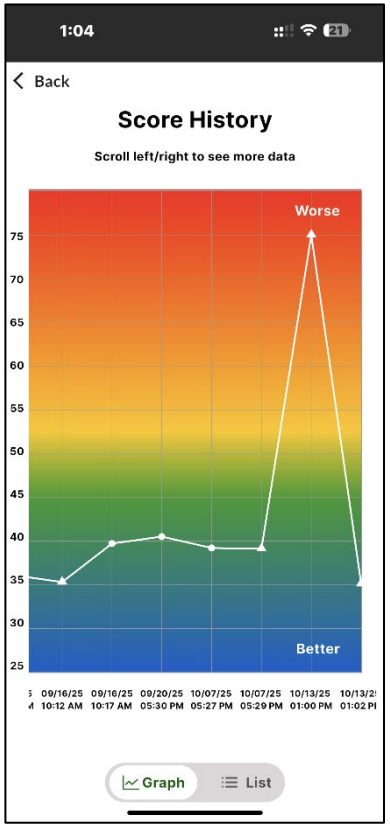


Druid Tasks – Results Screen Shots









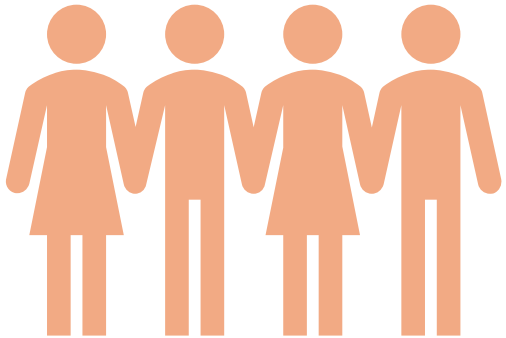
Methodology- Participants

Sample Size: A total of 21 healthy adults recruited.

Demographics: Aged 23–65 (8 female, 13 male).

Enrolment Criteria:

- Previous experience with alcohol and/or cannabis.
- No medical conditions.
- No prior DRUID app use within the last year.
- Abstinence from alcohol, cannabis, nicotine, and caffeine for 24 hours prior.



Group Assignment: Participants self-selected into either the alcohol (n=10) or cannabis (n=11) group. Three individuals participated in both sections of the study.

Control Group: One control participant was included in each group and did not consume any substance.

Alcohol Group

Substance: Consumption of 80-proof vodka.

Endpoint: Reaching a breath alcohol concentration (BrAC) of 0.10% or higher.

Assessments:

- **Timeline:** Measurements were taken at baseline and then at ten 30-minute intervals post-consumption.
- **Data Points:** DRUID assessments were conducted alongside BrAC measurements.

DRUID Impairment Cutoff: A 5-point or greater increase from an individual's baseline score was considered significant impairment.

Cannabis Group

Substance: Ad libitum consumption of cannabis (smoked or vaped).

Endpoint: Reaching a participant's desired level of intoxication.

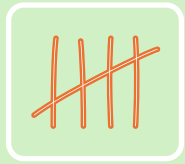
Assessments:

- **Timeline:** DRUID tests were conducted at baseline, immediately after consumption, and then at ten 30-minute intervals.
- **Benchmark:** A Certified Drug Recognition Expert (DRE) performed evaluation prior to consumption and after the first post-consumption DRUID test.

DRUID Impairment Cutoff: A 5-point or greater increase from an individual's baseline score was considered significant impairment.

Results - Alcohol

High Impairment Detection: 7 of 9 participants showed significant DRUID score increase of 5 points or more. Remaining 2 had a score increase of 4.8 and 4.6

