

Development and Initial Validation of Marijuana Identity Implicit Association Tests (MJ-IATs)

Among Late Adolescents in Washington State

Jason J. Ramirez, Christine M. Lee, Elliot C. Wallace & Kristen P. Lindgren

University of Washington, Center for the Study of Health and Risk Behaviors, Seattle, WA



INTRODUCTION

- There is an urgent need to identify risk markers and targets for prevention and intervention of marijuana misuse among adolescents in the U.S. Rates of daily use are at or near all-time highs and perceptions of risk are at historic lows among 8th, 10th, and 12th graders in the Monitoring the Future study despite known worse long-term health outcomes associated with earlier age of marijuana use onset (Johnston et al., 2021).
- One important risk factor for alcohol and tobacco misuse is the extent to which one identifies with each substance. This aspect of identity can be measured with adaptations of the Implicit Association Test (IAT), a computerized reaction time measure that aims to assess associations held in memory between constructs (e.g., marijuana and one's self-concept). IATs include various stimuli presented as pictures or words on a computer screen to represent the constructs of interest for measurement.
- The overarching aims of this study were to develop and validate two Marijuana Identity IATs among late adolescents in Washington State, one using images and another using words to represent marijuana and its control category.

METHODS

Participants and Procedures

- The current study included 169 adolescents between the ages of 15-18 ($M_{age} = 16.9$, $SD_{age} = 0.9$, 50% female, 66% high school student) with recruitment stratified by marijuana use (40 lifetime non-users, 45 light users: 1-3 use days in past 3 months, 32 moderate users: 4-11 use days in past 3 months, 51 heavy users: 12+ use days in past 3 months) and gender. Data described here come from the online baseline assessment that included the Marijuana Identity IATs and self-report measures of marijuana use, consequences, and explicit (i.e., self-reported) marijuana identification.

Measures

- Implicit Association Tests:** Implicit associations between "marijuana" and one's identity were assessed with two versions of Marijuana Identity IATs. Participants were presented with stimuli individually presented in the center of a computer screen and asked to sort these stimuli into one of four categories using two computer keys. Positive scores on an IAT indicate faster reaction times categorizing "Marijuana" and "Me" stimuli with the same key compared to categorizing "Marijuana" and "Not Me" stimuli with the same key. Both IATs used the words "me," "mine," "my," and "self" to represent Me, and "other," "them," "theirs," and "they" to represent Not Me. The word-based IAT used the words "stoner," "smoke," "use," and "high" to represent Marijuana, and "Abstainer," "Abstain," "Refrain," and "Sober" to represent Abstainer. The image-based version used the following images:



- Typical Marijuana Use** was assessed using the Marijuana Daily Questionnaire (MDQ; Lee, Kilmer, Neighbors, Atkins, Zheng, Walker, & Larimer, 2013) in which participants are asked to report how many hours they were high on each day of a typical week over the past three months. **Marijuana Consequences** were assessed using the Marijuana Consequences Checklist (Lee et al., 2020), in which participants reported the frequency of 26 consequences over the past three months. **Explicit Marijuana Identity** was assessed with a self-report semantic differential scale assessing the extent to which one views their self as a marijuana user relative to viewing others as marijuana users.

Data collection and poster preparation were supported by R21DA045092 (PI: Ramirez) from the National Institute on Drug Abuse and by a grant from the Alcohol and Drug Abuse Institute (ADAI) at the University of Washington. Please send correspondence to Jason Ramirez at jjramirz@uw.edu

