Personalizing Drug Prevention by Targeting Personality Risk Factors for Cannabis Misuse

Hanie Edalati, PhD & Patricia J. Conrod, PhD,

Department of psychiatry, University of Montreal, CHU Ste-Justine

Past Year Use of Tobacco Cigarettes, Alcohol, Cannabis, and Prescription Opioids, 1999-2017 OSDUHS (Grades 7-12)
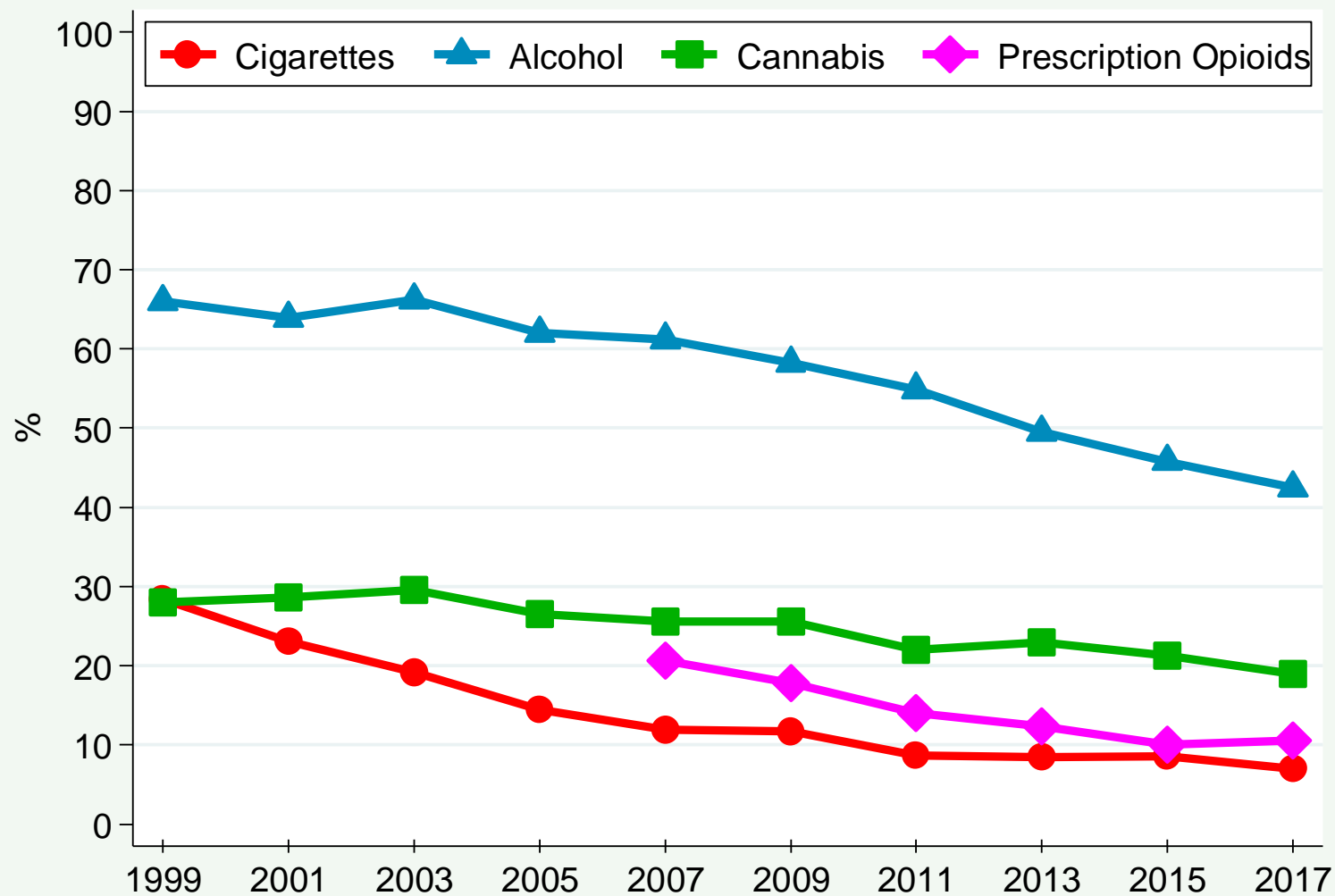
Note: Use of prescription opioids refers to nonmedical use, not asked between 1999 and 2005

The effectiveness of prevention programs involving psychosocial and educational intervention with young people

4 meta-analyzes indicate limited evidence for the effectiveness of universal approaches to drug and alcohol prevention (Tobler et al., 2001, 2003, Foxcroft, 2006, Faggiano, 2009).

Evidence-based programs:
    Life Skills Training (LSTP, UNPlugged, Climate Schools)
        Social norms training (changing attitudes about norms)
        Drug refusal skills (promote the ability to refuse alcohol and drugs)
        Generic coping skills (promoting adaptive skills)
Strengthening Families Program (Spoth, Redmon, & Shin, 1998)
communication /and supervision
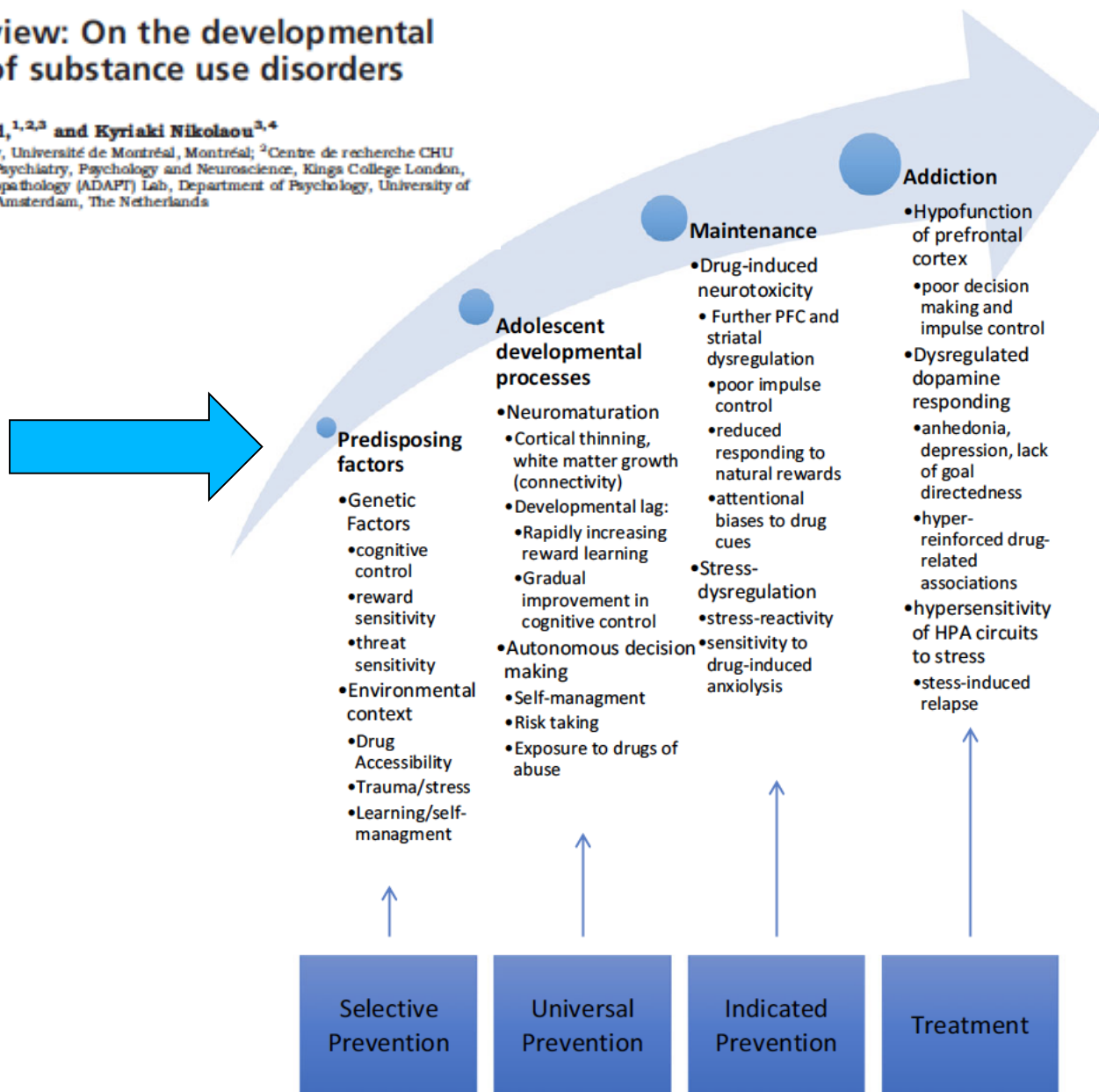Individual skills training / promoting adaptive capacity in adolescents

Several intervention sessions (3 months to 3 years)
Efficacy is limited to mild effects on adolescent drug use (NNT = 33-100)

Developmental neuroscience of substance use

Annual Research Review: On the developmental neuropsychology of substance use disorders

Patricia J. Conrod,[1,2,3] and Kyriaki Nikolaou[3,4]

[1]Faculty of Medicine, Department of Psychiatry, Université de Montréal, Montréal; [2]Centre de recherche CHU Sainte-Justine, Montréal, Canada; [3]Institute of Psychiatry, Psychology and Neuroscience, Kings College London, London, UK; [4]Addiction Development and Psychopathology (ADAPT) Lab, Department of Psychology, University of Amsterdam, Amsterdam, The Netherlands

Predisposing factors

- Genetic Factors
  - cognitive control
  - reward sensitivity
  - threat sensitivity
- Environmental context
  - Drug Accessibility
  - Trauma/stress
  - Learning/self-managment

