

Does Cannabis Use in Young Adulthood Predict Changes in Psychological and Functional Outcomes? Insights from Self-report and Hair Data

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** equal contribution*



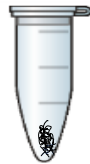
Background

- Mental health problems high during young adulthood ¹
 - Teenage cannabis use associated with worse functioning at age 20, with mixed evidence for psychopathology ²
 - How is **cannabis use at age 20** associated with **psychopathology and functioning at age 24**?
- **Mixed epidemiological evidence from studies using self-report or hair data to measure cannabis use/THC exposure**
- **Can hair data be useful to test these associations?**

Hair analysis methods



Collection



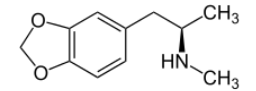
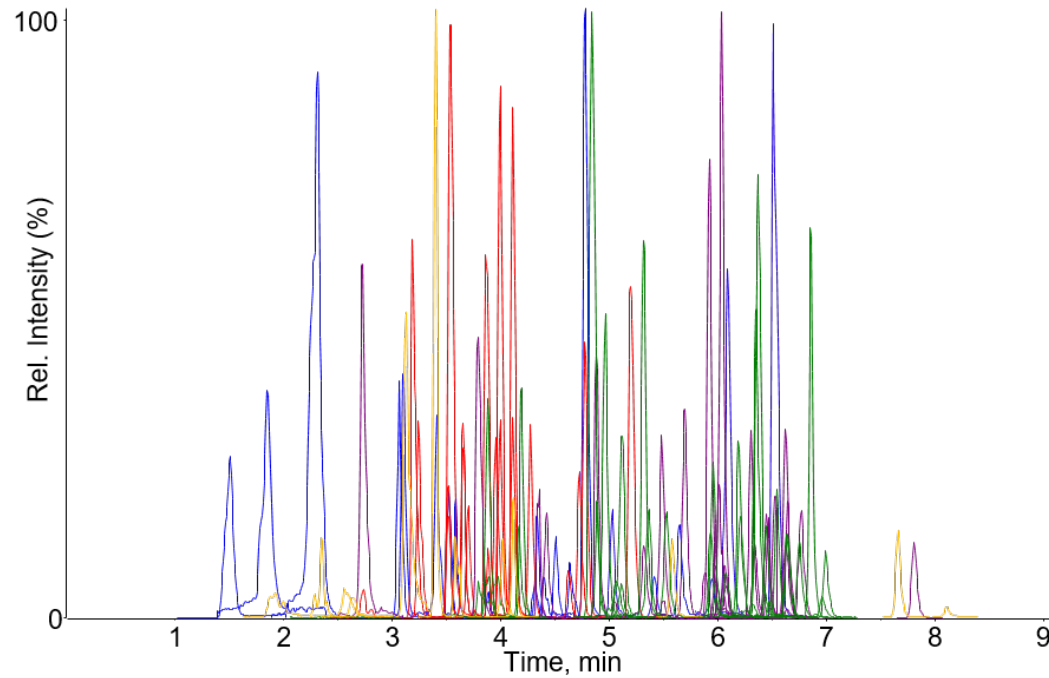
Extraction



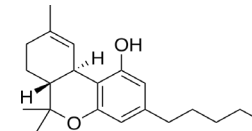
Quantification: Liquid chromatography-mass spectrometry
LC-MS/MS



Hair analysis methods

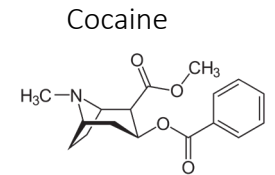


3,4-Methylenedioxymethamphetamine (MDMA)



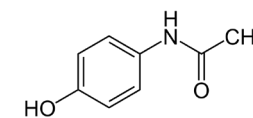
Delta-9-tetrahydrocannabinol (THC)

