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CORE CENTRE FOR OUTCOMES RESEARCH AND EVALUATION

Addressing Drug-Impaired Driving: An Evidence Based Approach

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CIHR IRSC

A growing concern

- **Motor vehicle collisions**
  - –40,000 deaths and 2.5 million emergency department visits per year.

- **Nonmedicinal recreational cannabis**
  - –Legalized in Canada, Uruguay, and 15 U.S. states and DC.

- **Evidence accumulation on harms of cannabis on driving**
  - **–Windle et al. 2021 (McGill Univ.), ecologic study**
    - 15% increases in rate of fatal motor vehicle collisions in U.S. states that legalized cannabis
  - **–Nazif-Munoz et al. 2020 (McGill Univ.), interrupted time–series analysis.**
    - Cannabis legalization in Uruguay was associated with an immediate **52%** increase in the rate of light motor vehicle fatalities.

Drugs and Psychomotor Skills

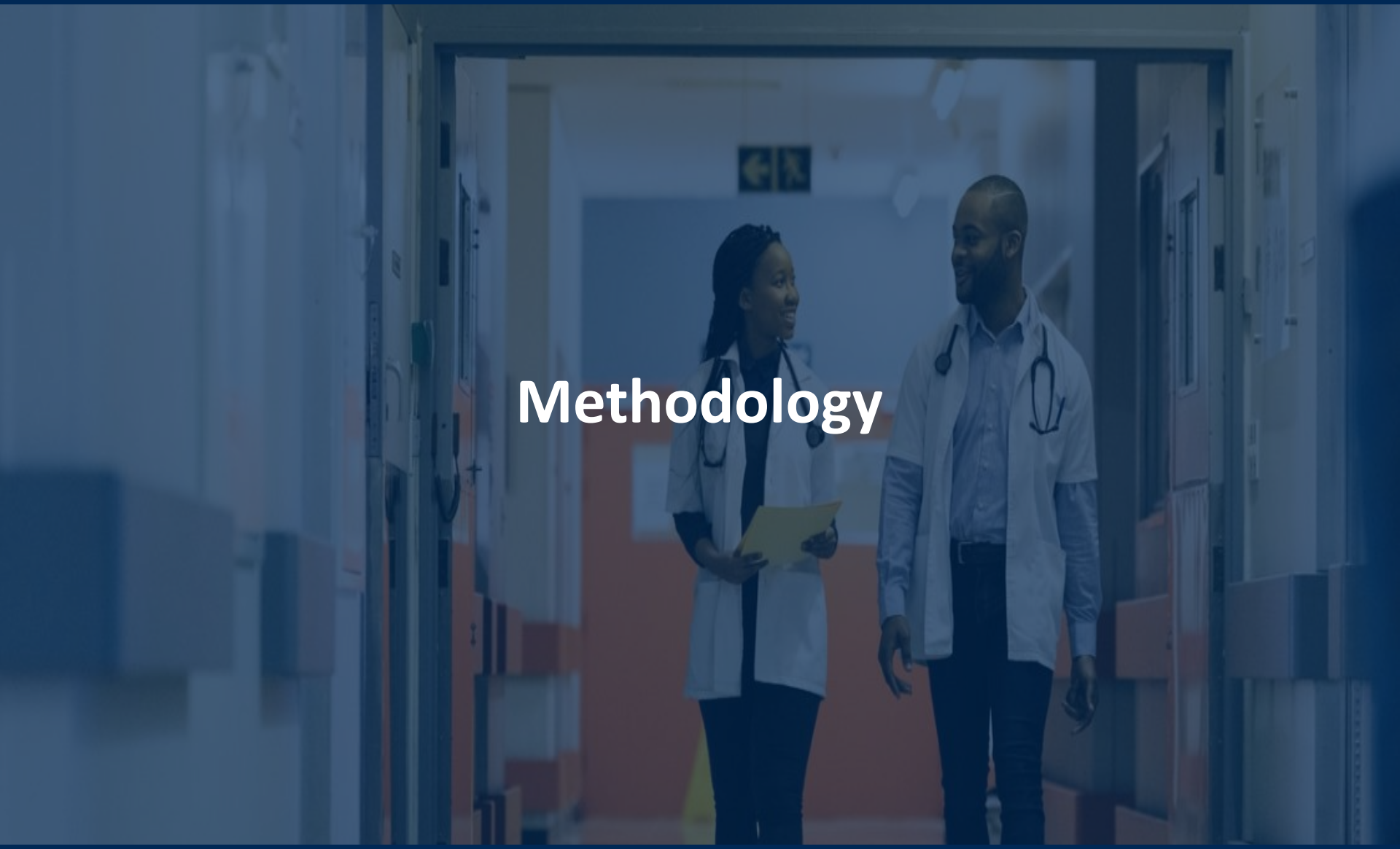
Ways in which different drugs affect brain functioning