Adolescent developmental processes

- Neuromaturation
  - Cortical thinning, white matter growth (connectivity)
  - Developmental lag:
    - Rapidly increasing reward learning
    - Gradual improvement in cognitive control
- Autonomous decision making
  - Self-managment
  - Risk taking
  - Exposure to drugs of abuse

Maintenance

- Drug-induced neurotoxicity
  - Further PFC and striatal dysregulation
  - poor impulse control
  - reduced responding to natural rewards
  - attentional biases to drug cues
- Stress-dysregulation
  - stress-reactivity
  - sensitivity to drug-induced anxiolysis

Addiction

- Hypofunction of prefrontal cortex
  - poor decision making and impulse control
- Dysregulated dopamine responding
  - anhedonia, depression, lack of goal directedness
  - hyper-reinforced drug-related associations
- hypersensitivity of HPA circuits to stress
  - stess-induced relapse

| Selective Prevention | Universal Prevention | Indicated Prevention | Treatment |

3 Overview of the neurodevelopmental processes implicated in transition to addiction

Table 3.1: Risk Factors for Adolescent and Young Adult Substance Use

Risk Factors	Definition	Adolescent Substance Use	Young Adult Substance Use
Individual/Peer			
Early initiation of substance use[46,47]	Engaging in alcohol or drug use at a young age.	✔	✔
Early and persistent problem behavior[48,49]	Emotional distress, aggressiveness, and "difficult" temperaments in adolescents.	✔	
Rebelliousness[48,50]	High tolerance for deviance and rebellious activities.	✔	✔
Favorable attitudes toward substance use[51,52]	Positive feelings towards alcohol or drug use, low perception of risk.	✔	✔
Peer substance use[53-55]	Friends and peers who engage in alcohol or drug use.	✔	✔
Genetic predictors[56]	Genetic susceptibility to alcohol or drug use.	✔	✔
Family			

Conrod and Nikolaou, Journal of Child Psychology and Psychiatry, 2016
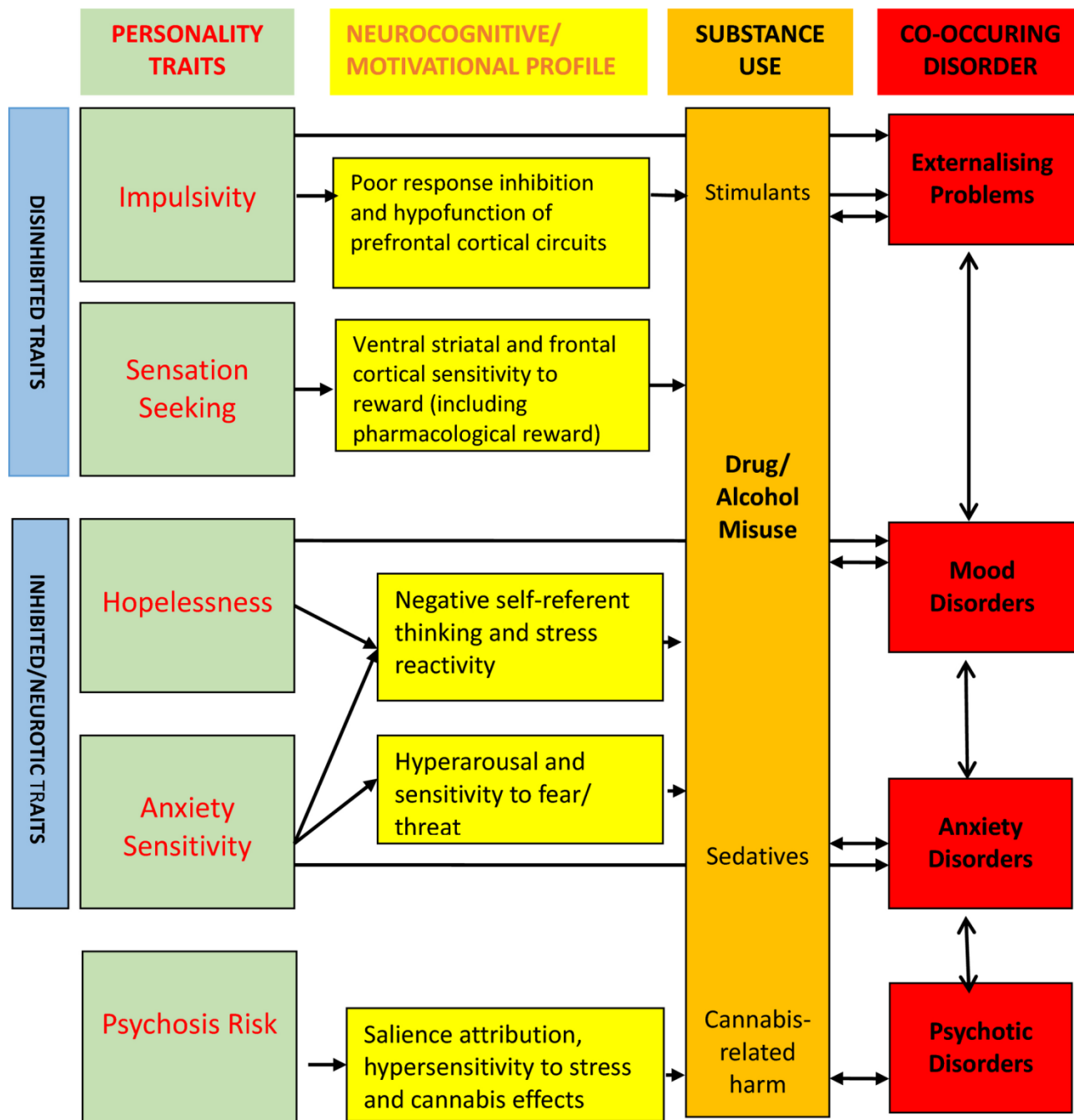
Substance Use Risk Profile Scale
Woicik et al., ACER, 2009

1. I am content.*
2. I often don't think things through before I speak.
3. I would like to skydive.
4. I am happy.*
5. I often involve myself in situations that I later regret being involved in.
6. I enjoy new and exciting experiences even if they are unconventional.
7. I have faith that my future holds great promise.*
8. It's frightening to feel dizzy or faint.
9. I like doing things that frighten me a little.
10. It frightens me when I feel my heart beat change.
11. I usually act without stopping to think.
12. I would like to learn how to drive a motorcycle.
13. I feel proud of my accomplishments.*
14. I get scared when I'm too nervous.
15. Generally, I am an impulsive person.
16. I am interested in experience for its own sake even if it is illegal.
17. I feel that I'm a failure.
18. I get scared when I experience unusual body sensations.
19. I would enjoy hiking long distances in wild and uninhabited territory.
20. I feel pleasant.*
21. It scares me when I'm unable to focus on a task.
22. I feel I have to be manipulative to get what I want.
23. I am very enthusiastic about my future.*

Asterisk (*) indicates reverse keyed item.

Substance Use Risk Profile Scale (SURPS)

- 4 dimensions:
  - Anxiety sensitivity, Negative Thinking, Impulsivity and Sensation Seeking
- Internal consistency (Woicik et al., 2009)
- Concurrent validity (Woicik et al., 2009; Schlaucht et al., 2014)

- Incremental validity (Woicik et al., 2009)

- Predictive validity (Krank et al., 2010)
- Test-retest reliability (Woicik et al., 2009)
- Sensitivity/specificity (Castellanos-Ryan et al, 2013)
- Generalisability, applications in different cultural and clinical contexts (Jolin-Castonguay et al., 2013; Schlaucht et al., 2014)
- Translated: French, German, Spanish, Czech, Dutch, Cantonese, Japanese, Sri Lankan (Robles-García et al., 2014; Omiya et al., 2012; Malmberg, et al., 2013; Chandrika Ismail, et al., 2009; Jolin-Castonguay et al., 2013)

Sensitivity and false positive rates (1-specificity) of Age 14 SURPS subscales in the prediction of Age 16 substance use, emotional and behavioural symptoms in British high school students (N = 1057). (Castellanos-Ryan et al., Alcohol Clin Exp Res. 2013 Jan;37 Suppl 1:E281-90. doi: 10.1111/j.1530-0277.2012.01931)

%	Hopelessness	Anxiety Sensitivity	Impulsivity	Sensation Seeking-R‡	Selecting HR adolescents based on ROC cut-offs	Selecting HR adolescents (1SD > mean cut-offs)†
	S, FP	S, FP	S, FP	S, FP	S, FP	S, FP
Monthly binging (13%)	20, 12	27, 31	**61, 32**	**48, 30**	72, 49	70, 42
Drinking problems (17%)	**49, 34**	32, 31	**55, 31**	36, 30	84, 63	75, 53
Smoking (9%)	**61, 49**	33, 30	**55, 33**	38, 30	81, 65	72, 55
Drug use (21%)	**60, 49**	27, 22	**54, 30**	**43, 28**	91, 75	74, 52
BSI depression (23%)	**54, 31**	**42, 28**	**51, 30**	34, 30	91, 70	73, 47
Emotional problems (13%)	**54, 34**	**59, 27**	**46, 34**	32, 31	91, 72	80, 53
Conduct problems (41%)	**26, 13**	33, 29	**58, 20**	**35, 28**	77, 50	72, 46
Hyperactivity problems (32%)	**26, 15**	37, 28	**58, 25**	**38, 28**	78, 55	74, 49

Table 5. Odds ratios for substance use, emotional and behavioural symptoms within the next 18 months (by T4) by personality subscale cut-offs (N = 1057).

