Targeting adolescent impulsivity in School-based interventions

Patricia J. Conrod, Ph.D.

Professeur Agrégé, Université de Montréal, CHU Hôpital Ste Justine

Senior Clinical Lecturer& Consultant Clinical Psychologist, Addictions Department, Institute of Psychiatry, King's College London

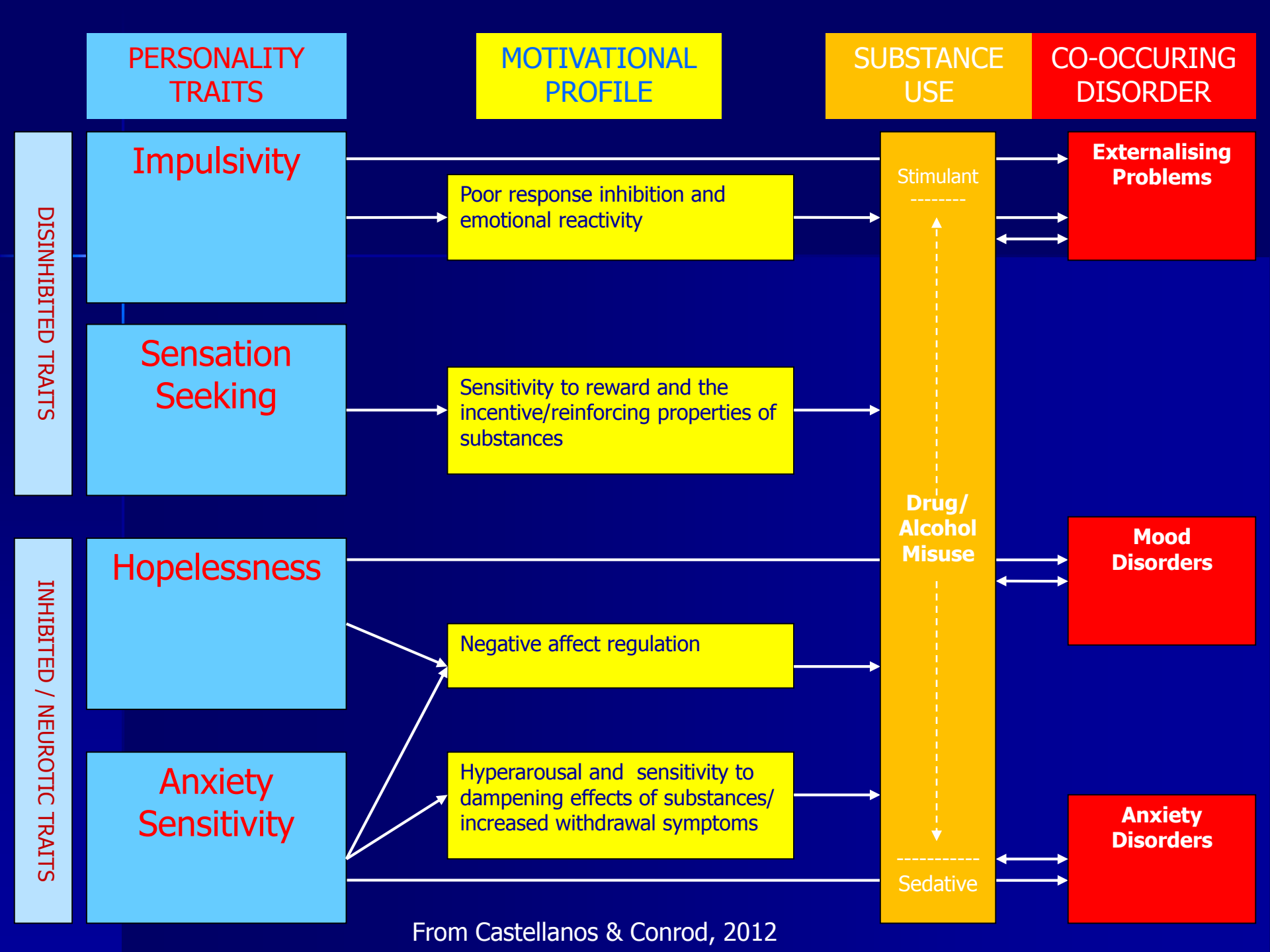
Age at onset of alcohol use and DSM-IV alcohol abuse and dependence: A 12-year follow-up

Bridget F. Grant[a,*], Frederick S. Stinson[a], Thomas C. Harford[b]

Table 4
Logistic regression analysis of DSM-IV alcohol abuse and dependence in 1994 using the 1982 age at drinking onset baseline

	Alcohol abuse			Alcohol dependence		
Variable	β	S.E.	Odds ratio	β	S.E.	Odds ratio
Intercept	−0.94[a]	0.46		−1.41[a]	0.71	
Age at drinking onset (years)	−0.07[b]	0.02	0.93	−0.09[b]	0.03	0.91
Male	0.69[b]	0.09	2.00	0.87[b]	0.14	2.39
Black	−0.52[b]	0.14	0.59	−0.15	0.17	0.86
Married	−0.66[b]	0.08	0.52	−1.38[b]	0.13	0.25
Age (years, 1982)	−0.06[b]	0.02	0.94	−0.07[b]	0.03	0.93
High school dropout	0.19	0.13	1.21	1.03[b]	0.14	2.80
Parental education (less than high school)	0.07	0.13	1.07	−0.30[a]	0.14	0.74
Antisocial behaviors (1 to 3 symptoms)	0.86[b]	0.16	2.36	0.73[b]	0.27	2.08
Antisocial behaviors (4+ symptoms)	1.16[b]	0.16	3.19	1.48[b]	0.27	4.40
Family history of alcoholism	0.18[a]	0.08	1.20	0.15	0.12	1.17
Lifetime marijuana use (10+ times)	0.54[b]	0.08	1.72	0.46[b]	0.13	1.58

[a] $P < .05$.
[b] $P < .01$.



From Castellanos & Conrod, 2012

Substance Use Risk Profile Scale:

23-item scale assessing impulsivity, sensation seeking, anxiety sensitivity and hopelessness

- Internal consistency (Woicik et al., 2009)
- Concurrent validity (Woicik et al., 2009)
- 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)
- Translated: French, German, Spanish, Czech, Dutch, Cantonese, Japanese, Sri Lankan

Table 5. Sensitivity and false positive rates (1-specificity) of the f baseline SURPS subscales in the prediction of substance use, emotional and behavioural symptoms within the next 18 months (by T4) in the overall sample (N = 1057).

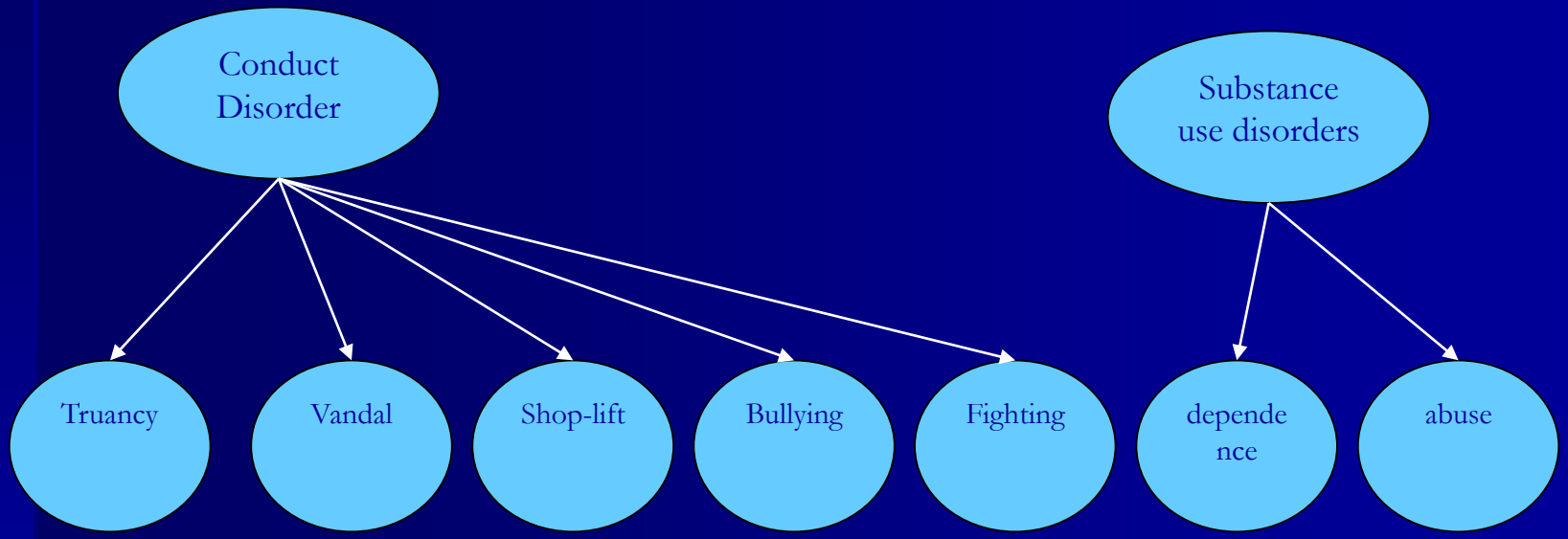
	Hopelessness	Anxiety Sensitivity	Impulsivity	Sensation Seeking-R‡	Selecting HR adolescents based on ROC cut-offs	Selecting HR adolescents (1SD > mean cut-offs)†
%	S, FP	S, FP	S, FP	S, FP	S, FP	S, FP
Monthly binging (13%)	20, 12	27, 31	**61, 32**	**48, 30**	72, 49	70, 42
Drinking problems (17%)	**49, 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).