Drug class	Drug	Impairment						
		Drowsiness	Cognitive functions	Motor functions	Mood	Lateral vehicle control	Time estimation	Balance
Illicit drugs	Cannabis	●	●	●	●	●	●	●
	Cocaine	—	●	●	●	—	—	—
	Amphetamines	—	●	●	●	—	●	●
	MDMA[a]	—	●	—	●	—	—	●
	Hallucinogens	—	●	●	●	—	●	●
Prescription drugs	Benzodiazepines	●	●	●	—	●	—	●
	Opioids	●	●	●	●	●	—	●
	Other depressants	●	●	●	●	●	—	●
New psychoactive substances	Synthetic cannabinoids	●	●	●	●	●	●	●
	Synthetic cathinones	—	●	●	●	—	—	—

World Health Organization 2016. Drug use and road safety: a policy brief

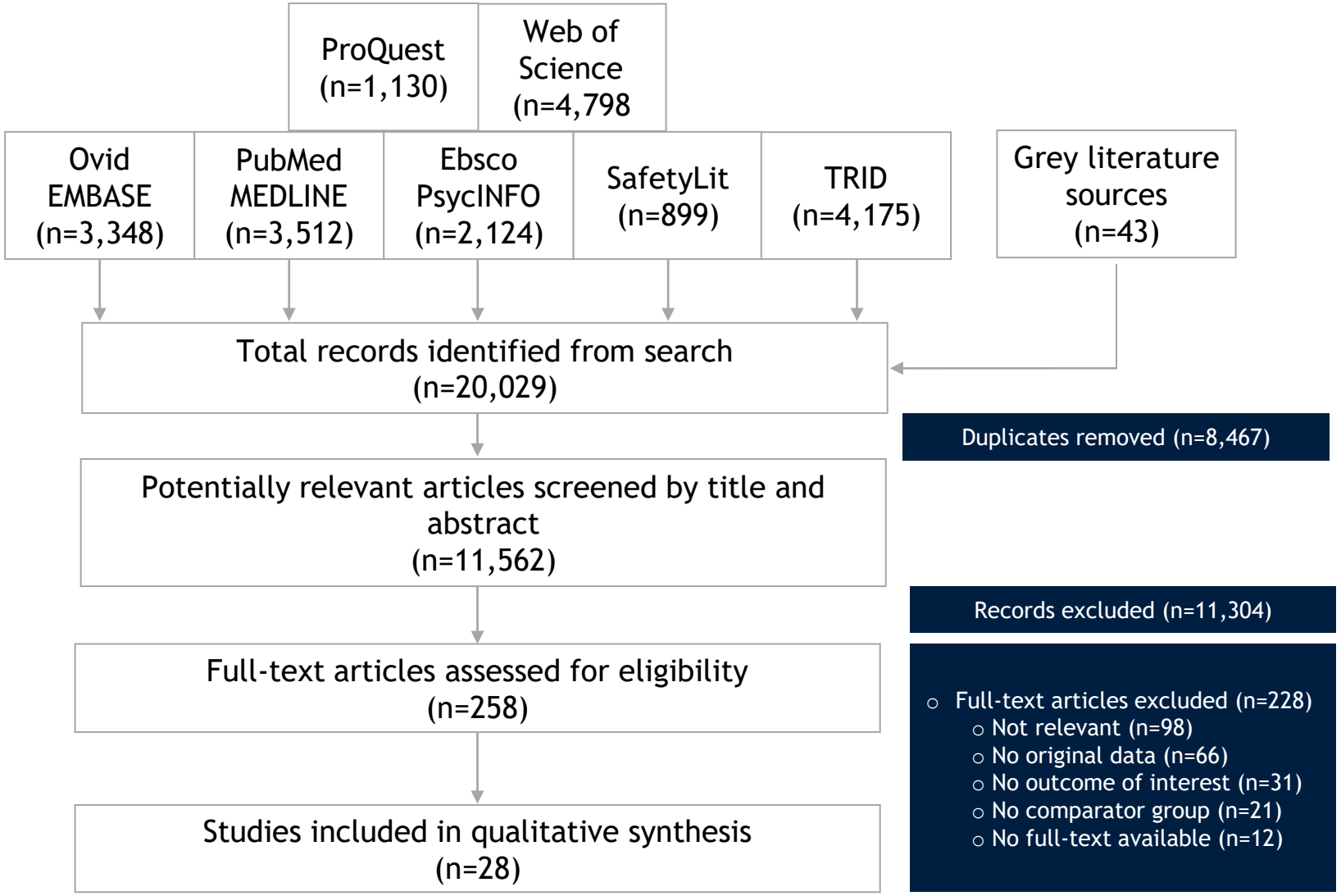
Objective

Evaluate preventive interventions based on measures of drugged driving knowledge, attitudes, behaviors, and traffic-related outcomes among adults and youth.