Cut-off score	High Hopelessness (n=192) OR (95%CI) ≥16 vs. All	vs. LR (n=345)	High Anxiety Sensitivity (n=327) OR (95%CI) ≥13 vs. All	vs. LR (n=345)	High Impulsivity (n=248) OR (95%CI) ≥15 vs. All	vs. LR (n=345)	High Sensation Seeking-R‡ (n=329) OR (95%CI) ≥16 vs. All	vs. LR (n=345)
Early onset drinking	1.10 (0.68-1.80)	1.41 (0.78-2.54)	0.82 (0.53-1.27)	1.19 (0.69-2.03)	**2.43 (1.63-3.63)**	**2.46 (1.49-4.03)**	**1.77 (1.19-2.63)**	**1.93 (1.19-3.15)**
Weekly binging	1.10 (0.49-2.44)	1.46 (0.56-3.78)	0.39 (0.16-0.96)	0.68 (0.24-1.93)	1.66 (0.85-3.26)	1.88 (1.03-4.33)	**1.95 (1.02-3.69)**	**2.53 (1.15-5.55)**
Drinking problems	**2.14 (1.47-3.11)**	**2.55 (1.61-4.04)**	1.02 (0.72-1.45)	1.47 (0.96-2.27)	**2.14 (1.51-3.04)**	**2.44 (1.59-3.75)**	1.30 (0.93-1.83)	**1.71 (1.12-2.62)**
Smoking	1.71 (1.08-2.77)	1.83 (1.02-3.29)	1.04 (0.66-1.63)	1.29 (0.75-2.23)	**2.07 (1.34-3.19)**	**2.03 (1.18-3.44)**	1.39 (0.90-2.15)	1.58 (0.93-2.68)
Drug use	**1.68 (1.18-2.38)**	**2.10 (1.38-3.18)**	0.79 (0.57-1.10)	1.19 (0.80-1.77)	**2.76 (2.01-3.77)**	**2.94 (2.00-4.32)**	**1.98 (1.42-2.62)**	**2.24 (1.52-3.20)**
BSI depression	**2.84 (1.99-4.06)**	**4.54 (2.94-7.02)**	**1.54 (1.21-2.12)**	**2.79 (1.88-4.15)**	**1.99 (1.42-2.80)**	**3.59 (2.37-5.44)**	1.33 (0.95-1.85)	**2.39 (1.58-3.62)**
Emotional problems	**1.81 (1.17-2.80)**	**3.51 (2.00-6.18)**	**3.40 (2.36-4.89)**	**4.53 (2.77-7.48)**	1.51 (1.02-2.23)	**2.90 (1.61-4.99)**	1.14 (0.78-1.63)	**2.47 (1.45-4.23)**
Conduct problems	**2.35 (1.67-3.30)**	**3.57 (2.47-5.15)**	1.22 (0.93-1.58)	**1.99 (1.45-2.74)**	**5.88 (4.30-8.06)**	**6.89 (4.79-9.91)**	1.41 (1.08-1.83)	**2.27 (1.66-3.12)**
Hyperactivity problems	**1.99 (1.40-2.83)**	**3.10 (2.09-4.60)**	1.40 (1.06-1.86)	**2.27 (1.59-3.23)**	**4.21 (3.11-5.69)**	**5.17 (3.59-7.48)**	1.56 (1.18-2.07)	**2.45 (1.71-3.46)**

Note: Results in bold indicate significance levels of <.01; LR = Low Risk, i.e. those who score bellow norm-based cut-offs on all traits; All = all those who scored below the cut-off on that particular trait regardless of whether they scored above norm-based cut-offs on other personality traits; Age, gender and ethnicity were included as covariates.
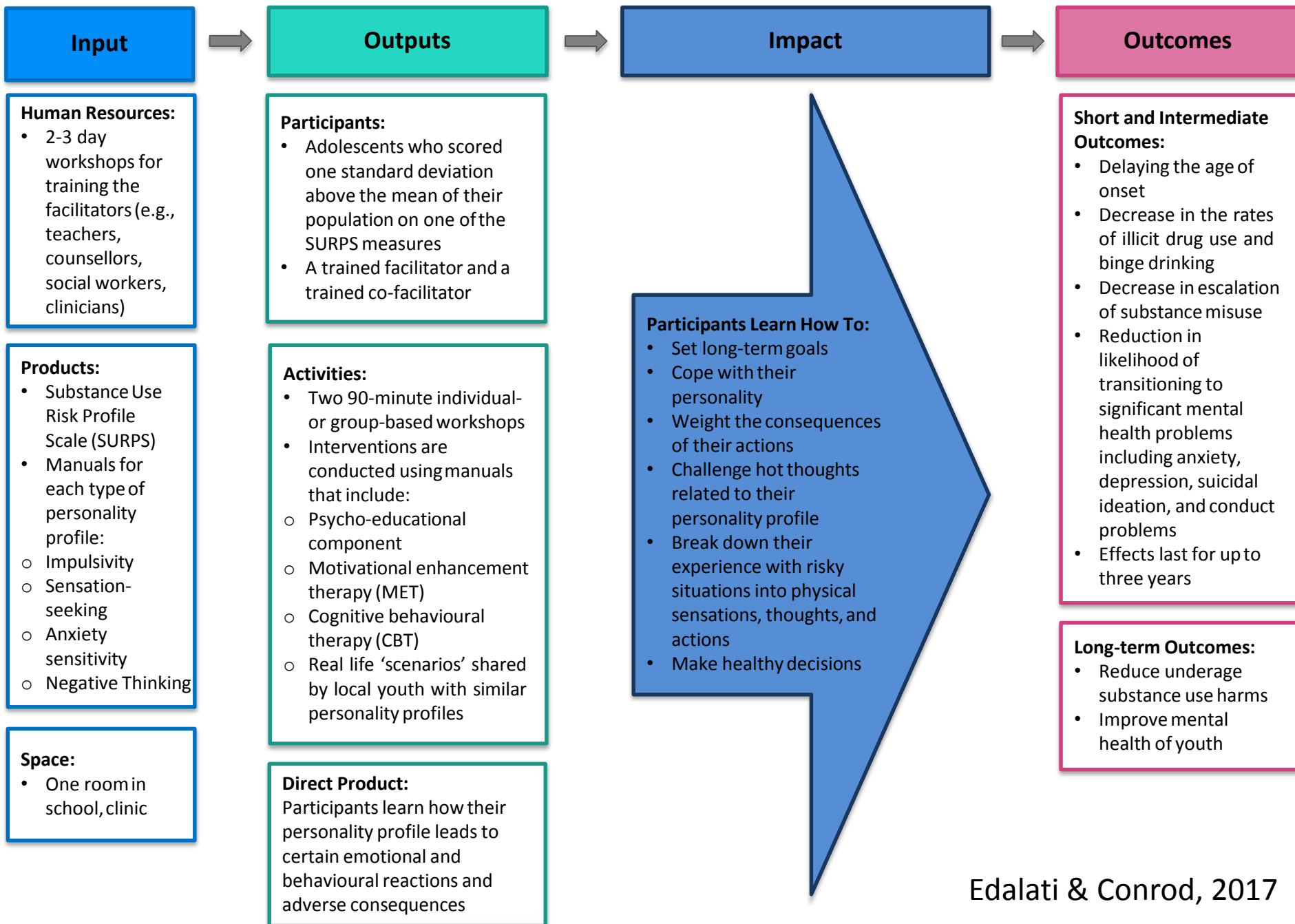
Dr. Patricia Conrod

Professor

Department of Psychiatry

University of Montréal

The Logic Model for Preventure Programme

Input → **Outputs** → **Impact** → **Outcomes**

Input

Human Resources:
- 2-3 day workshops for training the facilitators (e.g., teachers, counsellors, social workers, clinicians)

Products:
- Substance Use Risk Profile Scale (SURPS)
- Manuals for each type of personality profile:
  - Impulsivity
  - Sensation-seeking
  - Anxiety sensitivity
  - Negative Thinking

Space:
- One room in school, clinic

Outputs

Participants:
- Adolescents who scored one standard deviation above the mean of their population on one of the SURPS measures
- A trained facilitator and a trained co-facilitator

Activities:
- Two 90-minute individual- or group-based workshops
- Interventions are conducted using manuals that include:
  - Psycho-educational component
  - Motivational enhancement therapy (MET)
  - Cognitive behavioural therapy (CBT)
  - Real life 'scenarios' shared by local youth with similar personality profiles

Direct Product:
Participants learn how their personality profile leads to certain emotional and behavioural reactions and adverse consequences

Impact

Participants Learn How To:
- Set long-term goals
- Cope with their personality
- Weight the consequences of their actions
- Challenge hot thoughts related to their personality profile
- Break down their experience with risky situations into physical sensations, thoughts, and actions
- Make healthy decisions

Outcomes

Short and Intermediate Outcomes:
- Delaying the age of onset
- Decrease in the rates of illicit drug use and binge drinking
- Decrease in escalation of substance misuse
- Reduction in likelihood of transitioning to significant mental health problems including anxiety, depression, suicidal ideation, and conduct problems
- Effects last for up to three years

Long-term Outcomes:
- Reduce underage substance use harms
- Improve mental health of youth

Edalati & Conrod, 2017

Validated Prevention Program through 8 Randomised Trials

ADOLESCENT SUBSTANCE ABUSE (f CHUNG, SECTION EDITOR)