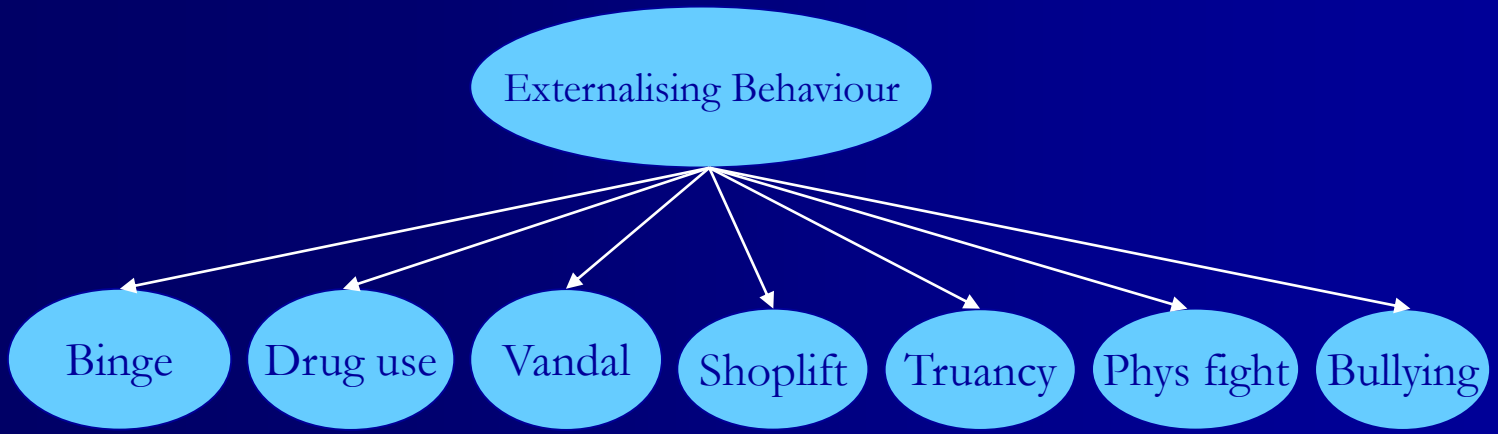
	High Hopelessness (n=192)		High Anxiety Sensitivity (n=327)		High Impulsivity (n=248)		High Sensation Seeking-R‡ (n=329)	
	OR (95%CI)		OR (95%CI)		OR (95%CI)		OR (95%CI)	
Cut-off score	≥16 vs. All	vs. LR (n=345)	≥13 vs. All	vs. LR (n=345)	≥15 vs. All	vs. LR (n=345)	≥16 vs. All	vs. LR (n=345)
Early onset 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 tra
regardless of whether they scored above norm-based cut-offs on other personality traits; Age, gender and ethnicity were included as covariates.

DSM-IV Structure of Externalising Behaviours

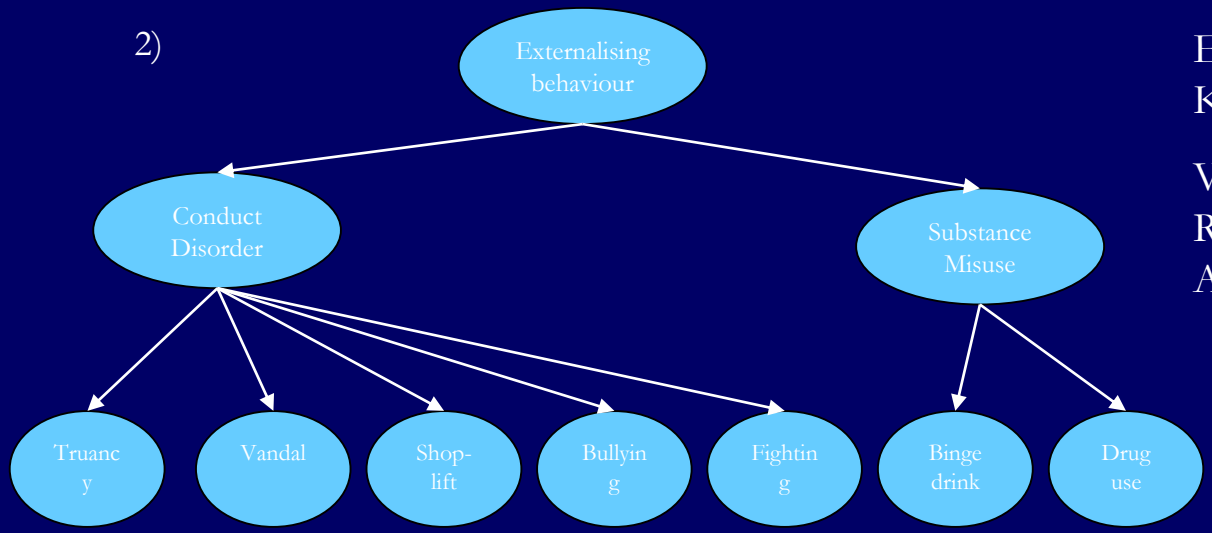


One factor model: Krueger et al (2005)



Higher order two-subfactor model (2)
Hierarchical two-subfactor model (3)

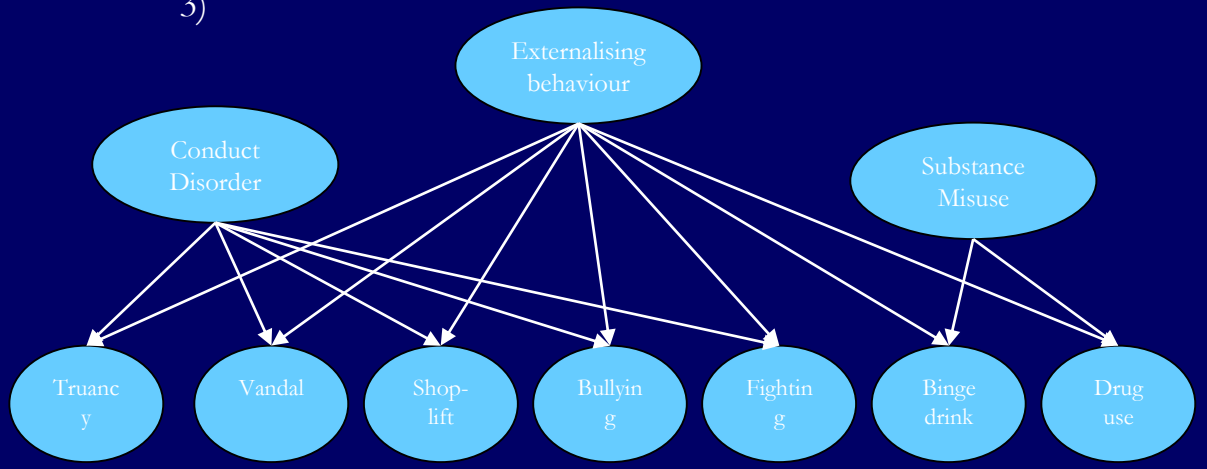
2)



Externalising spectrum in adults (e.g. Krueger et al., 2002).