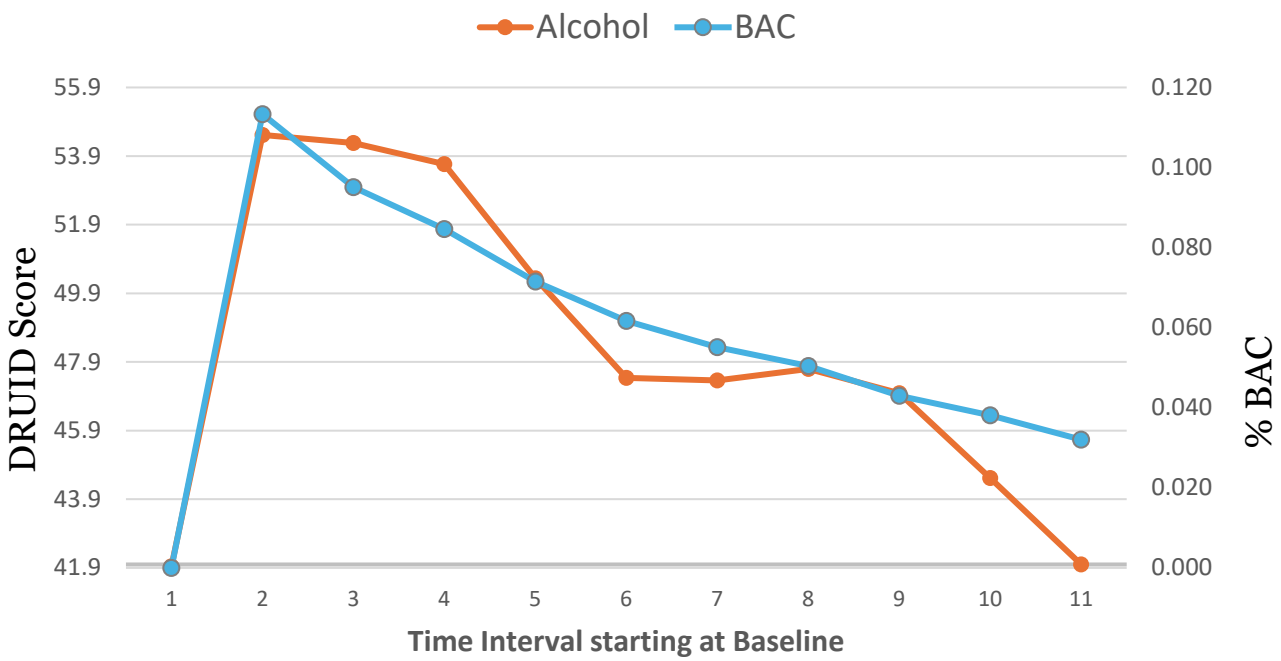


Average Score Increase: The average increase was 18.0 points at peak impairment (range 5.7-35.3), indicating strong detection of alcohol-induced impairment.

Correlation with BAC: DRUID scores closely tracked BAC levels, decreasing as BAC declined.

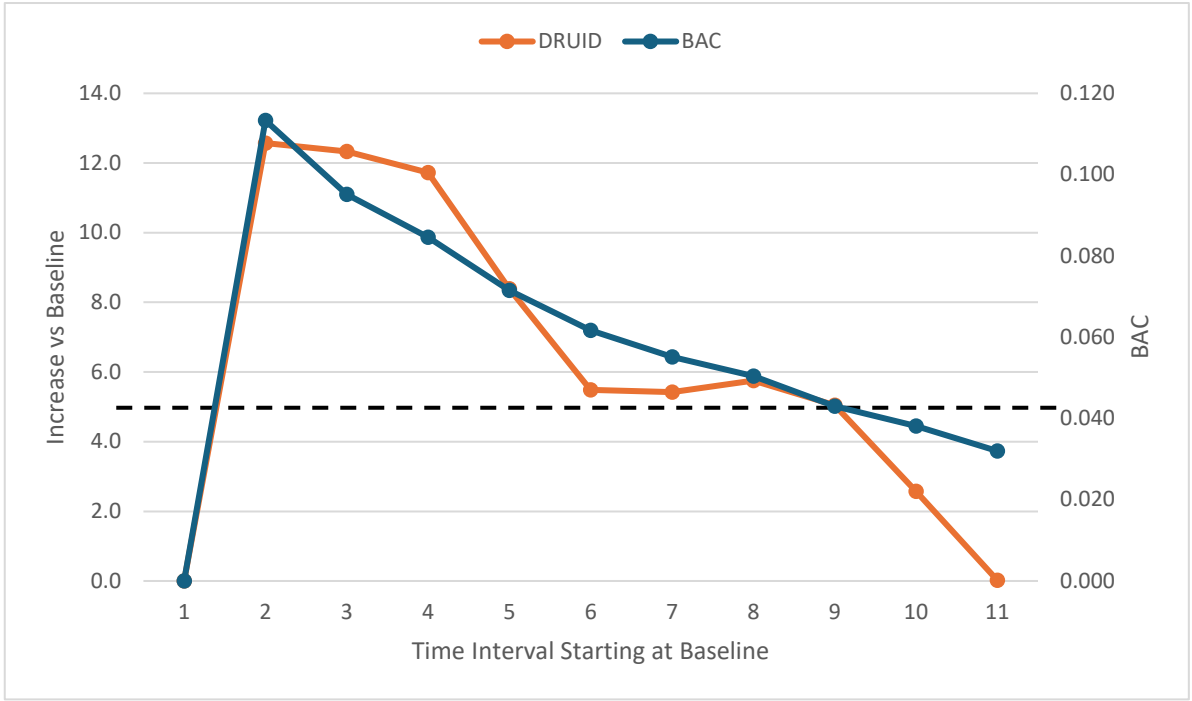
Consistency with Prior Research: This supports previous research by Richman and May (2019) showing a proportional relationship between DRUID scores and alcohol intoxication.

Alcohol: DRUID v/s BAC - Average Raw Scores Over 5 Hours



Round	% BAC	Alcohol
Baseline	0.000	41.9
1	0.113	54.5
2	0.095	54.3
3	0.085	53.7
4	0.072	50.3
5	0.062	47.4
6	0.055	47.4
7	0.050	47.7
8	0.043	47.0
9	0.038	44.5
10	0.032	42.0

Alcohol: DRUID v/s BAC - Average Score Difference From Baseline



Round	% BAC	Alcohol
Baseline	0.000	0.0
1	0.113	12.6
2	0.095	12.3
3	0.085	11.7
4	0.072	8.4
5	0.062	5.5
6	0.055	5.4
7	0.050	5.8
8	0.043	5.0
9	0.038	2.6
10	0.032	0.0

Results - Cannabis

High Alignment with DRE: 9 out of 11 participants (82%) showed alignment between DRUID and DRE assessments.