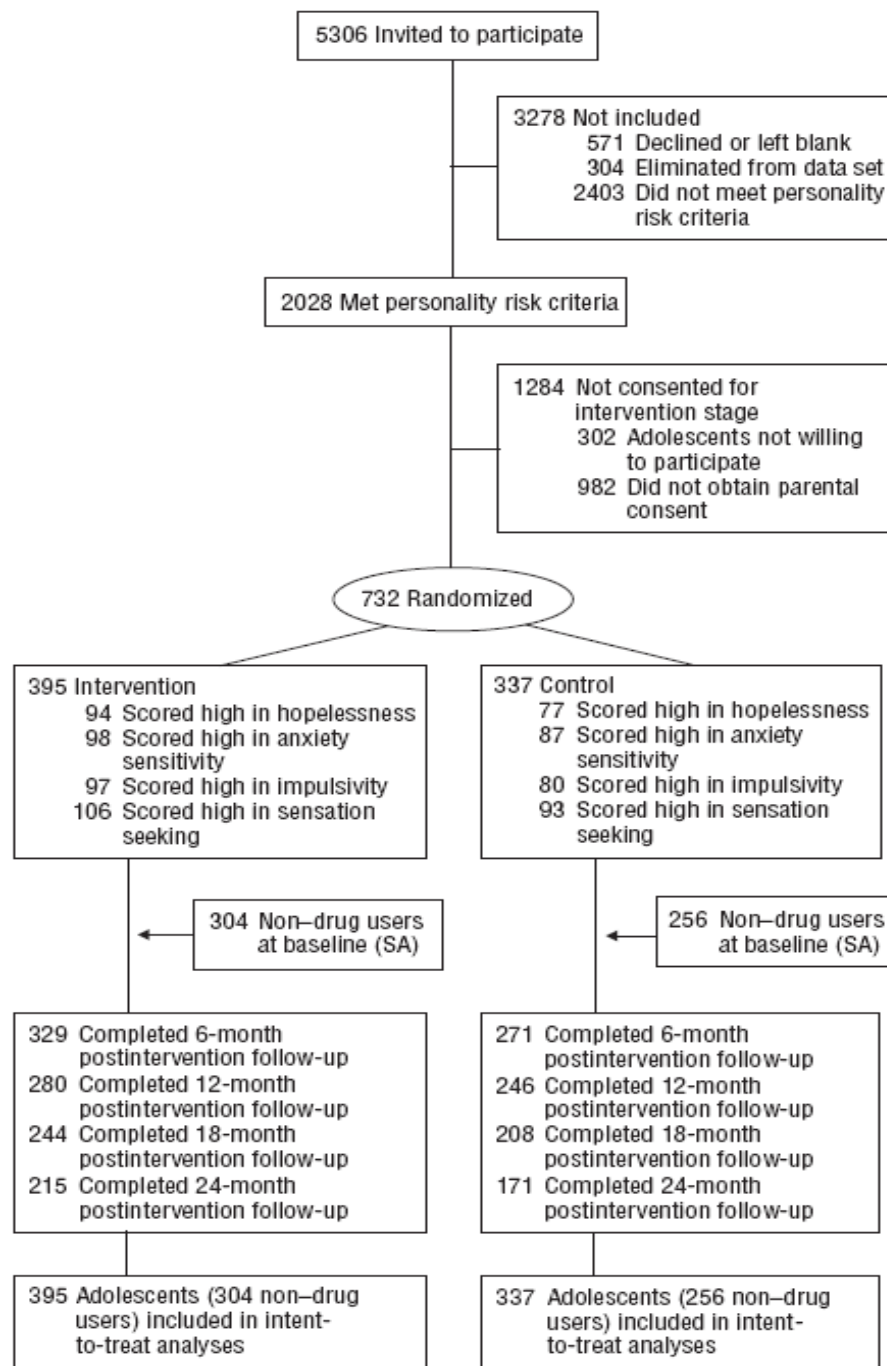# Personality-Targeted Interventions for Substance Use and Misuse

Pat ricia J . C onrod [1]

Table **1**   Summary of eight random.ized trials of personality-targe ted interventions for ubstance misuse aoc! standardized effect s i:zes Cohen's *d* equivalent)

Trial	Personali ty trait,; targetoo	PopuJation targeted	Behaviouml outcomes targeted	Effect rz.es ait reported as Cohen's d
1. Monlreal Prescription Drug and Alcohol Dependence Trial [22]	IMP/SS, AS, HOP	Alcohol and/or prescription drug- dependent women Int: $ıı = 78$ Ctr. $ıı = 45$	Alcoholuse AlcoholQF Dependence symptoms Remission prescription drug use	0 .4 7 0.10 to 0.84)* 0.02 --OJS to OJ9) 0 .4 7 (0.10 to 0.84)* 0.46 0.10 to 0.83)* 0.58 0.03 to 1.13)*
2. Canadian Preven rure Trial [60]	AS, SS, HOP	HR secondary srudents (drinkers) Int: $N=166$ Ctr. $ıı = 131$	Alcohol use 4 months) Binge drinking (4 months) Drinking problems 4 months)	020 --0.02 ıo 0.43) OJ7 0.14 to 0.60)* OJ2 0.09 to 0.55)*
3. College AS Trial" [78]	AS	College student,; Int: $11= 51$ Ctr: $Il= 56$	Drinking frequency Binge drinking Drinking problems	00 ns) ot reported OJ 7 (--0.02 to O.75)
4. UK Preventure Triabl [61, 62•, 8 1]	AS, IMP, HOP, SS	HR secondary srudents Int: $ıı = 190$ Ctr: $Il= 15 7$	Alcohol use 6 months) Binge drinking (6 months) Drinking problems (6 month) Drinking problems (2 years Drug use frequency 2 years) Cannabis use (2 years) Cocaine use 2 years)	022 0.00 to 0.43)* 02 1 (0.00 to 0.42)* OJS (0.00 to 0.42)* OJ3 (0.12 to 0.54)* 025 (0.10 to 0.40)* 0.16 (0.04 to OJ 4)†d 0.80 (0.94 to 1.17)†d
S. Dutch Preventuree Trial [77]	AS, IMP, HOP, SS	HR secondary srudents (drinkers) Int: $ıı =343$ Ctr: $ıı = 356$	Alcohol use (12 months Binge drinking (12 months) Drinking problems (12 months)	0.02 OB(0.17 to 0.4 7)* 00 ns)
6. Advenrure Triael [24, 63•]	AS, IMP, HOP, SS	HR secondary srudents Int: $Il=558$ Ctr. $ıı = 437$	Alcohol use (2 year) Drinking Q (2 years) Binge drinking (2 years Binge drinking-freq (2 years) Binge drinking-g rowth 2 yea.r.i) Drinking problems (2 years Cannabis use (2 years)	0.68 (0.55 to 0.8 1)* OJ6 (023 to 0.49)* 0.88 0.75 to 1.0 * OJ8 (02 5 to 0.50)* 2.07 (1.91 to 22 2)* 1.02 0.88 to 1.16)* 0.06c--0.06 ıo 0.18f
7. Austmlian Srudy [SI]	AS, IMP, HOP, SS	HR secondary srudents Int: $Il=202$ Ctr: $ıı = 291$	Alcohol use (3 years) Binge drinking (3 years) Drinking problems (3 year)	0.4 7 029 to 0.65)* 0.65 (0.46 to 0.84)* 0.54 (OJ S to 0.72)*
8. CBT for High AS [64]	AS	Community-recruited adults	Alcohol use Binge drinking Drinking problems (phy) Drinking problems (interper)	ot reported ot reported 0.64 0.48

Preventure Trial London, UK

Conrod, P.J., Castellanos-Ryan, N. & Strang, J. (2010). *Archives Gen Psychiatry.*

5306 Invited to participate

3278 Not included
 571 Declined or left blank
 304 Eliminated from data set
 2403 Did not meet personality risk criteria

2028 Met personality risk criteria

1284 Not consented for intervention stage
 302 Adolescents not willing to participate
 982 Did not obtain parental consent

732 Randomized

395 Intervention
 94 Scored high in hopelessness
 98 Scored high in anxiety sensitivity
 97 Scored high in impulsivity
 106 Scored high in sensation seeking

337 Control
 77 Scored high in hopelessness
 87 Scored high in anxiety sensitivity
 80 Scored high in impulsivity
 93 Scored high in sensation seeking

304 Non-drug users at baseline (SA)

256 Non-drug users at baseline (SA)

329 Completed 6-month postintervention follow-up
280 Completed 12-month postintervention follow-up
244 Completed 18-month postintervention follow-up
215 Completed 24-month postintervention follow-up

271 Completed 6-month postintervention follow-up
246 Completed 12-month postintervention follow-up
208 Completed 18-month postintervention follow-up
171 Completed 24-month postintervention follow-up