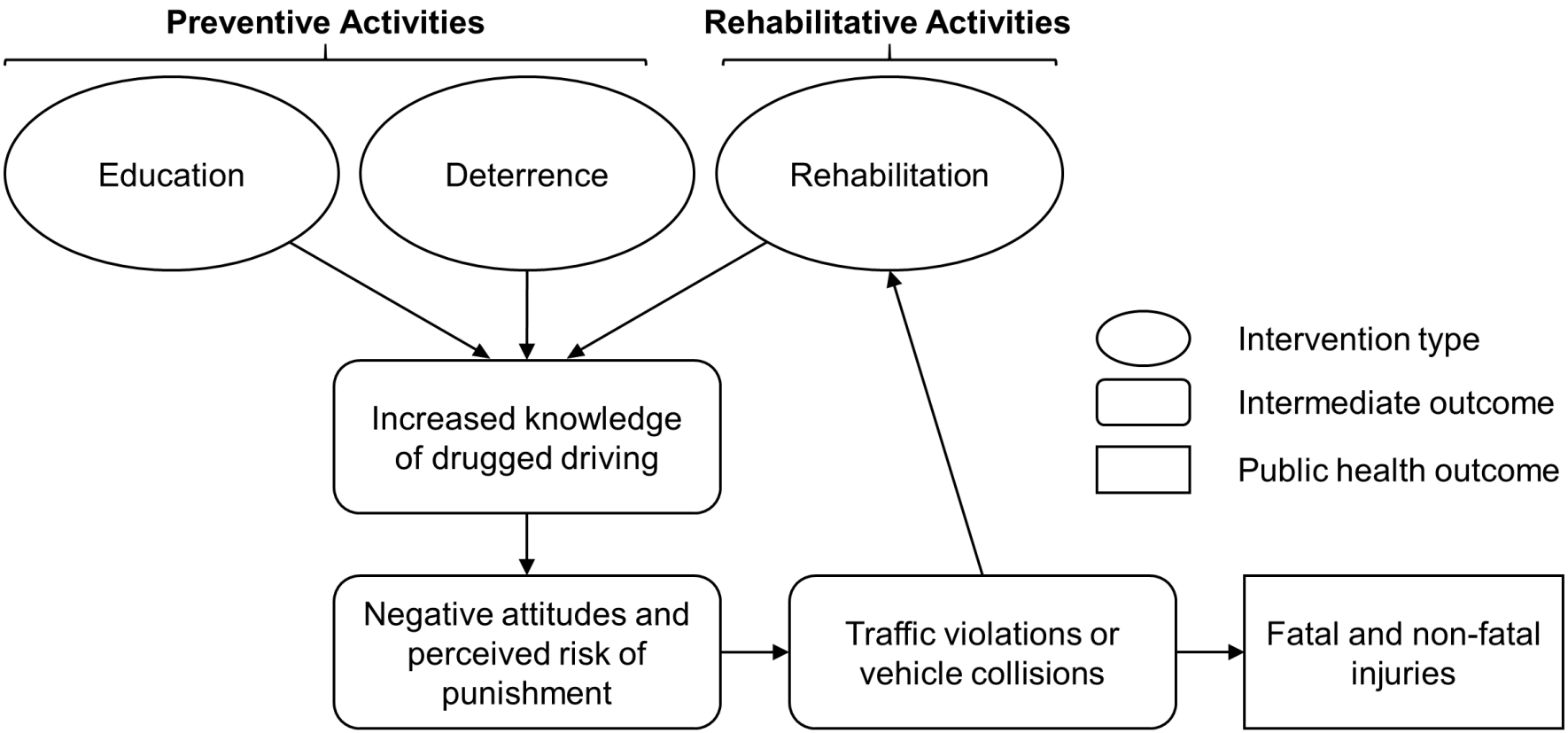


Methodology

Systematic Search



Analytical Framework



Evidence Appraisal – GRADE Approach

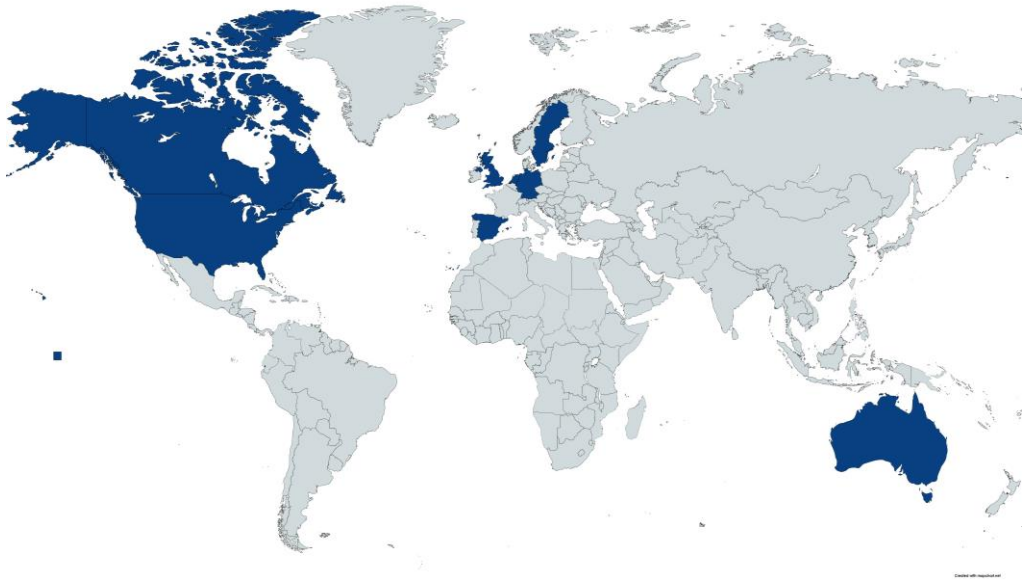
Quality level	Definition
HIGH ⊕⊕⊕⊕	We are confident that the true effects lie close to that of the estimates of the effect
MODERATE ⊕⊕⊕◯	The true effects are likely to be close to the estimates of the effects, but there is a possibility that they are substantially different
LOW ⊕⊕◯◯	The true effects might be substantially different from the estimates of effects
VERY LOW ⊕◯◯◯	The estimates are very uncertain, and often will be far from the truth

Guyatt, Gordon, et al. "GRADE guidelines: 1. Introduction—GRADE evidence profiles and summary of findings tables." *Journal of clinical epidemiology* 64.4 (2011): 383-394.


Results

Overview of identified studies

- Evidence for the prevention of drugged driving ranged from 1987 to 2020.
- Most participants were adolescents and young adults (aged 15–25 years; n=33,711/37,117).
- Various countries and languages (e.g., US, UK, Germany, Sweden, Netherlands, Canada, Australia, Spain).
- Various study designs (e.g., RCTS, cross-sectional, interrupted time series designs).