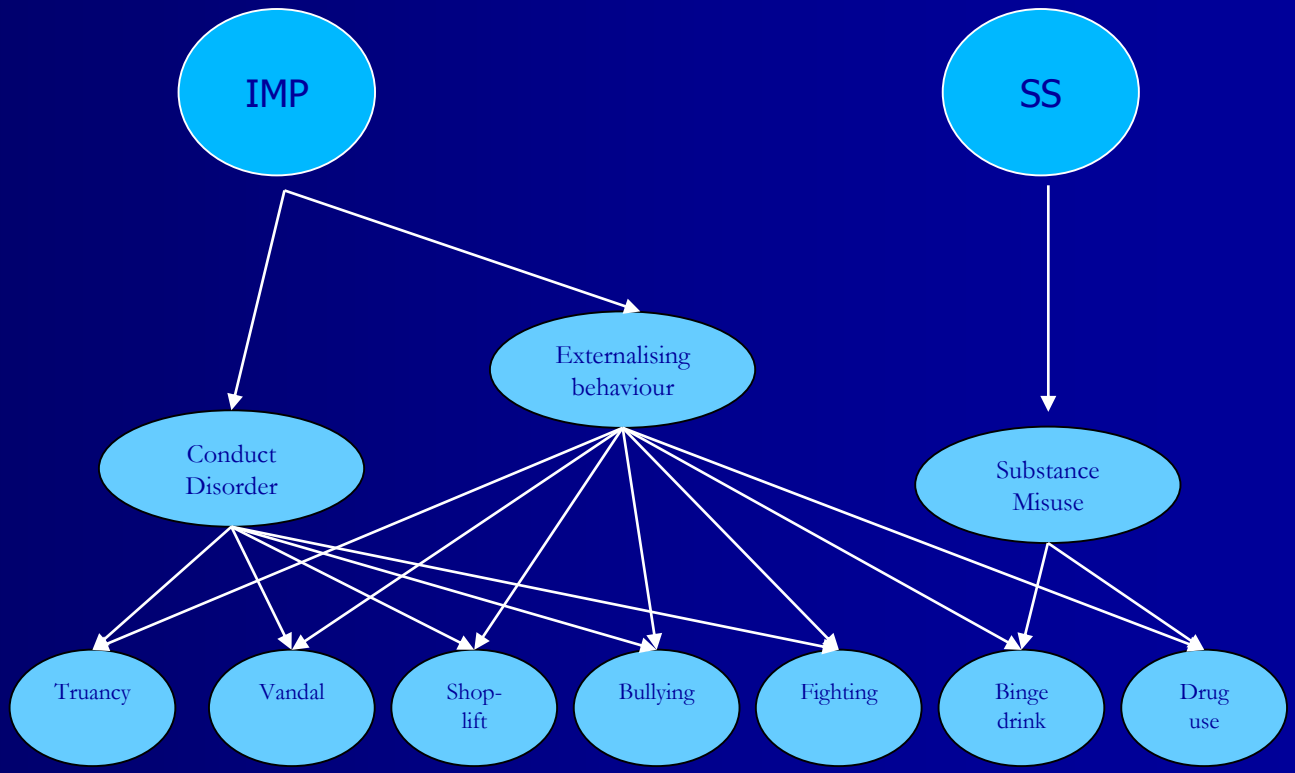
Validation in Adolescents, (Castellanos-Ryan & Conrod, Journal of Child Abnormal, 2011)

3)



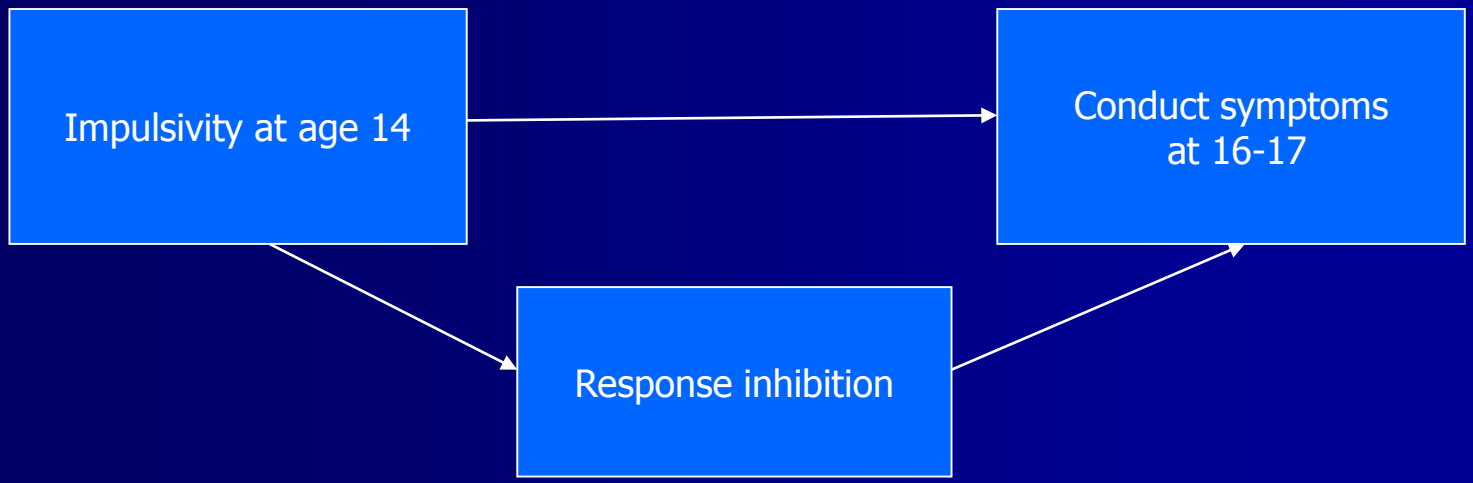
Hierarchical two-subfactor model (3)

Castellanos-Ryan & Conrod, Journal of Child Abnormal, 2011



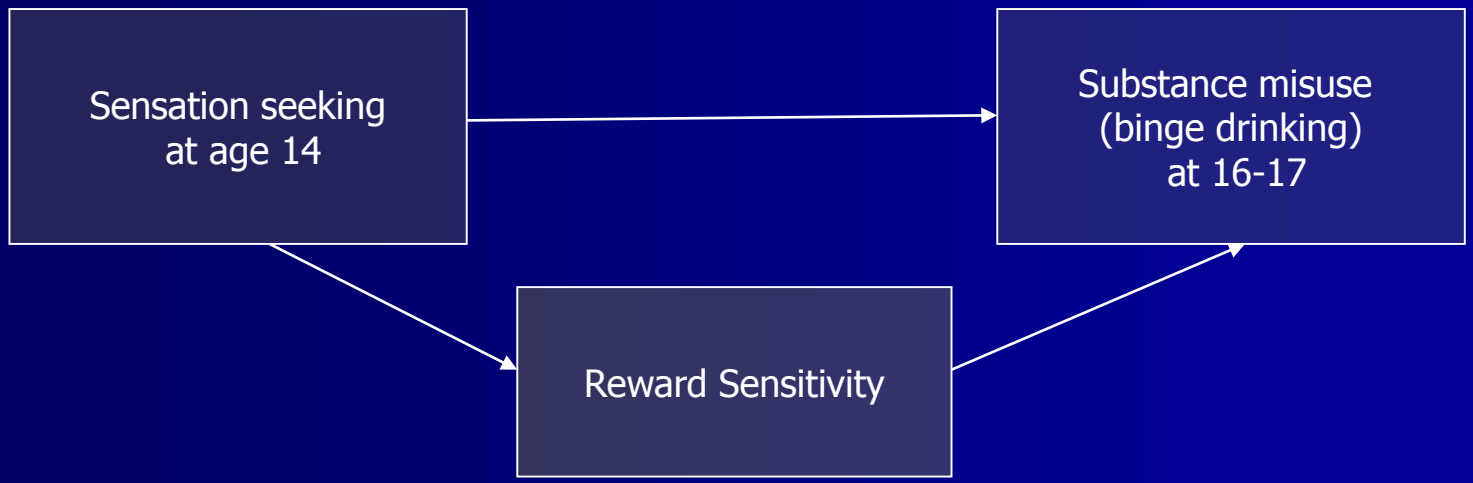
Cognitive correlates of risk
(Castellanos-Ryan, Rubia & Conrod, ACER, 2010)

- Enriched sample of 100 adolescents followed longitudinally:
  - CD+, SM+, CDSM+, CTL
- IMP – poor response inhibition (SSRT) mediates common and specific relationship between IMP and antisocial behaviour



Cognitive correlates of risk
(Castellanos-Ryan, Rubia & Conrod, ACER, 2010)

- SS – reward-dependent disinhibition mediates specific relationshp between SS and substance misuse latent factor.



Project Title: Reinforcement-related behaviour in normal brain function and psychopathology
Coordinator: Gunter Schumann
Funding volume: European Commission

-First multicentre functional and structural genetic-neuroimaging study of a cohort of **2000 14 year old adolescents**.