395 Adolescents (304 non-drug users) included in intent-to-treat analyses

337 Adolescents (256 non-drug users) included in intent-to-treat analyses
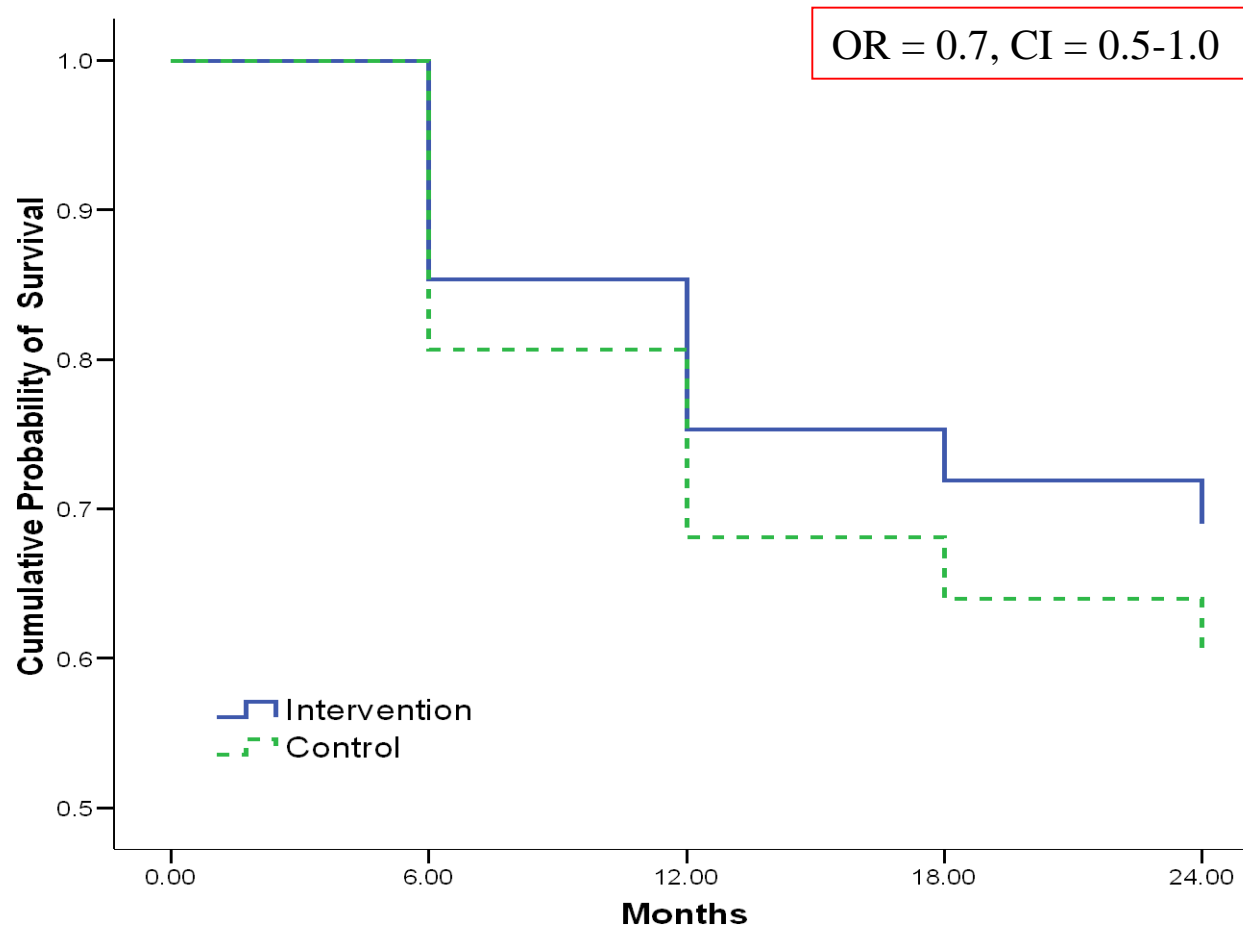
95% of students assent to survey
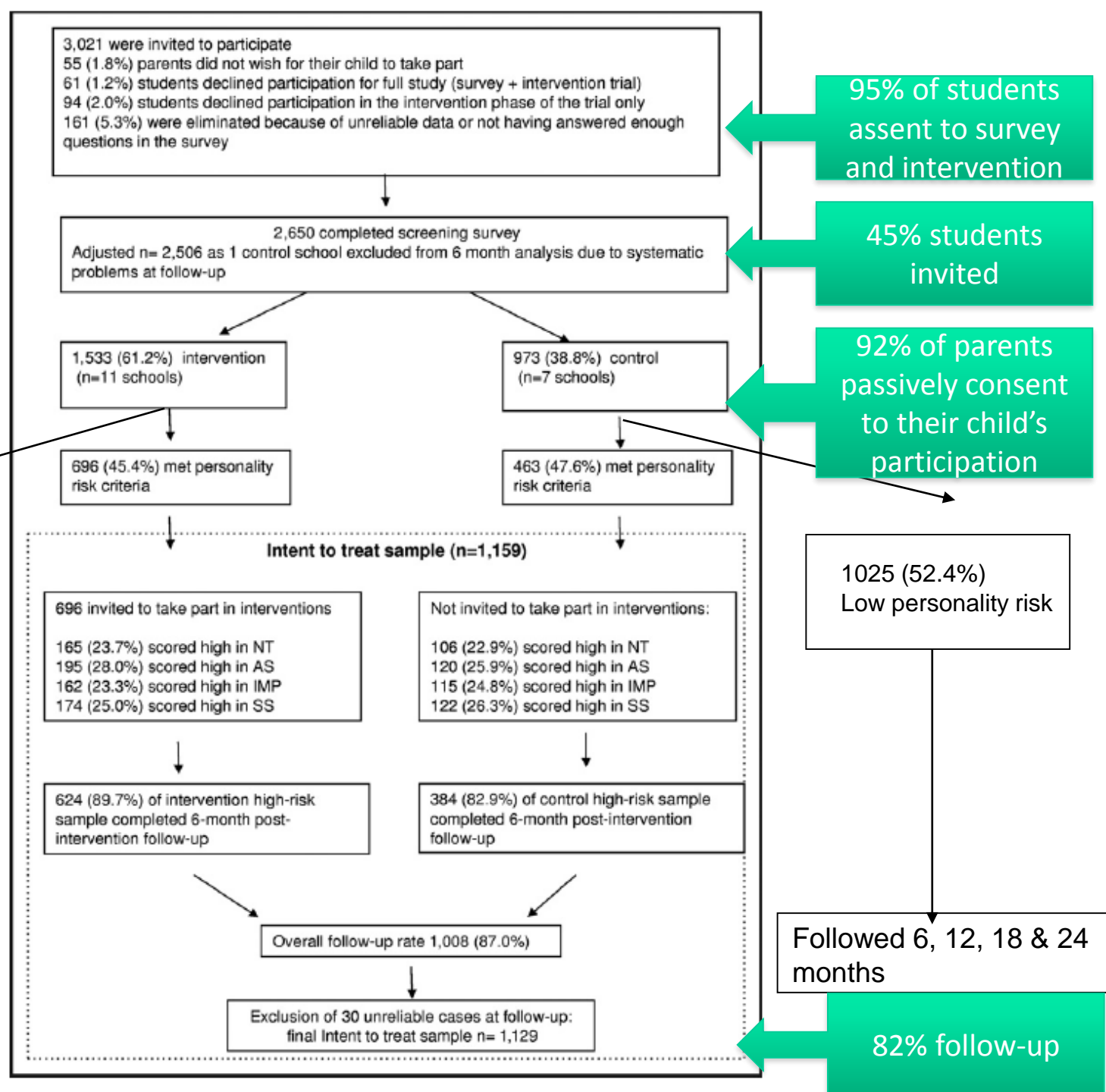
45% of students score >1 SD

85% of students sign up for program

50% of parents actively consent

82% follow-up

Preventure Trial 2-year outcomes: Survival as a non-cannabis user

OR = 0.7, CI = 0.5-1.0

Conrod, P.J., Castellanos-Ryan, N. & Strang, J. (2010). *Archives Gen Psychiatry*.

Adventure Trial

3,021 were invited to participate
55 (1.8%) parents did not wish for their child to take part
61 (1.2%) students declined participation for full study (survey + intervention trial)
94 (2.0%) students declined participation in the intervention phase of the trial only
161 (5.3%) were eliminated because of unreliable data or not having answered enough questions in the survey

95% of students assent to survey and intervention

2,650 completed screening survey
Adjusted n= 2,506 as 1 control school excluded from 6 month analysis due to systematic problems at follow-up

45% students invited

1,533 (61.2%) intervention (n=11 schools)

973 (38.8%) control (n=7 schools)

92% of parents passively consent to their child's participation

696 (45.4%) met personality risk criteria

463 (47.6%) met personality risk criteria

1268 (54.6%) Low personality risk

1025 (52.4%) Low personality risk

Intent to treat sample (n=1,159)

696 invited to take part in interventions

165 (23.7%) scored high in NT
195 (28.0%) scored high in AS
162 (23.3%) scored high in IMP
174 (25.0%) scored high in SS

Not invited to take part in interventions:

106 (22.9%) scored high in NT
120 (25.9%) scored high in AS
115 (24.8%) scored high in IMP
122 (26.3%) scored high in SS

624 (89.7%) of intervention high-risk sample completed 6-month post-intervention follow-up

384 (82.9%) of control high-risk sample completed 6-month post-intervention follow-up

Followed 6, 12, 18 & 24 months

Followed 6, 12, 18 & 24 months

Overall follow-up rate 1,008 (87.0%)

Exclusion of 30 unreliable cases at follow-up: final Intent to treat sample n= 1,129