RESULTS

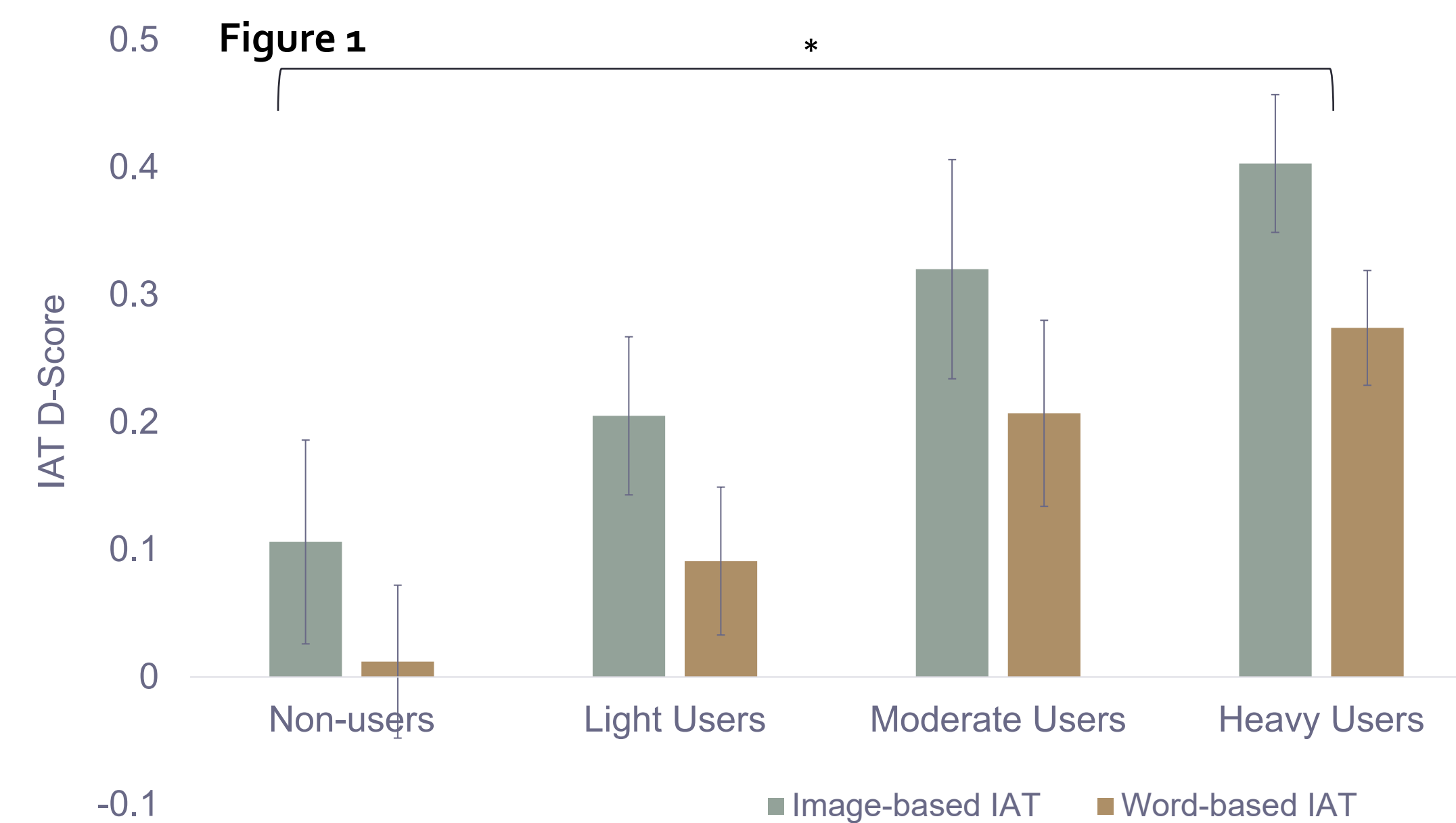
Descriptive Statistics and Psychometrics

- See Table 1 below. Both IATs had mean d-scores significantly greater than zero ($ps < .05$) indicating faster average reaction times when "me" was paired with "marijuana" (and "not me" paired with the control category) relative to when "me" was paired with the control category (and "marijuana" paired with "not me"). Both IATs were normally distributed with little skewness, and the image-based IAT had better internal consistency although both were in range of other typical substance-related IATs.

	Image-Based MJ Identity IAT	Word-Based MJ Identity IAT
Mean D-Score	0.26	0.15
Standard Deviation	0.45	0.38
Skewness	-0.23	-0.13
Internal Consistency (Split-half Reliability)	0.52	0.40

Discriminant Validity

- IAT scores did not differ on either version as a function of sex. IAT scores did differ between individuals according to user type with significant pairwise differences between non-users and heavy users on both IATs ($ps < .05$, See Figure 1).