-Assessed on **traits related to response inhibition, reward, punishment and emotional behaviour**

NATURE NEUROSCIENCE ADVANCE ONLINE PUBLICATION

ARTICLES

nature neuroscience

Adolescent impulsivity phenotypes characterized by distinct brain networks

Robert Whelan[1,2], Patricia J Conrod[3,4], Jean-Baptiste Poline[5], Anbarasu Lourdusamy[3], Tobias Banaschewski[6], Gareth J Barker[3], Mark A Bellgrove[7], Christian Büchel[8], Mark Byrne[2], Tarrant D R Cummins[7], Mira Fauth-Bühler[9], Herta Flor[10], Jürgen Gallinat[11], Andreas Heinz[11], Bernd Ittermann[12], Karl Mann[9], Jean-Luc Martinot[13,14], Edmund C Lalor[2], Mark Lathrop[15], Eva Loth[3,16], Frauke Nees[10], Tomas Paus[17–19], Marcella Rietschel[20], Michael N Smolka[21,22], Rainer Spanagel[23], David N Stephens[24], Maren Struve[10], Benjamin Thyreau[5], Sabine Vollstaedt-Klein[9], Trevor W Robbins[25], Gunter Schumann[3,16], Hugh Garavan[1,2] & the IMAGEN Consortium[26]

Whelan
Fig. 1

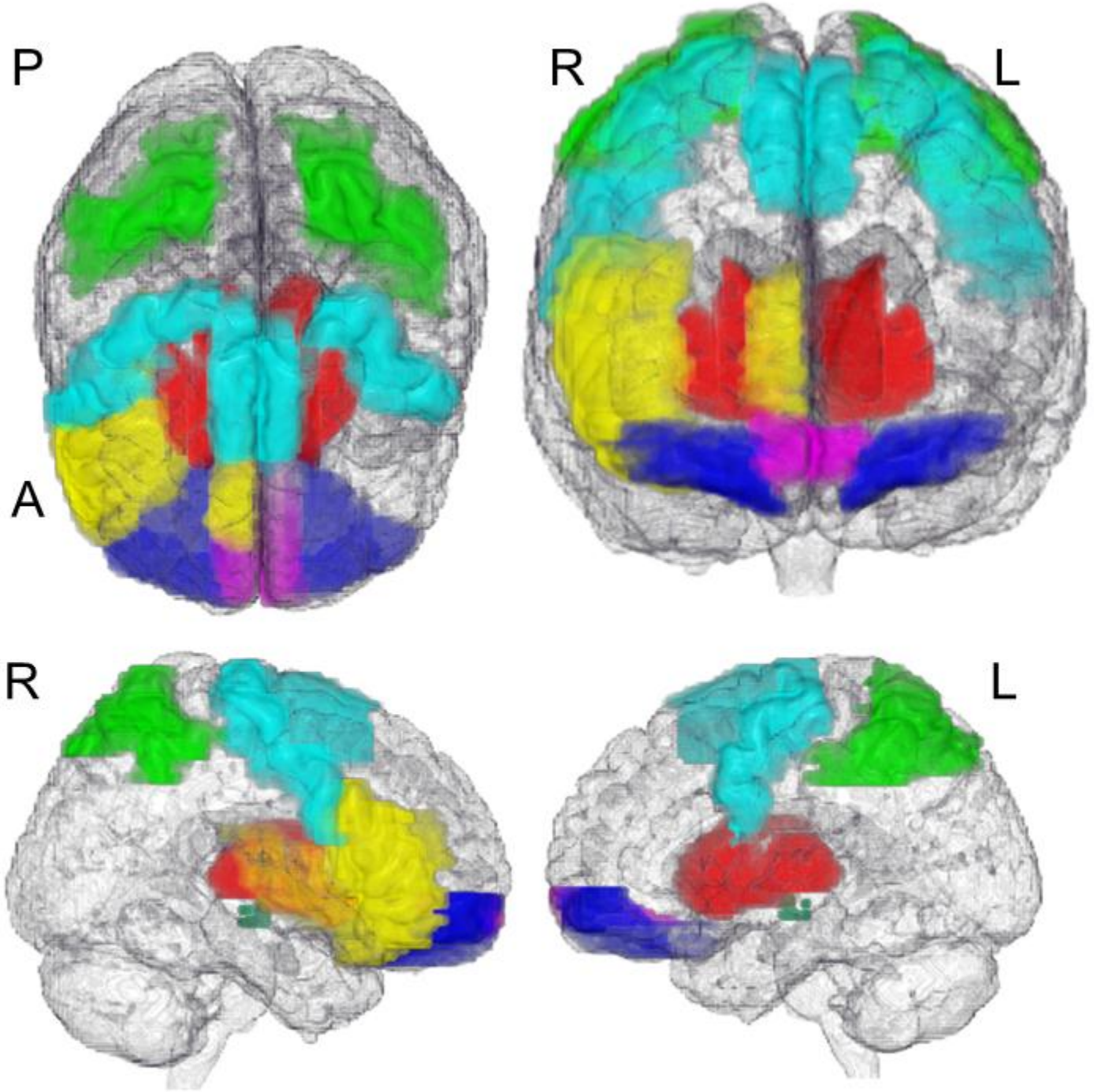
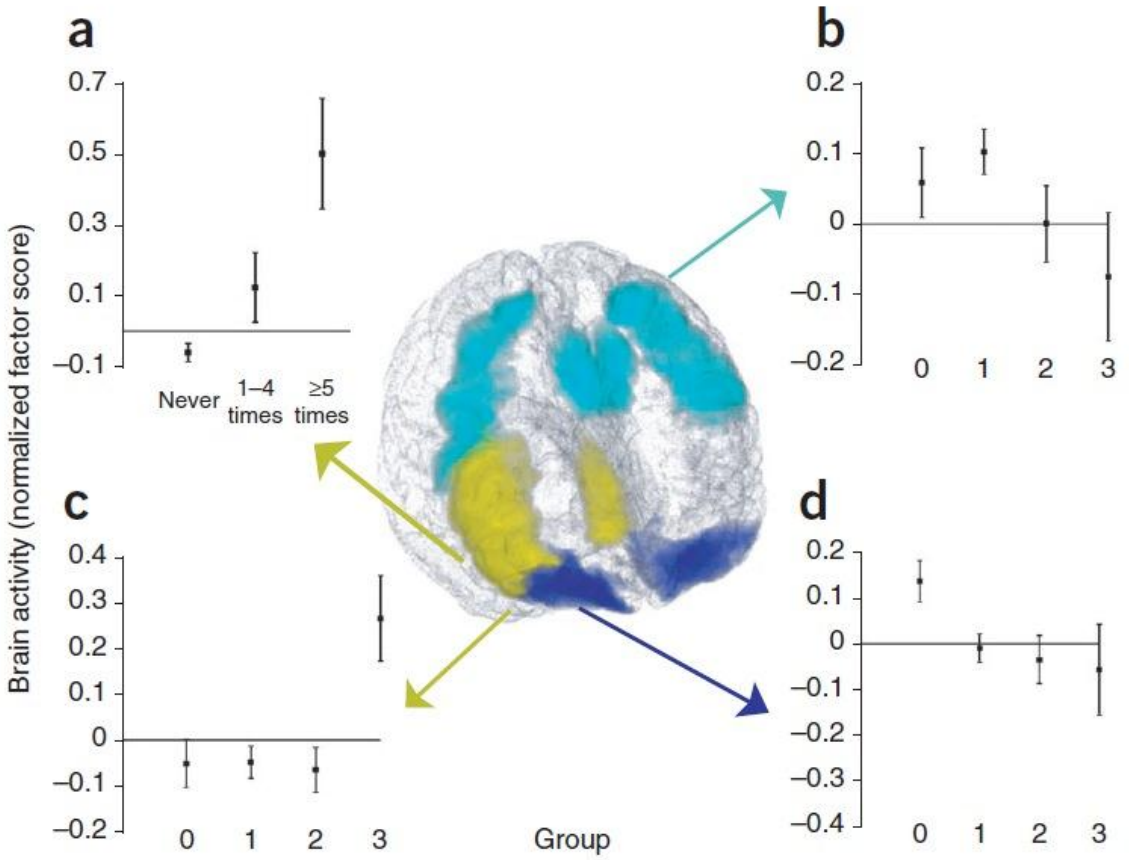


Figure 8: Whelan, Conrod, et al., *Nature Neuroscience, in press*. A graphical representation of substance misuse results. (**a**) The mean factor score for those who had never tried illicit substances, those with four or fewer lifetime uses, and those with five or more lifetime uses, with use of alcohol and nicotine as nuisance variables. (**b**–**d**) Mean factor scores for those who had never tried alcohol, nicotine or illicit substances, those who had tried either alcohol or nicotine, those who had tried alcohol and nicotine, and those who had tried alcohol, nicotine and at least one illicit substance (groups 0, 1, 2 and 3, respectively) for the pre-SMA/PCG, right frontal and stop success orbital networks. Error bars represent ±1 s.e.m.



Personality-Targeted Interventions:
Conrod et al., *Psych Addictive Beh*, 2000

- Psychoeducational Component
- Motivational Component
  - Motivational interviewing techniques
  - Goal setting exercises
- Cognitive-Behavioral Component
  - Personality-specific cognitive distortions
    - Anxiety sensitivity:
      - decatastrophizing & exposure (Barlow & Craske, 1988)
    - Hopeless:
      - negative thought challenging (Beck & Young, 1985)
    - Impulsive:
      - Response inhibition "stop", "focus", "choose" (Kendall & Braswell, 1985)
    - Sensation seeking:
      - thought challenging for boredom & need for stimulation

introduction to impulsivity

An impulsive person acts on the spur of the moment without thinking much about the consequences of their actions. When you feel as if you are being treated unfairly, are frustrated or are angry, you might experience a lack of control and may say or do something that you later regret.

how much do you agree with the following statements?