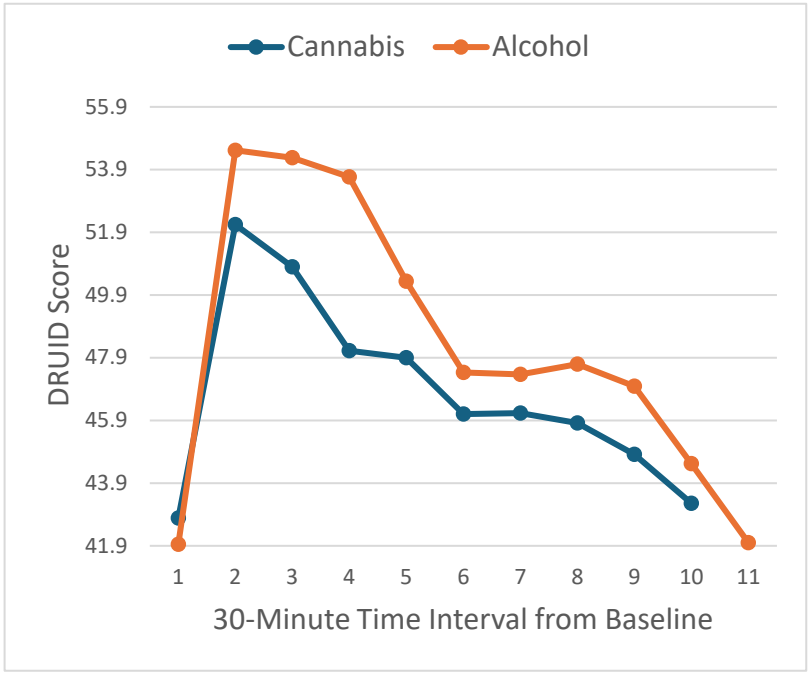
Average Score Increase: The average DRUID score-difference from baseline at peak impairment was 12.3 points (range 5.6-20.9).

Outliers: In two cases, the DRE indicated impairment while DRUID scores (3.8 and 2.2) did not meet the 5-point threshold.

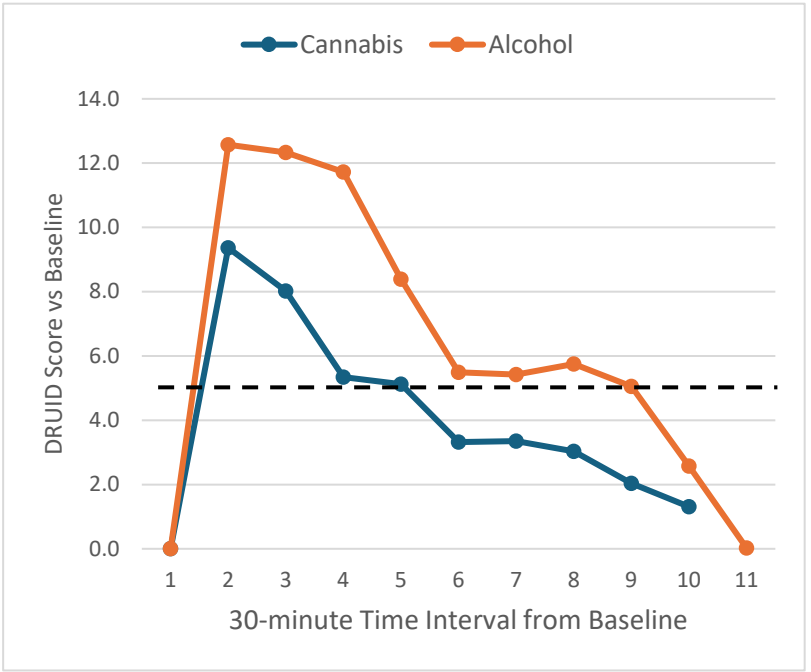
Supporting Evidence: These findings are consistent with previous studies on DRUID and cannabis impairment. Spindle et al. (2021), Karoly et al. (2022), and Zamarripa et al. (2025) have all demonstrated DRUID's sensitivity to cannabis-induced impairment.

DRUID Scores after Cannabis and Alcohol Ingestion Collected at 30-minute Intervals

DRUID RAW SCORES



DRUID SCORE CHANGE FROM BASELINE



Conclusion

Summary: The DRUID® app successfully detected impairment in a controlled setting for both alcohol and cannabis use.

Validation: DRUID results showed strong alignment with both DRE evaluations and BAC measurements.

Implication: The results suggest the DRUID app is a promising and viable tool for real-time impairment screening.

Contact Information

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