82% follow-up

Can cannabis use be prevented by targeting personality risk in schools? Twenty-four-month outcome of the adventure trial on cannabis use: a cluster-randomized controlled trial
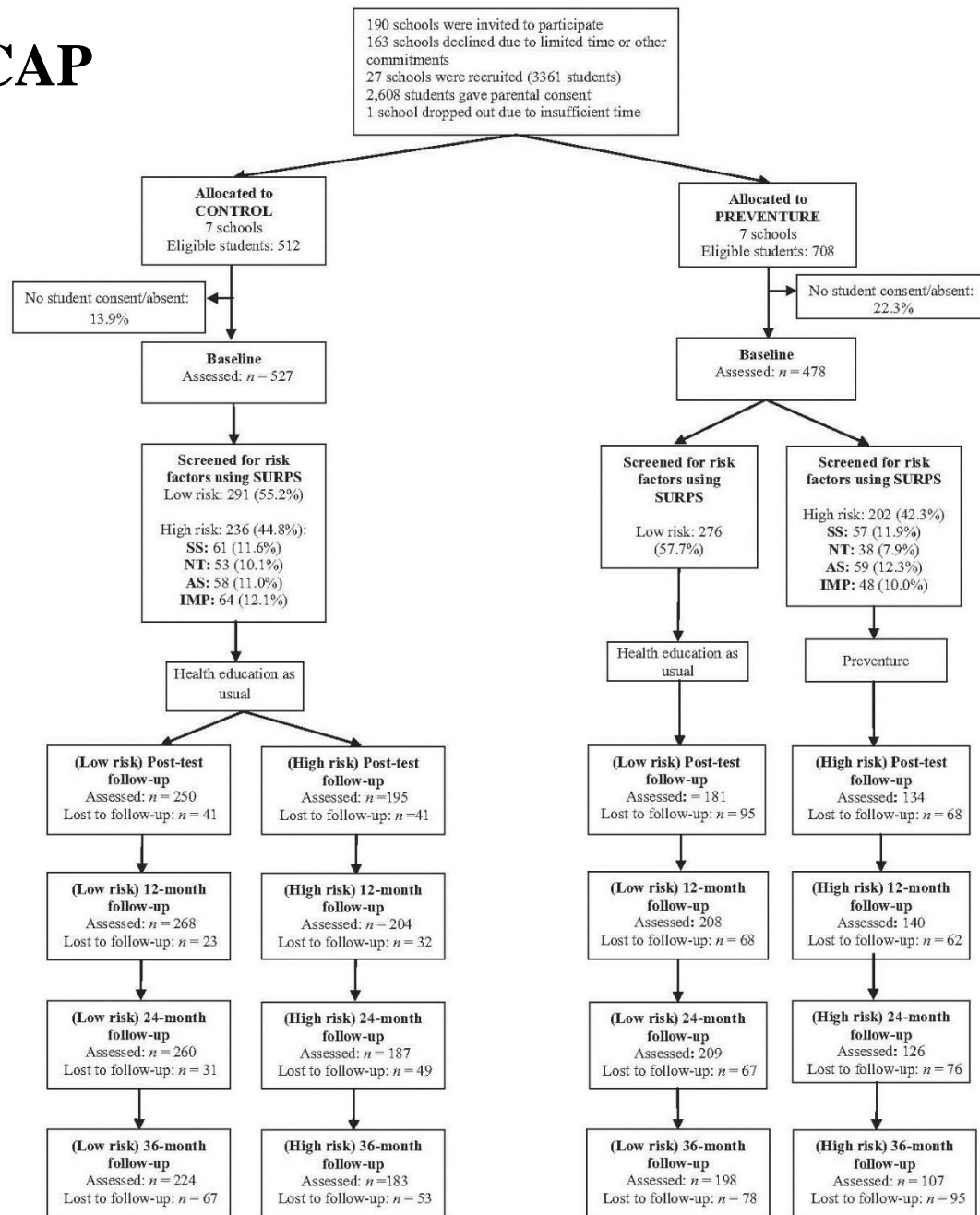
Ioan T. Mahu[1], Christine Doucet[1], Maeve O'Leary-Barrett[3] & Patricia J. Conrod[1,2]

Université de Montréal, Centre Hospitalier et Universitaire Ste-Justine, Department of Psychiatry, Montréal, Canada,[1] Addictions Department, King's College London, Institute of Psychiatry, London, UK[2] and McGill University, Montréal, Canada[3]

Table 2 Summary of primary and secondary outcomes by time and intervention status.

	Primary outcome: marijuana use						Secondary outcome: marijuana use frequency[a]					
	Control % prevalence		Intervention % prevalence				Control		Intervention			
Personality trait × time	Raw	Adjusted[b]	Raw	Adjusted[b]	OR[c]	95% CI	Mean (n)	SD	Mean (n)	SD	β[d]	95% CI
HR	$n=442$[e]	$n=403$	$n=593$	$n=527$								
Baseline	8.8		11.1		$\chi^2=1.48$		1.92 (39)	1.13	1.92 (66)	1.11	$F=0.00$	
6 Months	17	(11.7)	14.7	(8.7)	0.67*	0.45–1.00	1.56 (75)	0.81	1.83 (87)	1.10	0.79	−0.11 to 0.42
12 Months	16.4	(11.2)	19.1	(14.6)	1.11	0.77–1.60	2.13 (72)	1.14	1.79 (113)	1.01	−0.14*	−0.60 to 0.01
18 Months	24.4	(19.9)	26.6	(20.9)	1.05	0.76–1.40	2.12 (107)	1.16	1.87 (149)	1.07	−0.12*	−0.54 to −0.00
24 Months	24.7	(21.3)	25.2	(22.4)	1.00	0.74–1.36	2.09 (109)	1.10	2.23 (149)	1.13	0.07	−0.12 to 0.43
NT	$n=107$	$n=93$	$n=137$	$n=123$								
Baseline	13.1		10.2		$\chi^2=0.49$		1.93 (14)	1.21	2.29 (14)	1.20	$F=0.61$	
6 onths	18.9	(12.9)	15.3	(8.1)	0.76	0.34–1.70	1.75 (20)	1.02	2.10 (21)	1.18	−0.00	−0.68 to 0.67
12 Months	17.1	(10.8)	19	(13)	1.16	0.53–2.60	2.33 (18)	1.33	1.92 (26)	1.06	−0.24	−1.20 to 0.05
18 Months	20.2	(14)	24.1	(17.9)	1.43	0.69–2.97	2.10 (21)	1.22	2.03 (33)	1.10	−0.25	−0.68 to 0.53
24 Months	30.5	(26.9)	24.8	(21.1)	0.76	0.41–1.42	1.94 (32)	1.08	2.38 (34)	1.16	0.22	−0.06 to 1.05
AS	$n=123$	$n=118$	$n=170$	$n=162$								
Baseline	4.1		4.7		$\chi^2=0.07$		1.60 (5)	0.89	1.50 (8)	1.07	$F=0.03$	
6 Months	8.9	(6.8)	7.7	(6.2)	0.79	0.31–2.03	1.73 (11)	0.91	1.46 (13)	0.88	−0.20	−1.11 to 0.42
12 Months	12.2	(9.3)	10.1	(9.3)	0.78	0.35–1.72	1.60 (15)	0.83	1.71 (17)	0.92	0.03	−0.67 to 0.77
18 Months	15.4	(12.7)	18.3	(15.4)	1.18	0.59–2.37	1.74 (19)	0.99	1.87 (31)	1.06	0.15	−0.28 to 0.92
24 Months	16.3	(13.6)	15.4	(15.4)	0.90	0.47–1.73	2.00 (20)	1.08	1.88 (26)	1.07	−0.03	−0.76 to 0.65
IMP	$n=109$	$n=99$	$n=132$	$n=107$								
Baseline	9.2		18.9		$\chi^2=4.59$*		1.9 (10)	1.20	2.00 (25)	1.08	$F=0.06$	
6 Months	17.6	(12.2)	26	(15)	1.32	0.61–2.84	1.37 (19)	0.68	1.74 (34)	1.02	0.15	−0.10 to 0.66
12 Months	20.4	(14.3)	30.5	(23.4)	1.58	0.77–3.26	2.18 (22)	0.96	1.95 (40)	1.18	−0.124	−0.83 to 0.27
18 Months	30.6	(24.5)	35.1	(28)	1.05	0.56–1.97	2.24 (33)	1.09	1.67 (46)	0.92	−0.28*	−1.03 to −0.12
24 Months	23.9	(21.2)	34.4	(29.9)	1.62	0.88–3.00	2.50 (26)	1.14	2.16 (45)	1.15	0.16	−0.78 to −0.31
SS	$n=103$	$n=93$	$n=154$	$n=135$								
Baseline	9.7		12.3		$\chi^2=0.43$		2.10 (10)	1.20	1.74 (19)	1.10	$F=0.68$	
6 Months	24	(16.1)	12.3	(7.4)	0.25***	0.10–0.57	1.48 (25)	0.65	1.95 (19)	1.27	0.24	−0.03 to −0.97
12 Months	16.3	(10.8)	19.2	(15.6)	0.98	0.47–2.04	2.29 (17)	1.31	1.50 (30)	0.73	−0.36**	−1.37 to −0.17
18 Months	32.7	(30.1)	30.5	(24.4)	0.81	0.45–1.47	2.24 (34)	1.26	1.96 (47)	1.20	−0.13	−0.90 to −0.26
24 Months	29.8	(25.8)	28.4	(25.9)	0.89	0.50–1.59	1.97 (31)	1.08	2.39 (44)	1.13	0.22	−0.05 to 1.02

Australian CAP Trial

190 schools were invited to participate
163 schools declined due to limited time or other commitments
27 schools were recruited (3361 students)
2,608 students gave parental consent
1 school dropped out due to insufficient time

Allocated to CONTROL
7 schools
Eligible students: 512

Allocated to PREVENTURE
7 schools
Eligible students: 708

No student consent/absent: 13.9%

No student consent/absent: 22.3%

Baseline
Assessed: $n = 527$

Baseline
Assessed: $n = 478$

Screened for risk factors using SURPS
Low risk: 291 (55.2%)

High risk: 236 (44.8%):
SS: 61 (11.6%)
NT: 53 (10.1%)
AS: 58 (11.0%)
IMP: 64 (12.1%)

Screened for risk factors using SURPS
Low risk: 276 (57.7%)

Screened for risk factors using SURPS
High risk: 202 (42.3%)
SS: 57 (11.9%)
NT: 38 (7.9%)
AS: 59 (12.3%)
IMP: 48 (10.0%)