1 - strongly disagree **2** - disagree **3** - agree **4** - strongly agree

I often don't think things through before I speak.	☐
I often involve myself in situations that I later regret.	☐
I usually act without stopping to think.	☐
Generally, I am an impulsive person.	☐
I feel I have to be crafty and manipulative to get what I want.	☐
Add your total to determine your level of impulsivity.	☐

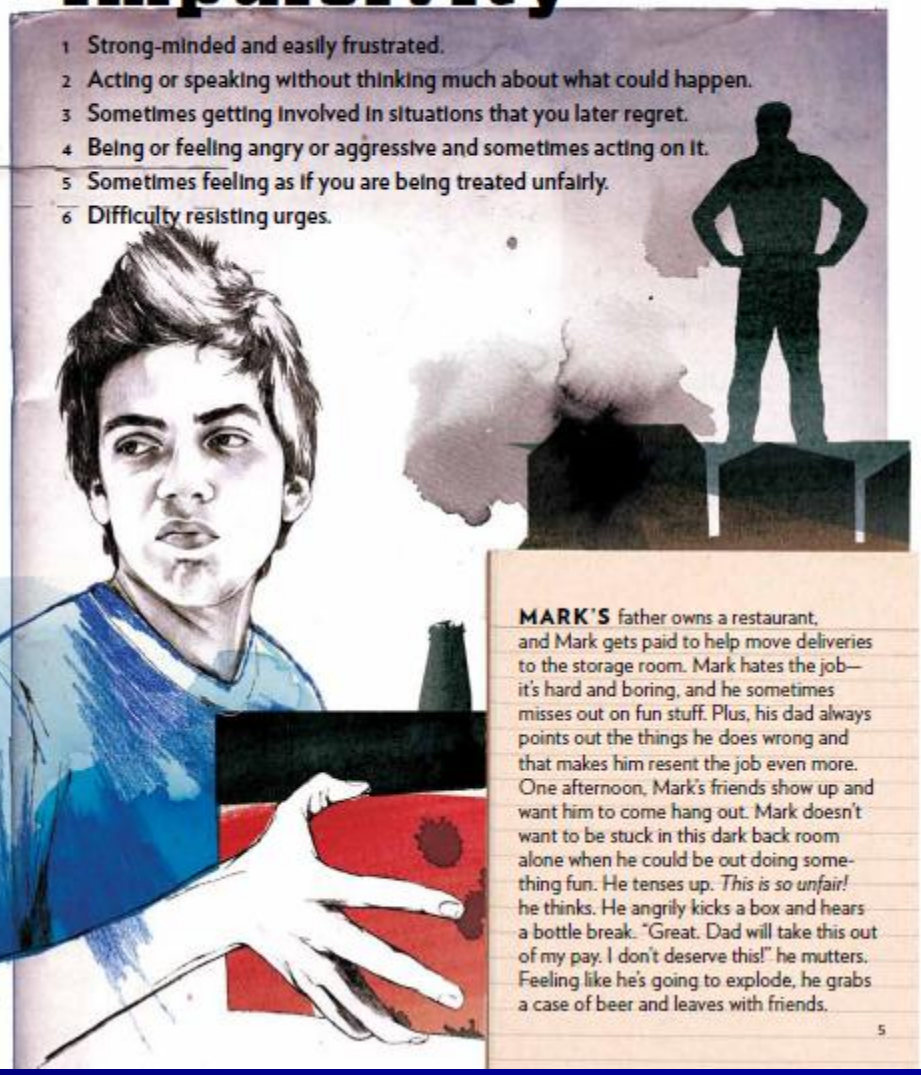
under 9 = low 9-14 = medium 14 and above = high

What does impulsivity mean to you?

CHARACTERISTICS OF

impulsivity

1. Strong-minded and easily frustrated.
2. Acting or speaking without thinking much about what could happen.
3. Sometimes getting involved in situations that you later regret.
4. Being or feeling angry or aggressive and sometimes acting on it.
5. Sometimes feeling as if you are being treated unfairly.
6. Difficulty resisting urges.



MARK'S father owns a restaurant, and Mark gets paid to help move deliveries to the storage room. Mark hates the job—it's hard and boring, and he sometimes misses out on fun stuff. Plus, his dad always points out the things he does wrong and that makes him resent the job even more. One afternoon, Mark's friends show up and want him to come hang out. Mark doesn't want to be stuck in this dark back room alone when he could be out doing something fun. He tenses up. *This is so unfair!* he thinks. He angrily kicks a box and hears a bottle break. "Great. Dad will take this out of my pay. I don't deserve this!" he mutters. Feeling like he's going to explode, he grabs a case of beer and leaves with friends.

Personality-Targeted Interventions: The Evidence

Phase I: Proof of concept (Conrod et al., 2006).

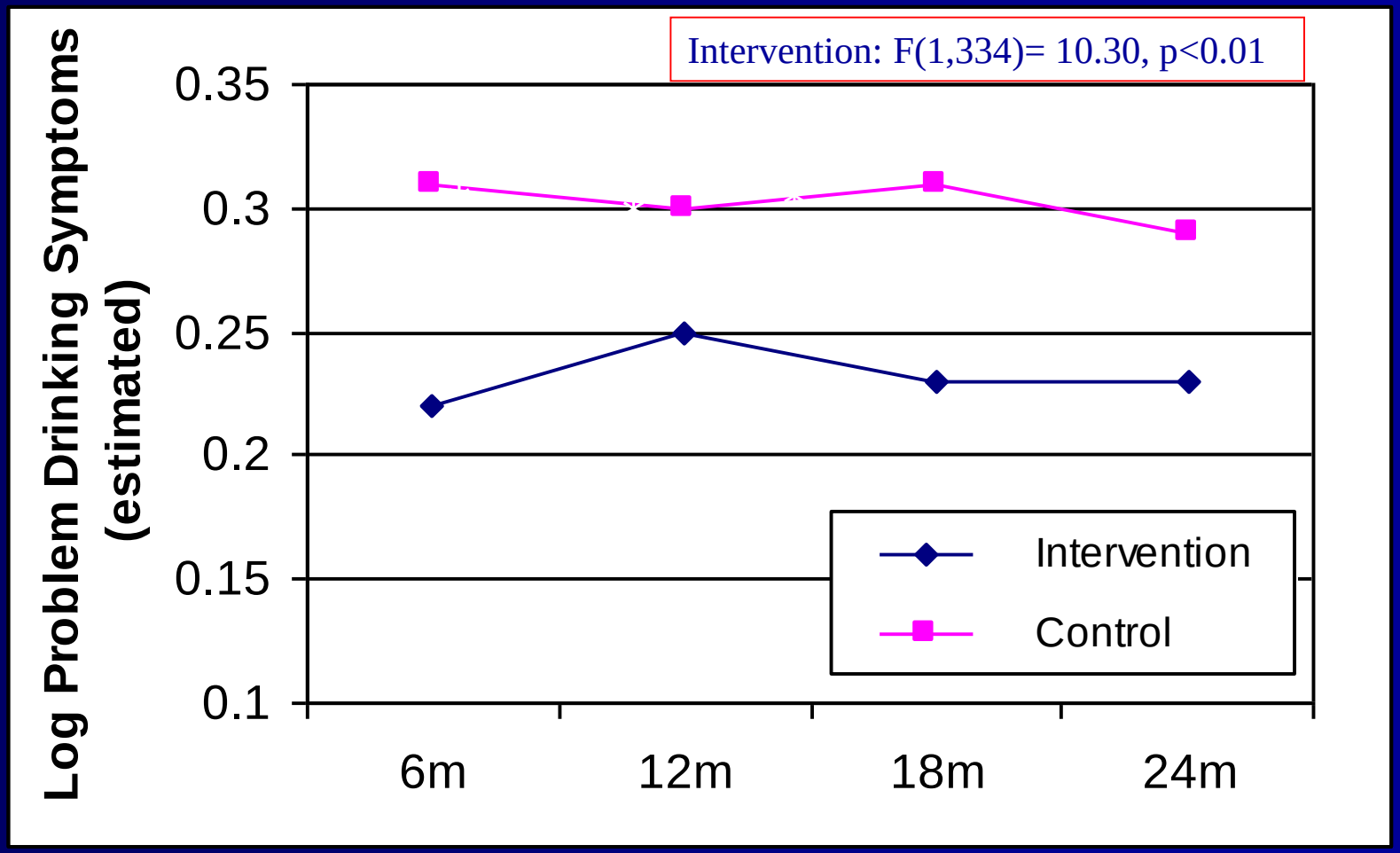
Phase II: Efficacy (Conrod et al., 2008; 2010; 2011)

Phase III: Effectiveness (Conrod et al., 2013)

Phase IV: Process, secondary outcomes, pathways, delivery models (O'Leary-Barrett et al., 2013)

Phase V: Special populations (Stewart et al., 2012), contexts, generalisability (Lammers, et al., 2010), optimisation (Newton et al., 2012)