output: value
in pg/mg

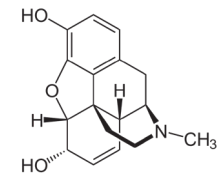


Cocaine

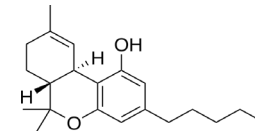
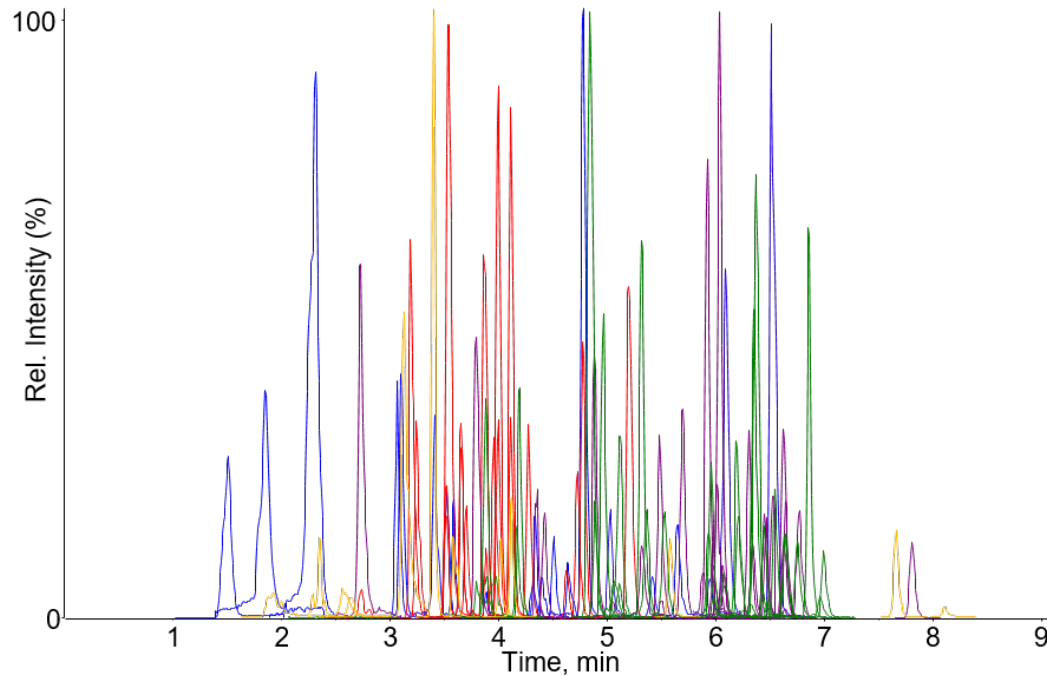
Paracetamol



Opioids



A quick note on THC



Delta-9-tetrahydrocannabinol (THC)

output: value
in pg/mg

- **Detected in weekly-daily cannabis users**
- **Not detected in occasional cannabis users**