Concurrent Validity

	Marijuana Use			Marijuana Consequences		
	B	SE B	Wald Chi-Square	B	SE B	Wald Chi-Square
	Model 1			Model 1		
Biological Sex	-0.40	0.22	3.38	-0.21	0.16	1.68
Age	-0.01	0.12	0.01	0.00	0.09	0.00
Word-Based IAT	1.11	0.31	12.80***	0.99	0.23	17.78***
	Model 2			Model 2		
Biological Sex	-0.26	0.19	1.82	-0.06	0.17	0.12
Age	-0.13	0.11	1.46	-0.06	0.10	0.41
Word-Based IAT	0.31	0.29	1.13	0.36	0.25	2.09
Explicit MJ Identity	0.41	0.05	65.49***	0.29	0.05	41.95***

Table 2: Negative binomial regression models including word-based IAT scores. Separate models were run for separate outcomes: Marijuana Use and Marijuana Consequences. Models 1 and 2 are distinguished by the inclusion of explicit marijuana identity in Model 2. Sex coded as male = 0, female = 1. * $p < .05$, ** $p < .01$, *** $p < .001$

	Marijuana Use			Marijuana Consequences		
	B	SE B	Wald Chi-Square	B	SE B	Wald Chi-Square
	Model 1			Model 1		
Biological Sex	-0.48	0.22	4.61*	-0.17	0.16	1.12
Age	-0.04	0.12	0.12	-0.01	0.09	0.02
Image-Based IAT	0.82	0.29	7.93**	0.61	0.19	8.10**
	Model 2			Model 2		
Biological Sex	-0.33	0.20	2.90	-0.08	0.17	0.23
Age	-0.13	0.11	1.41	-0.05	0.10	0.29
Image-Based IAT	0.58	0.21	7.74**	0.48	0.21	5.36*
Explicit MJ Identity	0.42	0.05	71.74***	0.31	0.04	51.95***

Table 3: Negative binomial regression models including image-based IAT scores. Separate models were run for separate outcomes: Marijuana Use and Marijuana Consequences. Models 1 and 2 are distinguished by the inclusion of explicit marijuana identity in Model 2. Sex coded as male = 0, female = 1. * $p < .05$, ** $p < .01$, *** $p < .001$

CONCLUSIONS

- The findings demonstrate relationships between IAT performance and marijuana use outcomes that compare favorably to past marijuana-related IATs lending support to implicit associations between marijuana and the self as an important marker of marijuana use behaviors.
- Both word- and image-based versions of MJ Identity IATs were associated with marijuana use and consequences, however only the image-based version was uniquely associated with outcomes after controlling for participants' self-reported MJ identification.
- The internal consistency of these IATs is within range of previous substance-related IATs although lower compared to self-report measures which we caution when considering IATs as tools for screening.
- Despite this, consistent associations with use and consequences suggest potential for marijuana identification as a causal candidate for marijuana misuse, however future experimental and longitudinal research will be needed to examine this possibility.

SELECTED REFERENCE

Johnston, L. D., Miech, R. A., O'malley, P. M., Bachman, J. G., Schulenberg, J. E., & Patrick, M. E. (2021). Monitoring the Future national survey results on drug use 1975-2020: Overview, key findings on adolescent drug use. *Journal of Consulting and Clinical Psychology, 89*, 702-709.

Lee, C.M., Kilmer, J.R., Neighbors, C., Atkins, D.C., Zheng, C., Walker, D.D., & Larimer, M.E. (2013). Indicated prevention for college student marijuana use: A randomized controlled trial. *Journal of Consulting and Clinical Psychology, 81*, 702-709.

Lee, C. M., Kilmer, J. R., Neighbors, C., Cadigan, J. M., Fairlie, A. M., Patrick, M. E., Logan, D. E., Walter, T., & White, H. R. (2020). A Marijuana Consequences Checklist for Young Adults with Implications for Brief Motivational Intervention Research. *Prevention Science, 1-11*.