Health education as usual

Health education as usual

Preventure

(Low risk) Post-test follow-up
Assessed: $n = 250$
Lost to follow-up: $n = 41$

(High risk) Post-test follow-up
Assessed: $n = 195$
Lost to follow-up: $n = 41$

(Low risk) Post-test follow-up
Assessed: $= 181$
Lost to follow-up: $n = 95$

(High risk) Post-test follow-up
Assessed: 134
Lost to follow-up: $n = 68$

(Low risk) 12-month follow-up
Assessed: $n = 268$
Lost to follow-up: $n = 23$

(High risk) 12-month follow-up
Assessed: $n = 204$
Lost to follow-up: $n = 32$

(Low risk) 12-month follow-up
Assessed: 208
Lost to follow-up: $n = 68$

(High risk) 12-month follow-up
Assessed: 140
Lost to follow-up: $n = 62$

(Low risk) 24-month follow-up
Assessed: $n = 260$
Lost to follow-up: $n = 31$

(High risk) 24-month follow-up
Assessed: $n = 187$
Lost to follow-up: $n = 49$

(Low risk) 24-month follow-up
Assessed: 209
Lost to follow-up: $n = 67$

(High risk) 24-month follow-up
Assessed: 126
Lost to follow-up: $n = 76$

(Low risk) 36-month follow-up
Assessed: $n = 224$
Lost to follow-up: $n = 67$

(High risk) 36-month follow-up
Assessed: $n = 183$
Lost to follow-up: $n = 53$

(Low risk) 36-month follow-up
Assessed: $n = 198$
Lost to follow-up: $n = 78$

(High risk) 36-month follow-up
Assessed: $n = 107$
Lost to follow-up: $n = 95$

Figure 1 Trial profile – CONSORT figure for participant flow in the Preventure and Control groups, at baseline, immediate posttest, and 12-, 24-, and 36-month follow-up. SS = sensation seeking; NT = negative thinking; AS = anxiety sensitivity; IMP = impulsivity

Substance Abuse Treatment,
Prevention, and Policy

RESEARCH

Open Access

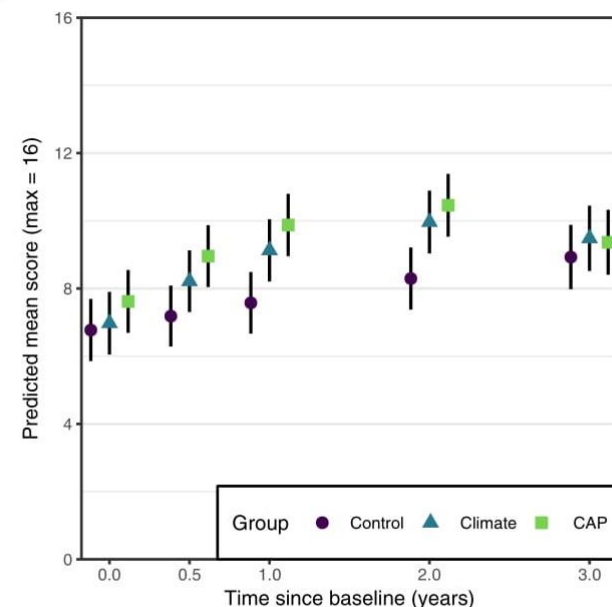# Universal cannabis outcomes from the Climate and Preventure (CAP) study: a cluster randomised controlled trial

Nicola C. Newton[1*†], Maree Teesson[1†], Marius Mather[1], Katrina E. Champion[1,2], Emma L. Barrett[1], Lexine Stapinski[1], Natacha Carragher[1], Erin Kelly[1], Patricia J. Conrod[3,4] and Tim Slade[1]

Fig. 2 Predicted means of cannabis knowledge at each measurement occasion for each intervention group. Cannabis knowledge scores were on a scale from 0 to 16, with higher scores representing greater knowledge about cannabis. Black lines represent 95% confidence intervals for the predicted mean
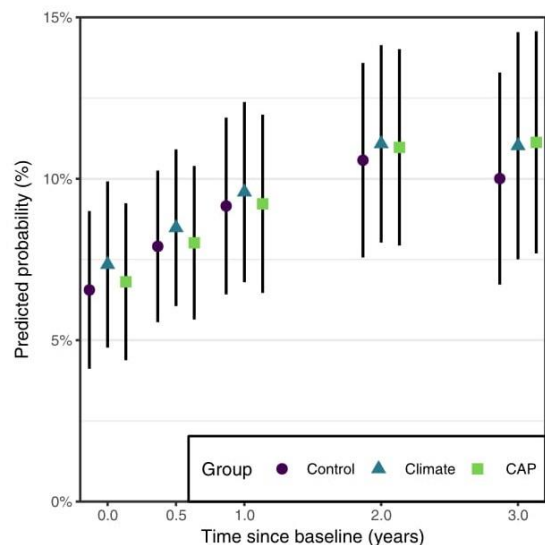
Fig. 3 Predicted probabilities of cannabis use at each measurement occasion for each intervention group. A single survey item asked participants whether they had used cannabis in the past 6 months. Black lines represent 95% confidence intervals for the predicted probability
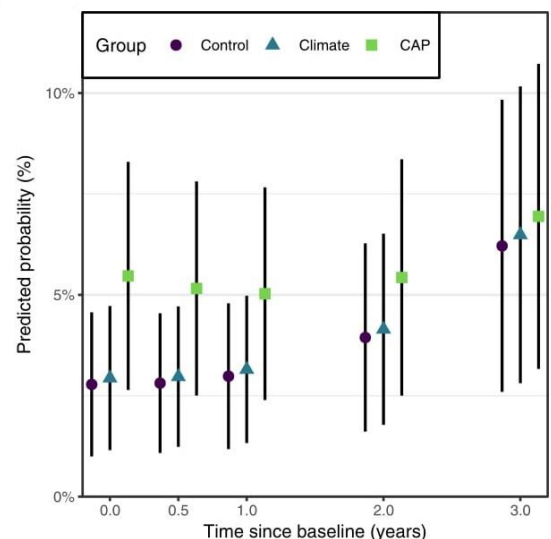
Fig. 4 Predicted probabilities of experiencing any harm from cannabis at each measurement occasion. Participants were asked whether they had experienced any of 6 different harms as a result of their cannabis use in the past 6 months. Black lines represent 95% confidence intervals for the predicted probability

Cannabis and Psychosis

- Cannabis use increases the risk for psychosis most particularly in individuals who have sub-clinical psychotic symptoms, family history of Sz, who use more frequently and in those who start using in early adolescence [4-8].

- Henquet et al. [25], prospective cohort study of 2,437 German youth (14-24 years old) showed that baseline cannabis use increased the risk of psychotic symptoms four years later. The effect of cannabis use was much stronger in individuals with subclinical psychosis predisposition at baseline than in those without.

Table 1. *Descriptive statistics for each psychotic-like experience and the total score for each time point*

	Time 1	Time 2	Time 3	Time 4
Psychotic-like experience	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
Thoughts read	0.45 (0.60)	0.50 (0.63)	0.42 (0.59)	0.37 (0.57)
Special messages	0.31 (0.61)	0.32 (0.60)	0.28 (0.58)	0.27 (0.57)
Spied upon	0.71 (0.77)	0.67 (0.74)	0.66 (0.71)	0.60 (0.72)
Heard voices	0.50 (0.74)	0.47 (0.69)	0.39 (0.66)	0.39 (0.71)
Controlled	0.21 (0.51)	0.27 (0.58)	0.21 (0.51)	0.22 (0.51)
Reads mind	0.69 (0.76)	0.68 (0.70)	0.67 (0.75)	0.68 (0.76)
Body changed	0.40 (0.66)	0.32 (0.58)	0.24 (0.51)	0.17 (0.50)
Special power	0.27 (0.59)	0.28 (0.61)	0.26 (0.58)	0.20 (0.51)
Visual hallucination	0.50 (0.75)	0.48 (0.74)	0.42 (0.70)	0.39 (0.72)
Total score	3.98 (3.23)	3.98 (3.37)	3.61 (3.31)	3.45 (3.05)
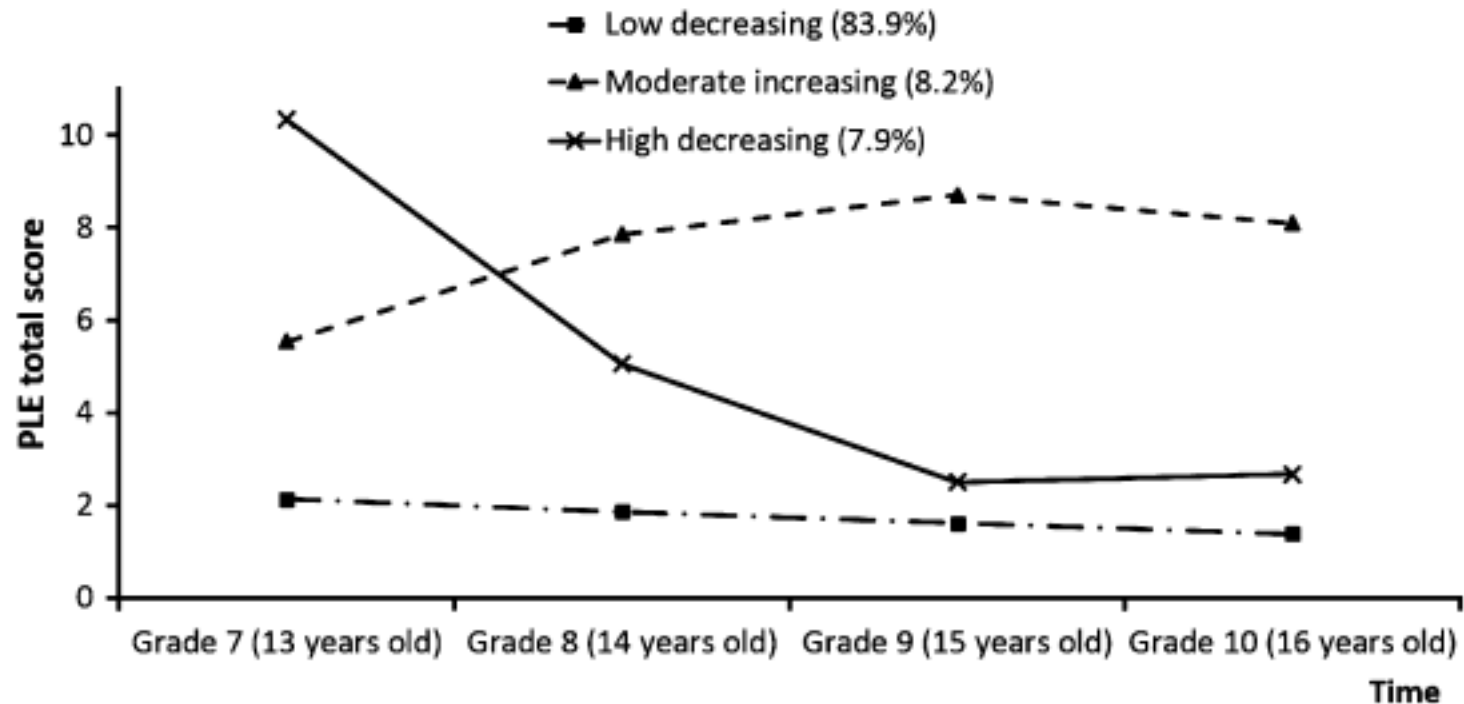
Figure 1 Developmental trajectories of psychotic-like experiences between 13- to 16-years old. PLE, psychotic-like experiences