Total score of
THC + CBN
used for analyses

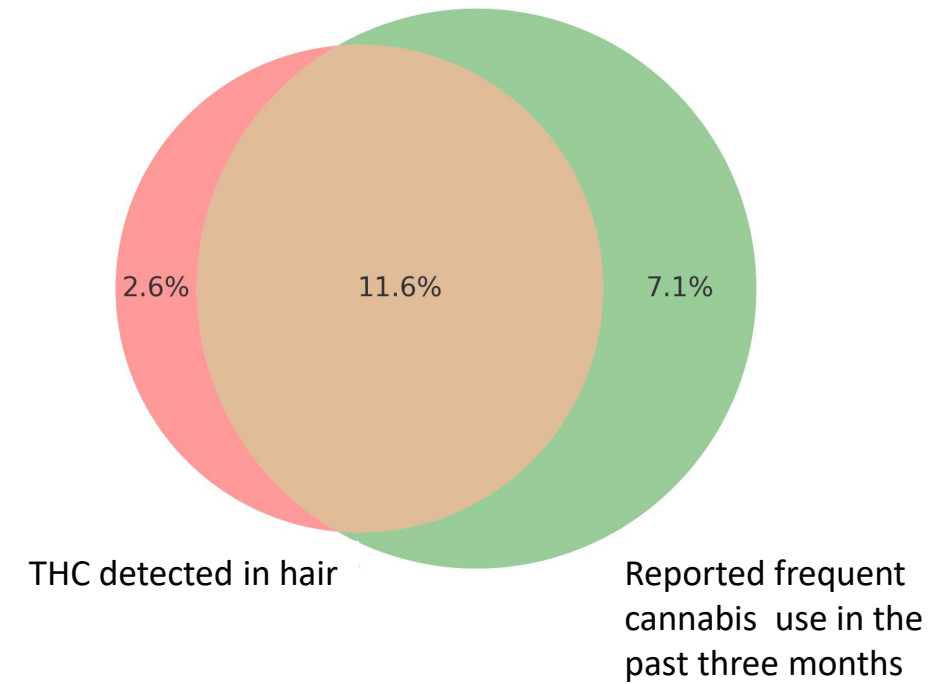
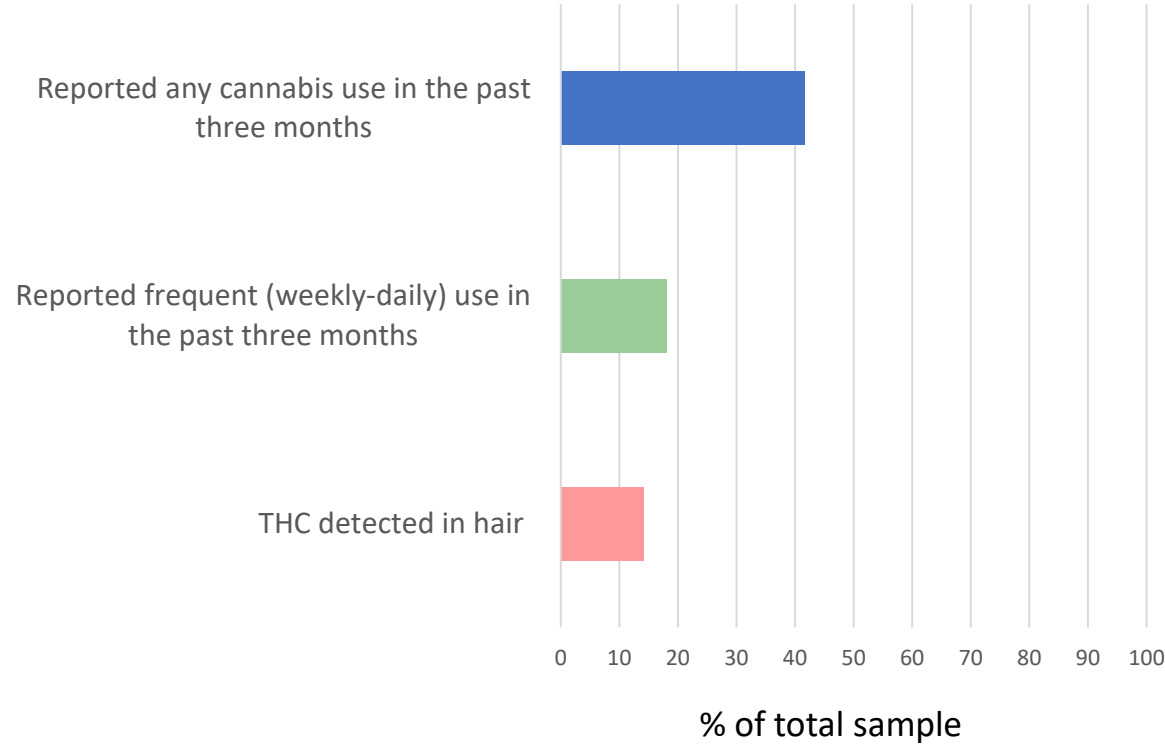
Self-reported substance use

How often did you consume this in the previous three months?

→ time-window reflected in hair

- **Never**
- **Once**
- **2-5 times**
- **Weekly**
- **(almost) daily**

THC in hair vs self-report at age 20

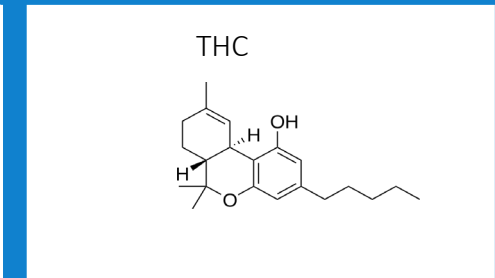




N = 863

Psychopathology and functioning age 20

THC exposure in hair



Self-reported cannabis use

Never
Once
2-5 times
Weekly
(almost) daily

Age 20



controlling for
Biological sex
migration background
SES

Psychopathology

- Psychosis symptoms
- Anxiety/depression
- Aggression
- Problematic substance use