Drinking Outcomes

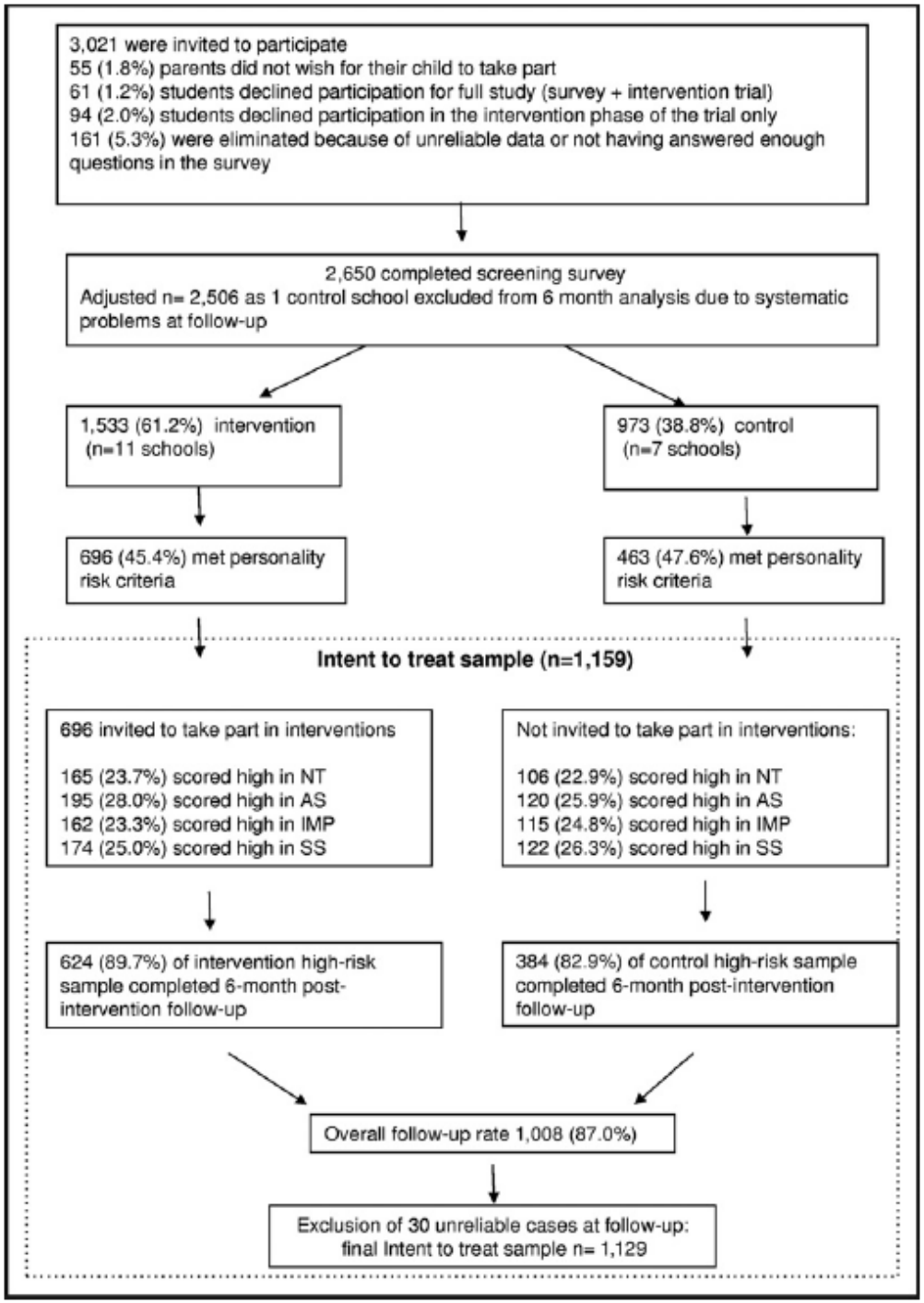


Conrod et al., *Journal of Consulting and Clinical Psychology*, 2011

UK Adventure Trial:
Effectiveness when delivered by teachers

- Phase III trial funded by Action on Addiction, 2006-2010
- Hypotheses
  - Primary:
    - Effectiveness when delivered by schools and teachers
  - Secondary:
    - Mental health benefits?
    - 'Herd effects'?: secondary effects on general population?

UK Adventure Trial



Two-Year Impact of Personality-Targeted, Teacher-Delivered Interventions on Youth Internalizing and Externalizing Problems: A Cluster-Randomized Trial

Maeve O'Leary-Barrett, B.A., Lauren Topper, Ph.D., Nadia Al-Khudhairy, M.Sc., Robert O. Pihl, Ph.D., Natalie Castellanos-Ryan, Ph.D., Clare J. Mackie, Ph.D., Patricia J. Conrod, Ph.D., C.Psychol.

TABLE 2 Intervention Effects on Internalizing and Externalizing Symptoms Over 2-Year Follow-Up (High Risk [HR] Sample, N=1,024)

		Main Effect of Intervention			
		Symptom Severity			
		Mean (SD)			Severe Symptom levels
Outcome	Symptom Description	Control	Intervention	β (SE)	OR (95% CI)
Internalizing symptoms[a]	Depression	13.15 (3.87)	12.71 (3.85)	0.09 (0.05)*	0.74 (0.58–0.96)*
	Suicidal ideation	0.34 (0.31)	0.31 (0.31)	0.09 (0.04)*	—
	Anxiety	8.60 (2.57)	8.22 (2.57)	0.12 (0.05)**	0.79 (0.59–1.05)
	Panic attacks	1.20 (0.35)	1.23 (0.36)	−0.04 (0.04)	—
Externalizing problems	Conduct problems	3.26 (1.17)	3.07 (1.16)	0.10 (0.03)***	0.79 (0.65–0.96)*

Note: β = standardized beta; OR = odds ratio.

[a]*Although analyses were carried out on log-transformed data, means (SDs) were provided for non–log-transformed variables for ease of interpretation.*

*$p < .05$, **$p \leq .01$, ***$p \leq .001$.

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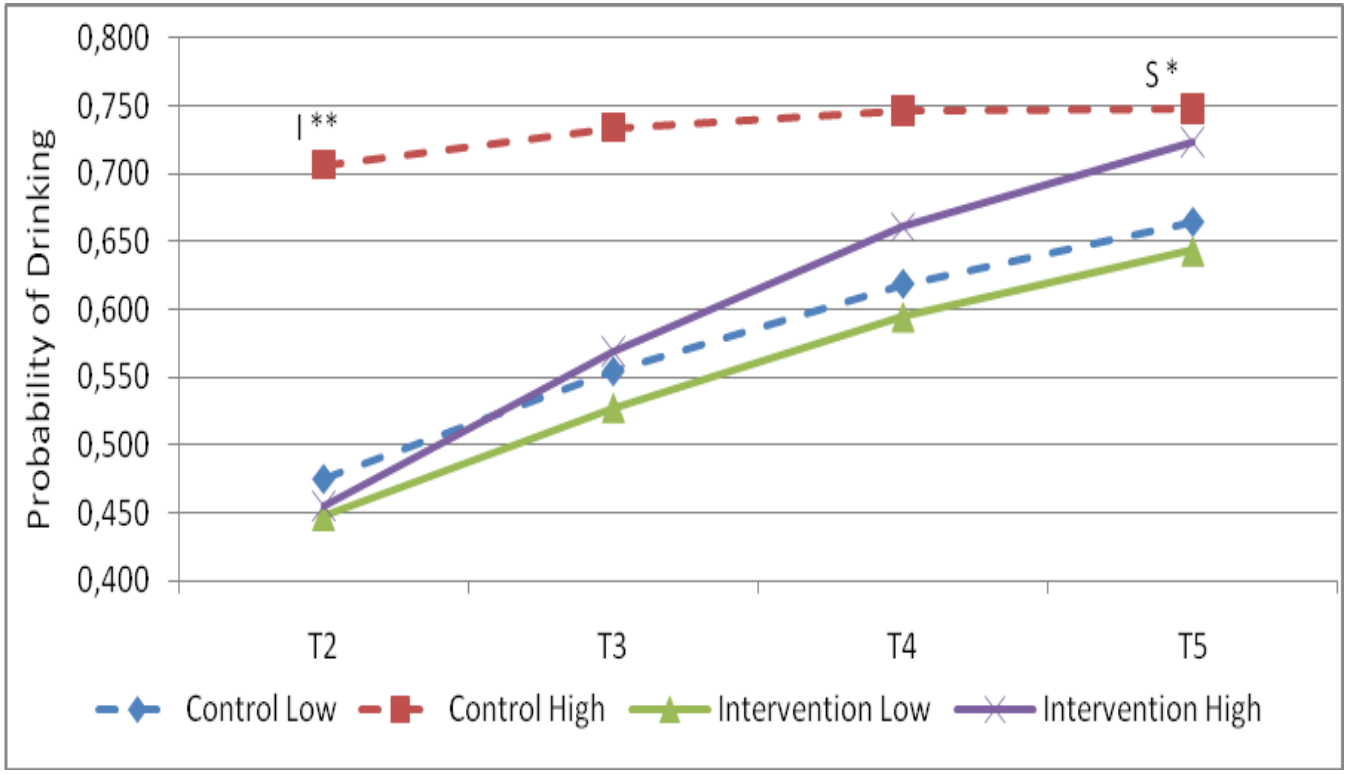
TABLE 3 Intervention Effects on Severe Symptom Outcomes Over 2-Year Follow-Up: High-Risk (HR) Sample and Personality-Specific Effects

Presence of severe symptoms	Personality group	n	OR (95% CI)
Depression	H group	240	0.77 (0.46–1.29)
	Other HR groups	784	0.71 (0.52–0.97)*
Anxiety	AS groups	292	0.67 (0.45–1.02)
	Other HR groups	732	0.84 (0.64–1.09)
Conduct problems	IMP group	238	0.64 (0.41–0.99)*
	Other HR groups	786	0.86 (0.71–1.05)

Note: AS = anxiety sensitivity; H = hopelessness; IMP = impulsivity; OR = odds ratio.