Cannabis use and psychotic-like experiences trajectories during early adolescence: the coevolution and potential mediators

Josiane Bourque,[1,2] Mohammad H. Afzali,[1] Maeve O'Leary-Barrett,[1] and Patricia Conrod[1,2]

[1]Centre de recherche CHU Sainte-Justine, Montreal, QC; [2]Department of Psychiatry, Faculty of Medicine, University of Montreal, Montreal, QC, Canada

Table 4 Mechanisms of cannabis use on psychotic-like experiences trajectory

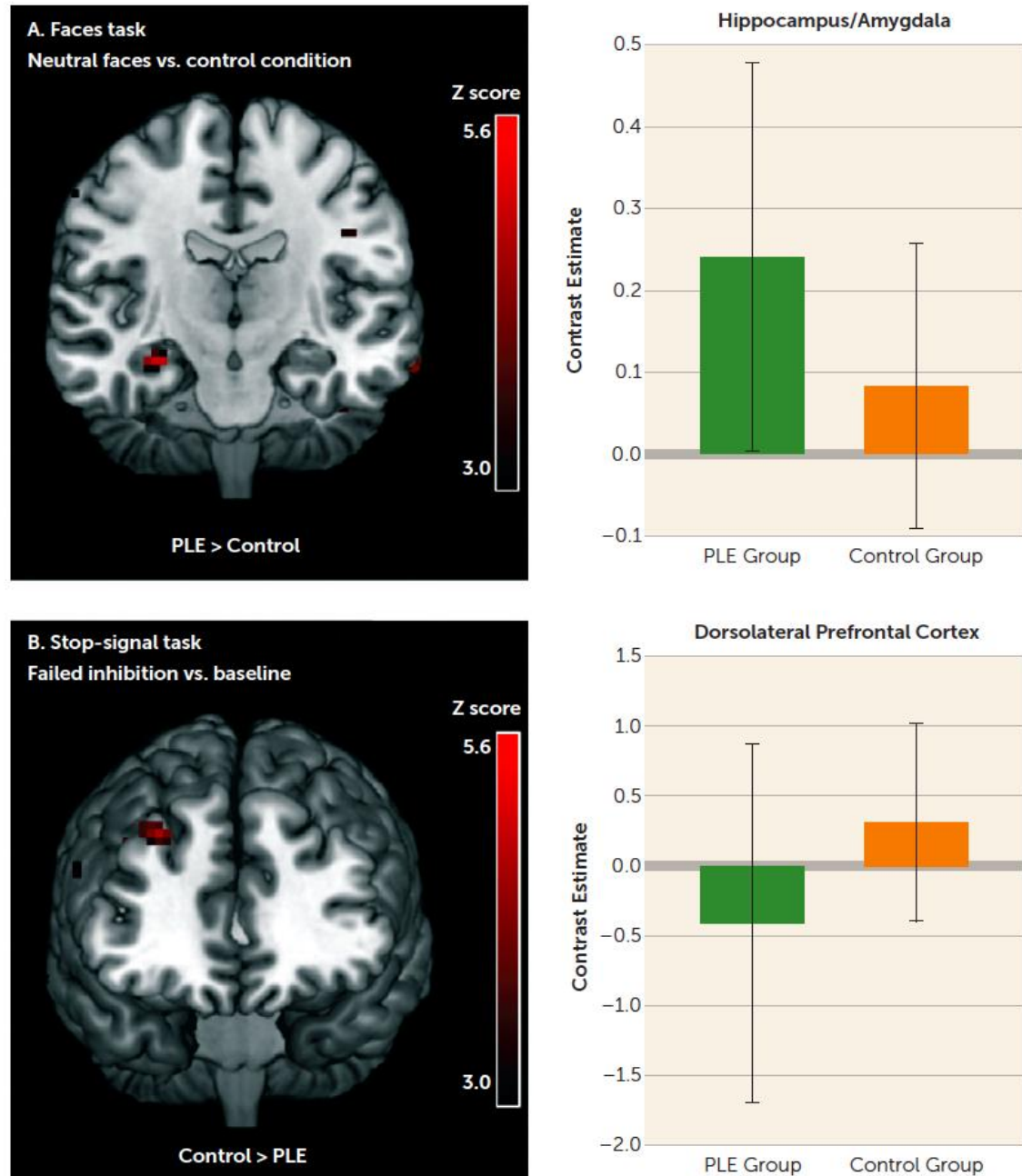| Mediator	Path a estimate (95% CI)	Path b estimate (95% CI)	Path c' estimate (95% CI)	Indirect path Estimate (95% CI)
Symptoms				
Growth in anxiety	.07 (−0.01, 0.16)	.40 (0.28, 0.53)***	.63 (0.18, 1.08)**	—
Growth in depression	.29 (0.15, 0.42)***	.25 (0.17, 0.32)***	.59 (0.13, 1.05)*	**.07 (0.03, 0.11)****
Cognitive functioning				
Growth in IQ	−.01 (−0.04, 0.02)	−.21 (−0.72, 0.30)	.66 (0.20, 1.12)**	—
Growth in SWM (number of errors)	.07 (−0.04, 0.17)	.01 (−0.14, 0.15)	.66 (0.20, 1.12)**	—
Growth in delayed memory recall[a]	.02 (−0.01, 0.04)	−.21 (−0.63, 0.21)	.66 (0.20, 1.12)**	—
Growth in response inhibition (number of commission errors)	.12 (0.03, 0.21)**	.12 (0.00, 0.24)****	.64 (0.19, 1.10)**	.01 (0.00, 0.03)****

Bourque, et al.,
American Journal of Psychiatry, 2017

Machine Learning Predicting Mood and Psychosis Symptoms at Year 16 in Full Sample
Fusiform activity during anticipation of reward,
Internalizing behaviors,
Cigarette and cannabis use,
Hippocampus/amygdala activity during neutral face processing
Cerebellum activity during angry faces processing

FIGURE 1. Cluster-Corrected Brain Activation Differences Between 14-Year-Olds With Psychotic-Lik Experiences (PLE) (N=27) and Control Subjects (N=135)[a]

A. Faces task
Neutral faces vs. control condition
Z score 5.6 3.0
PLE > Control

B. Stop-signal task
Failed inhibition vs. baseline
Z score 5.6 3.0
Control > PLE

Hippocampus/Amygdala

Dorsolateral Prefrontal Cortex

[a] Only cluster-corrected activations are shown in the maps. Error bars in the graphs are standard deviations.

CIHR ProVenture Study

Potvin, Conrod, Stip and Leyton

- Intensive 5-year prospective neuroimaging study of psychosis trajectories
  - ❑ 66 PLE increasing
  - ❑ 66 PLE decreasing
  - ❑ 66 no/low PLE

- 3 clinical and imaging assessments over 5 year period
  - ❑ Detailed neurocognitive, mental health and substance use assessment.
  - ❑ Salience-attribution (Faces), self-other mood task, working memory.

- CAARMS – conversion to psychosis

Conclusions

Some of the strongest effect sizes ever reported for a youth substance use prevention programme.
Efficacious and efficient approach:

peer involvement, group sessions

critical period in development

prospective risk factors rather than early signs of problems

CBT and motivational techniques: target individual risk factors, personally-relevant, focused, and easy for students to engage

Thank you!

The New York Times | https://nyti.ms/2dmE0hs

WELL | FAMILY

The 4 Traits That Put Kids at Risk for Addiction

By MAIA SZALAVITZ   SEPT. 29, 2016
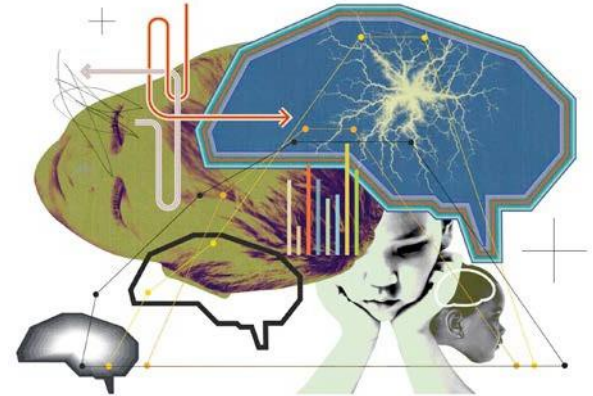
Canadian Institutes of Health Research (CIHR)
FRSQ chercheur Boursier-Senior
European Commisssion FP6-Health and
FP7-Social Sciences and Humanities
Mental Health Medical Research Council of Australia
ABMRF
Action on Addiction
Fondation Ste-Justine
National Insitutes of Health (NIH)
European Medical Research Board (ERAB)
Medical Research Council-UK

Hanie Edalati
hanie.edalati@umontreal.ca
Patricia Conrod
patricia.conrod@umontreal.ca

www.conrodventurelab.com/servicespveng

https://www.nytimes.com/2016/10/04/well/family/the-4-traits-that-put-kids-at-risk-for-addiction.html