Functioning

- General well-being
- Education/Employment
- Delinquency

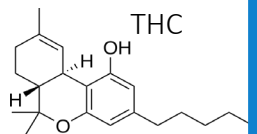
Age 24



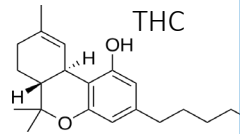
N = 863

Psychopathology and functioning

THC exposure in hair



Pg/mg



Yes/No



Psychopathology

Psychosis symptoms

Anxiety/depression

Aggression

Problematic substance use

Functioning

General well-being

Education/Employment

Delinquency

Age 20

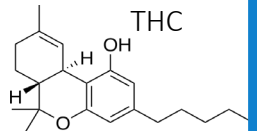
Age 24



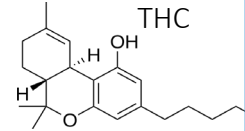
N = 863

Psychopathology and functioning

THC exposure in hair



Pg/mg



Yes/No

Self-reported cannabis use

Never
Once
2-5 times
Weekly
(almost) daily
Score 1-4

Weekly
To Daily
Yes/No

Age 20



Psychopathology

- Psychosis symptoms
- Anxiety/depression
- Aggression
- Problematic substance use

Functioning

- General well-being
- Education/Employment
- Delinquency

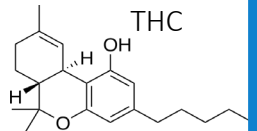
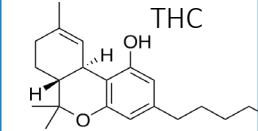
Age 24



N = 863

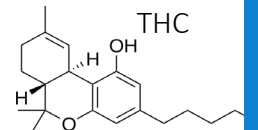
Psychopathology and functioning

THC exposure in hair

 Pg/mg	 Yes/No
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Self-reported cannabis use

Never Once 2-5 times Weekly (almost) daily Score 1-4	Weekly To Daily Yes/No
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 Yes/No
AND AND/OR
Weekly To Daily Yes/No



Psychopathology

- Psychosis symptoms
- Anxiety/depression
- Aggression
- Problematic substance use

Functioning

- General well-being
- Education/Employment
- Delinquency

Age 20

Age 24

		Outcomes at age 24													
		Psychosis symptoms		Problematic substance use (excluding cannabis)		Internalizing symptoms		General Well-being		Delinquency (excluding drug-related offenses)		Not in education, employment		Aggression (reactive, physical, proactive)	
Variables indexing cannabis exposure at age 20		β	p	OR	p	β	p	β	p	β	p	OR	p	β	p
Binary coding															
Cannabis detected in hair (1= yes)		.089	.004	2.58	<.001	.064	.024	-.078	.010	.015	.611	5.34	<.001	.078	.008
Self-reported frequent cannabis use (weekly/daily) vs occasional or no use		.105	.001	1.98	.004	.073	.010	-.079	.009	.021	.502	2.58	.033	.074	.011
Continuous/ordinal coding															
Log of concentration of cannabis detected in hair		.105	.001	1.27	.001	.063	.026	-.063	.038	.017	.575	1.00	.729	.087	.003
Likert scale self-reported cannabis use		.127	<.001	1.27	<.001	.088	.002	-.092	.003	.078	.014	1.40	.012	.079	.008
Composite binary codes from self-reported and hair data															
Self-reported frequent cannabis use and cannabis detected in hair (1= yes)		.094	.002	3.20	.001	.079	.005	-.081	.008	.035	.242	2.53	.058	.098	.001
Self-reported frequent cannabis use and/or cannabis detected in hair		0.103	<.001	1.89	.005	.062	.029	-.079	.010	.005	.876	5.43	<.001	.060	.039

controlling for: biological sex, migration background, SES, outcome measured at age 20

Results

- **All cannabis predictors** from age 20 were significantly associated with an **increase of psychosis symptoms, internalizing symptoms, and aggression and higher odds of problematic substance use at age 24.**
- All cannabis predictors from age 20 were significantly associated with a **decrease in general well-being** at age 24.
- No robust results for other measures of functioning (delinquency, not being in education/employment).