*$p < .05$.

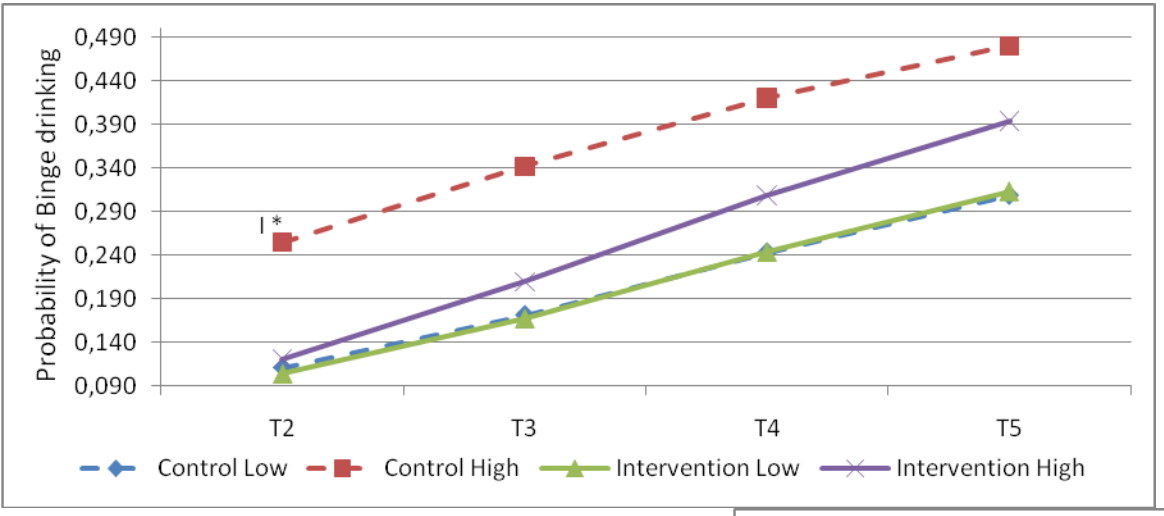
Intervention x Baseline Conduct Problems (high/low) on Drinking onset



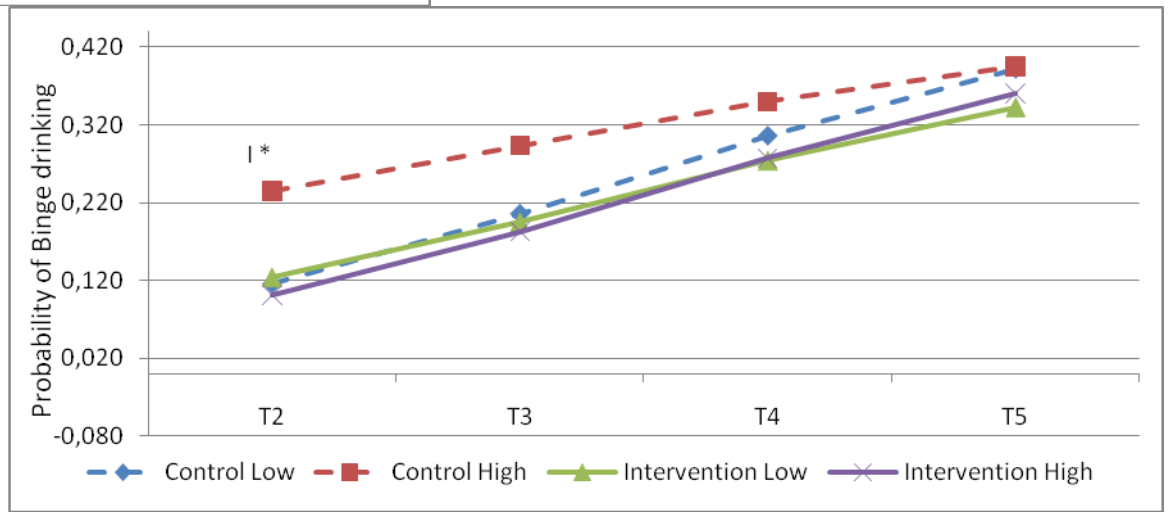
I (Intercept) : significant difference relative to Intervention High, $p<0.01$
S (Slope) : significant difference relative to Intervention High, $p<0.05$
Control Low: Control group, Low on Conduct problems (1 S.D. below the mean)
Control High: Control group, High on Conduct problems (1 S.D. above the mean)
Intervention Low: Intervention group, Low on Conduct problems (1 S.D. below the mean)
Intervention High: Intervention group, High on Conduct problems (1 S.D. above the mean)

Intervention x Baseline Conduct Problems (high/low) on Binge Drinking

Conduct Problems



ADHD symptoms



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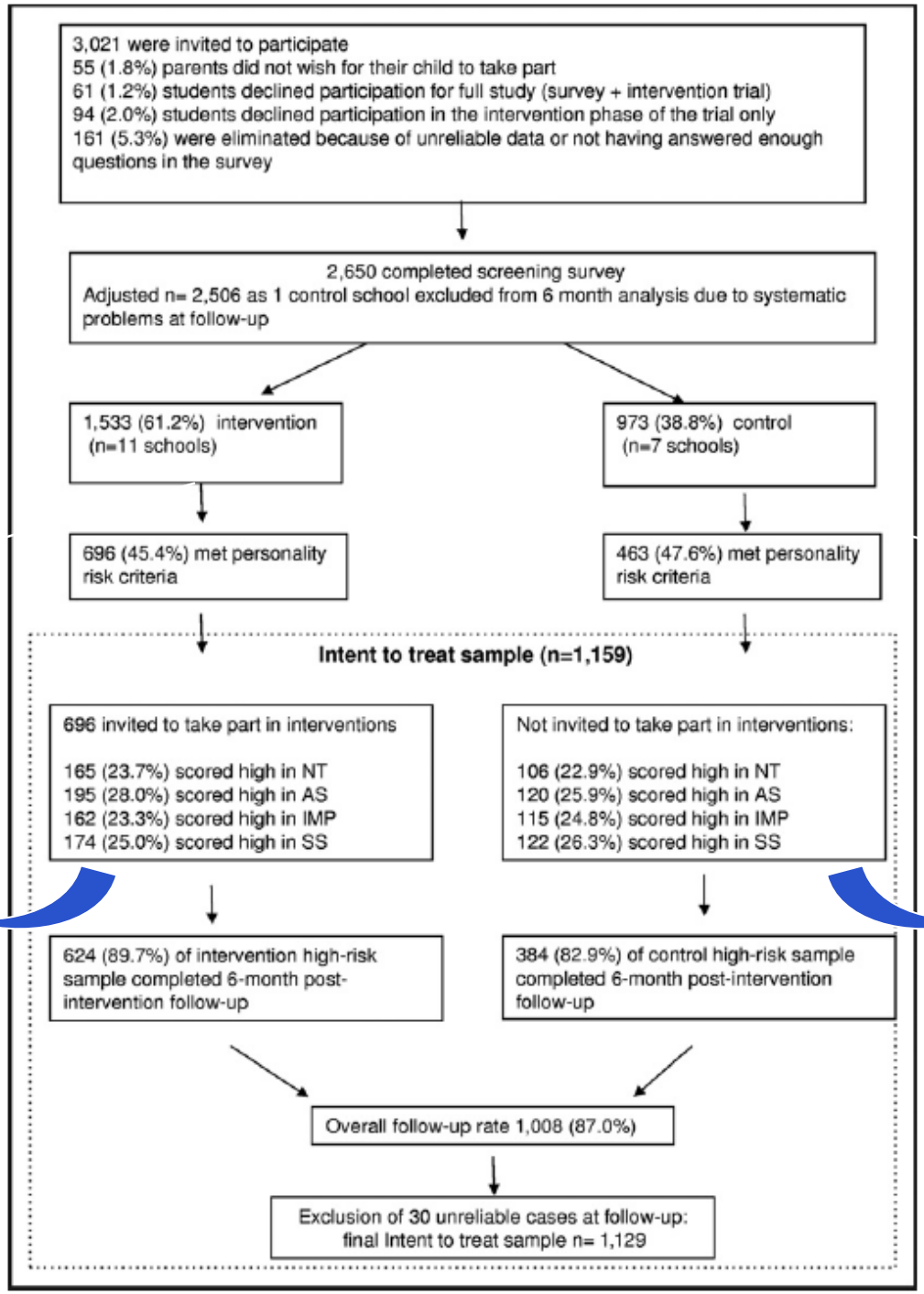
Intervention Low: Intervention group, Low on Conduct problems (1 S.D. below the mean)
Intervention High: Intervention group, High on Conduct problems (1 S.D. above the mean)

"Gee, Tommy, I'd be lost without your constant peer pressure."