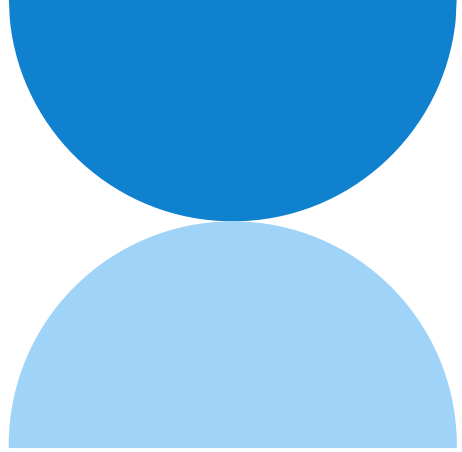
Conclusion

- Although THC not detected in all cannabis users, **hair data was “just as good” as self-reports in explaining variance in the outcomes.** However, **no evidence that it is actually better than self-reports.**
- **Assaying hair data more expensive than collecting self-reports, important to consider.**
- More research needed to understand mental health trajectories of cannabis users in young adulthood
- In light of a possible legalization in Switzerland, it is important to keep this on the research agenda



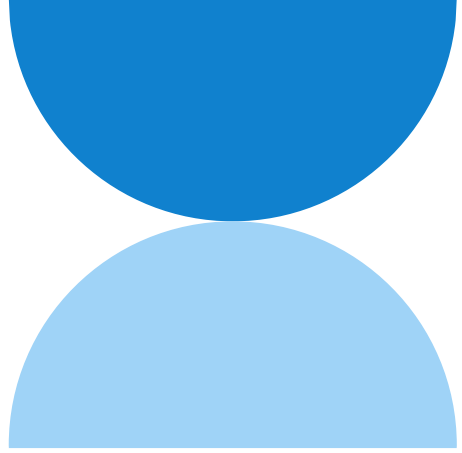
Limitations

- No measure of the components (cannabinoids) of the actual cannabis consumed
- Outcomes in this study often present co-morbidly: e.g. anxiety/depression, psychosis, problematic substance use
- No inferences about causation possible

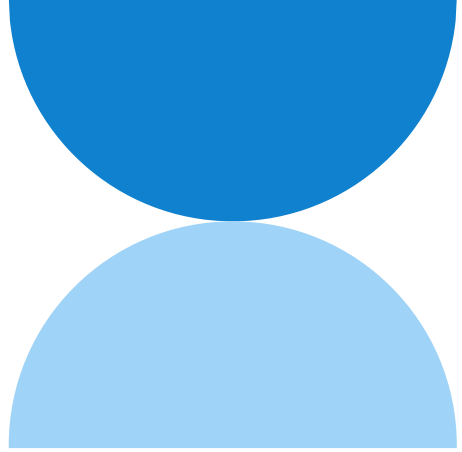


Looking forward

- How would these results look with a substance that is better detected in hair and tends to be under-reported, such as **cocaine**?



Thank you for listening!



Extra slides

Psychosis symptoms

	Psychosis symptoms N = 862				
	β	B	Lower bound	Upper bound	p
Binary coding					
Cannabis detected in hair (1= yes)	0.089	0.131	0.042	0.219	0.004
Self-reported frequent cannabis use (weekly/daily) vs occasional or no use	0.105	0.135	0.057	0.213	0.001
Continuous/ordinal coding					
Log of concentration of cannabis detected in hair	0.105	0.034	0.014	0.053	0.001
Likert scale self-reported cannabis use	0.127	0.045	0.023	0.066	<.001
Composite binary codes from self-reported and hair data					
Self-reported frequent cannabis use <u>and</u> cannabis detected in hair (1= yes)	0.094	0.149	0.053	0.246	.002
Self-reported frequent cannabis use <u>and/or</u> cannabis detected in hair	0.103	0.126	0.052	0.201	<.001

Problematic substance use (excluding cannabis)

	Problematic substance use (excluding cannabis)				
	N = 860				
	OR	Estimate	Lower bound	Upper bound	<i>p</i>
Binary coding					
Cannabis detected in hair (1= yes)	2.58	0.947	1.50	4.58	<.001
Self-reported frequent cannabis use (weekly/daily) vs occasional or no use	1.98	0.682	1.24	3.19	.004
Continuous/ordinal coding					
Log of concentration of cannabis detected in hair	1.27	0.238	1.12	1.46	.001
Likert scale self-reported cannabis use	1.27	0.240	1.12	1.45	<.001
Composite binary codes from self-reported and hair data					
Self-reported frequent cannabis use <u>and</u> cannabis detected in hair (1= yes)	3.20	1.162	1.70	6.36	.001
Self-reported frequent cannabis use <u>and/or</u> cannabis detected in hair	1.89	0.635	1.22	2.95	.005

Internalizing symptoms

	Internalizing symptoms N = 862				
	β	B	Lower bound	Upper bound	<i>p</i>
Binary coding					
Cannabis detected in hair (1= yes)	0.064	0.155	0.021	0.290	.024
Self-reported frequent cannabis use (weekly/daily) vs occasional or no use	0.073	0.156	0.037	0.275	.010
Continuous/ordinal coding					
Log of concentration of cannabis detected in hair	0.063	0.034	0.004	0.063	.026
Likert scale self-reported cannabis use	0.088	0.051	0.019	0.084	.002
Composite binary codes from self-reported and hair data					
Self-reported frequent cannabis use <u>and</u> cannabis detected in hair (1= yes)	0.079	0.211	0.064	0.357	.005
Self-reported frequent cannabis use <u>and/or</u> cannabis detected in hair (1= yes)	0.062	0.126	0.013	0.240	.029

General well-being

	General Well-being N = 862				
	β	B	Lower bound	Upper bound	p
Binary coding					
Cannabis detected in hair (1= yes)	-0.078	-0.141	-0.249	-0.034	.010
Self-reported frequent cannabis use (weekly/daily) (1= yes)	-0.079	-0.127	-0.222	-0.031	.009
Continuous/ordinal coding					
Log of concentration of cannabis detected in hair	-0.063	-0.025	-0.049	-0.001	.038
Likert scale self-reported cannabis use	-0.092	-0.040	-0.066	-0.013	.003
Composite binary codes from self-reported and hair data					
Self-reported frequent cannabis use <u>and</u> cannabis detected in hair (1= yes)	-0.081	-0.160	-0.277	-0.042	.008
Self-reported frequent cannabis use <u>and/or</u> cannabis detected in hair (1= yes)	-0.079	-0.120	-0.211	-0.029	.010

Delinquency (excluding drug-related offenses)

	Delinquency (excluding drug-related offenses)				
	N = 855				
	β	B	Lower bound	Upper bound	p
Binary coding					
Cannabis detected in hair (1= yes)	0.015	0.074	-0.210	0.357	.611
Self-reported frequent cannabis use (weekly/daily) vs occasional or no use	0.021	0.088	-0.169	0.345	.502
Continuous/ordinal coding					
Log of concentration of cannabis detected in hair	0.017	0.018	-0.045	0.081	.575
Likert scale self-reported cannabis use	0.078	0.090	0.018	0.161	.014
Composite binary codes from self-reported and hair data					
Self-reported frequent cannabis use <u>and</u> cannabis detected in hair (yes/no)	0.035	0.186	-0.125	-0.125	.242
Self-reported frequent cannabis use <u>and/or</u> or cannabis detected in hair	0.005	0.019	-0.225	0.263	.876

Not in education, employment

	Not in education, employment N = 861				
	OR	Estimate	Lower bound	Upper bound	p
Binary coding					
Cannabis detected in hair (1= yes)	5.34	1.67	2.21	12.81	<.001
Self-reported frequent cannabis use (weekly/daily) vs occasional or no use	2.58	0.948	1.05	6.12	.033
Continuous/ordinal coding					
Concentration of cannabis detected in hair (pg/mg)	1.00	0.00	1.00	1.00	.729
Likert scale self-reported cannabis use	1.40	0.335	1.08	1.82	.012
Composite binary codes from self-reported and hair data					
Self-reported frequent cannabis use <u>and</u> cannabis detected in hair (1= yes)	2.53	0.929	0.90	6.38	.058
Self-reported frequent cannabis use <u>and/or</u> cannabis detected in hair	5.43	1.69	2.28	13.52	<.001

Aggression

	Aggression (reactive, physical, proactive)				
	N = 862				
	β	B	Lower bound	Upper bound	p
Binary coding					
Cannabis detected in hair (1= yes)	0.078	0.083	0.022	0.144	0.008
Self-reported frequent cannabis use (weekly/daily) vs occasional or no use	0.074	0.070	0.016	0.124	0.011
Continuous/ordinal coding					
Log of concentration of cannabis detected in hair	0.087	0.020	0.007	0.034	0.003
Likert scale self-reported cannabis use	0.079	0.020	0.005	0.035	0.008
Composite binary codes from self-reported and hair data					
Self-reported frequent cannabis use <u>and</u> cannabis detected in hair (1= yes)	0.098	0.114	0.048	0.180	0.001
Self-reported frequent cannabis use <u>and/or</u> cannabis detected in hair (1= yes)	0.060	0.054	0.003	0.106	0.039