1268 (54.6%)
Low personality risk

1025 (52.4%)
Low personality risk

Followed 6, 12, 18 & 24 months

Followed 6, 12, 18 & 24 months

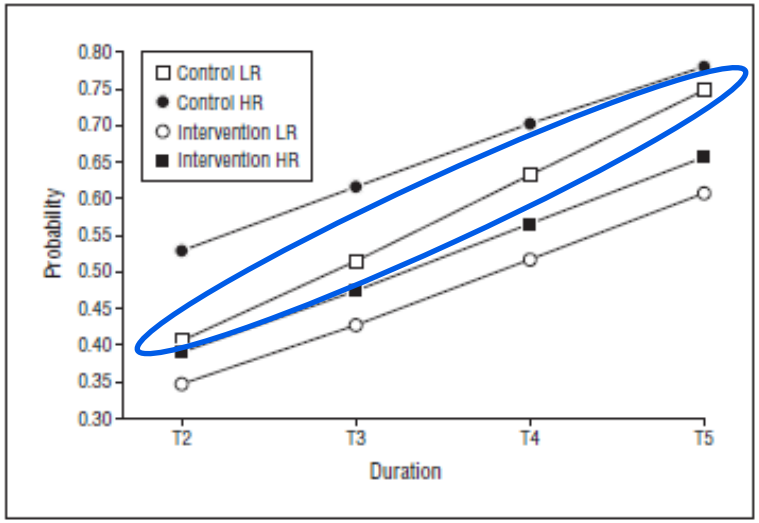


Figure 1. Estimated probability of reporting drinking × frequency of drinking in high-risk and low-risk youth attending intervention and control schools on the basis of 1217 respondents (53.1%) reporting nonuse at 6 months (T2), 1252 (54.6%) at 12 months (T3), 1020 (44.5%) at 18 months (T4), and 934 (40.7%) at 24 months (T5).

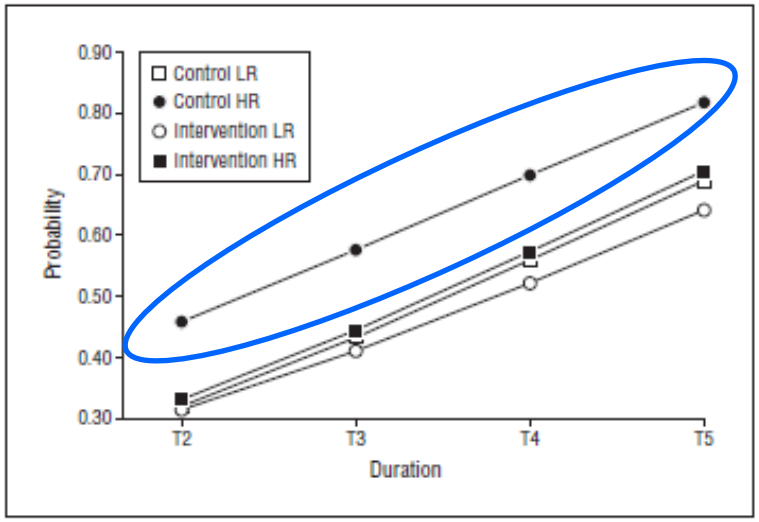


Figure 2. Estimated probability of reporting drinking × quantity of drinking in high-risk (HR) and low-risk (LR) youth attending intervention and control schools. T2 indicates 6 months after intervention; T3,12 months after intervention; T4, 18 months after intervention; and T5, 24 months after intervention.

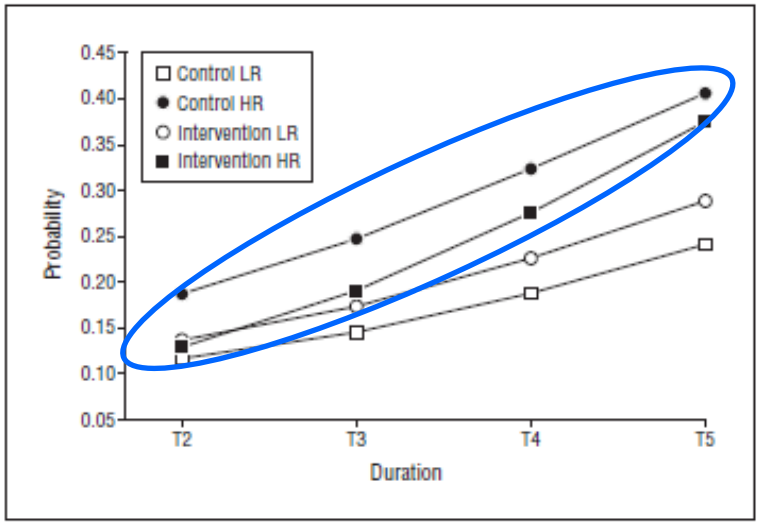


Figure 3. Estimated probability of reporting binge drinking × frequency of binge drinking in high-risk (HR) and low-risk (LR) youth attending intervention and control schools. T2 indicates 6 months after intervention; T3,12 months after intervention; T4, 18 months after intervention; and T5, 24 months after intervention.

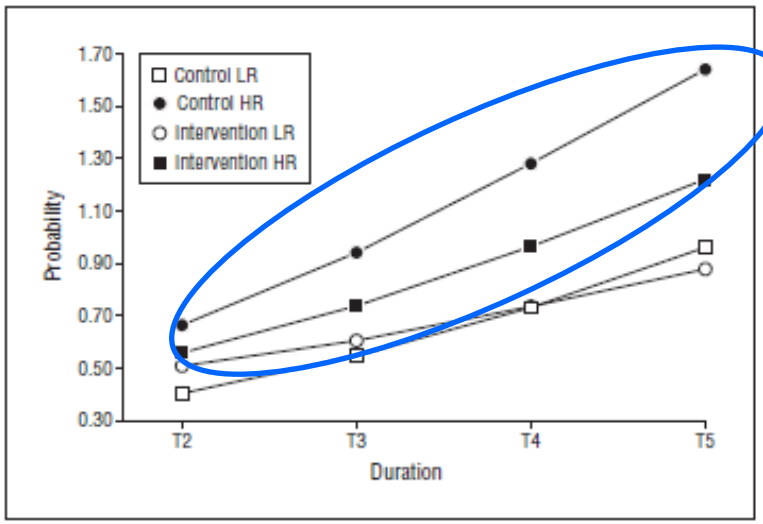


Figure 4. Estimated probability of reporting problem drinking symptoms × severity of problem drinking symptoms in high-risk (HR) and low-risk (LR) youth attending intervention and control schools. T2 indicates 6 months after intervention; T3,12 months after intervention; T4,18 months after intervention; and T5, 24 months after intervention.

CIHR Co-Venture Trial

32 public and private schools, each with approximately 150 Year 7 students, recruited from Greater Montreal Area, randomly assigned to treatment condition.

Preventure training of school staff

16 schools (50%) Intervention Condition

16 schools (50%) Control Condition

2208 (92%) students complete screening survey and consent to trial

2208 (92%) students complete screening survey and consent to trial

Baseline

1204 (54.5%) low risk

1004 (45.5%) high risk

1004 (45.5%) high risk

1204 (54.5%) low risk

NEURO-Venture
Brain structure-function

1004 invited to take part in interventions

251 (25%) score high in NT
251 (25%) score high in AS
251 (25%) score high in IMP
251 (25%) score high in SS

1004 Not invited to take part in interventions:

251 (25%) score high in NT
251 (25%) score high in AS
251 (25%) score high in IMP
251 (25%) score high in SS

Early Use
↓
Cognitive dev
↓
Em / Behav Problems
↓
Academic Failure
↓
ADDICTION OUTCOMES

1854 (84%) of control sample completed12-month FU

1854 (84%) of control sample completed12-month FU

12mo

NEURO-Venture
Brain structure-function

1854 (84%) of control sample completed 24-month FU

1854 (84%) of control sample completed 24-month FU

24mo

1854 (84%) of control sample completed 36-month FU

1854 (84%) of control sample completed 36-month FU

36mo

NEURO-Venture
Brain structure-function

1854 (84%) of control sample completed 48-month FU

1854 (84%) of control sample completed 48-month FU

48mo

Thank you

patricia.conrod@umontreal.ca

- My team: Natalie Castellanos, Maeve O'Leary-Barrett, Eveline Perrier-Ménard, Clare Mackie, the IMAGEN Consortium.
- Action on Addiction
- CIHR - INMHA
- ABMRF
- ERAB
- MRC-UK
- European Commission, FP6-Health and FP7-Humanities and Social Sciences.
- FRSQ Chercheur-Boursier