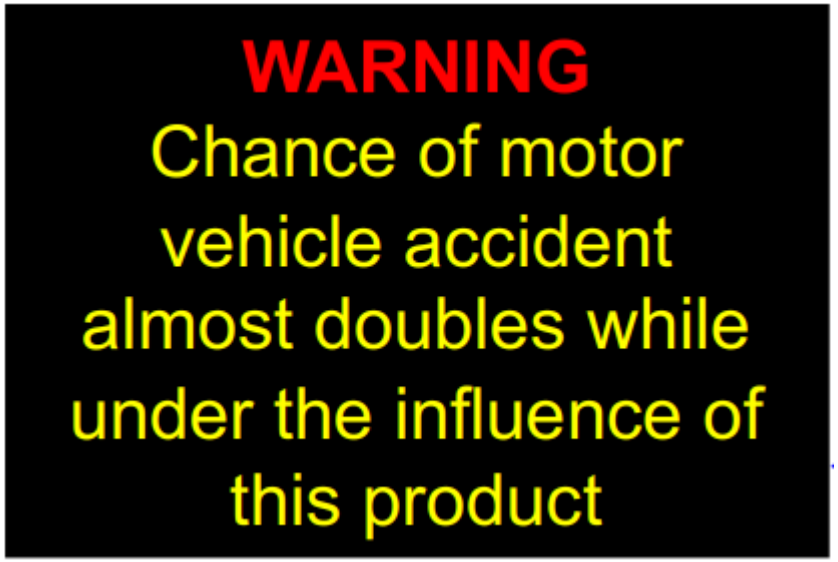
Population Level Prevention

Educational Interventions

Health Warnings

- **6% increase in agreement that drugged driving increases the risk of vehicle accidents** (Mutti-Packet et al. 2018).

- "Cost-effective medium to communicate health information, given their reach and frequency of exposure at the point of purchase and during use."



Deterrence Interventions

Road Side Drug Testing

- Hypothetical high-certainty apprehension scenarios (Jones et al. 2006).
  - –Police nearby and can randomly test for drugs.
  - –Drugged driving likelihood among cannabis users was (**OR, 0.2, 95%·CI, 0.1–0.3**).

- Real-world impact in Australia (Horyniak et al. 2017).
  - – Moderate effect among users of injection drugs tested >1 (**OR, 0.6, 95%·CI 0.4–1.1**).

MODERATE

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Deterrence Interventions

Media Campaigns

- Two campaigns, consistent finding.

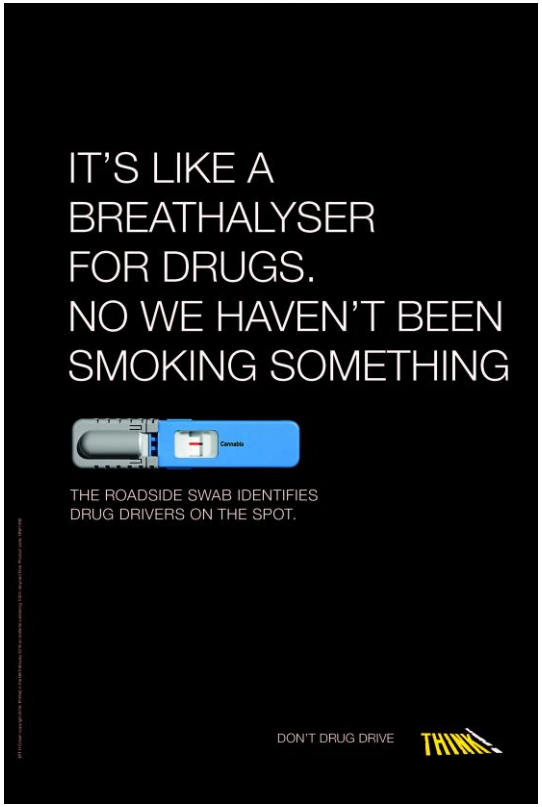
LOW

⊕⊕○○

- **Think! (UK Program, 2015)**
  - –Recognizer versus nonrecognizers' perceived likelihood of being stopped; 63% vs 45% ($p<0.05$).

- **Scottish Program (Ormston et al. 2003)**
  - –Increased knowledge of drugged driving laws (recognizers versus nonrecognizers).

- Cost-effective. Increases knowledge and perceived risk of punishment.



Deterrence Interventions

State Sanctions

Three approaches:

- **Criminalization of road traffic offences in Spain (Novoa et al. 2011).**
  - **–Traffic-injury collisions:**
  - **–Men: (RR, 0.93; 95%·CI, 0.89–0.97).**
  - **–Women: (RR, 0.99; 95%·CI, 0.95–1.03).**

LOW

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- **License withdrawal of drug offenders in select U.S. states (Sohoni et al. 2019).**
  - **–Traffic fatalities per 10,000 miles: 135.1 vs. 155.0 (p<0.001).**

VERY LOW

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- **Per se drugged driving laws in select U.S. states (multiple studies).**
  - **–Null and inconsistent findings across identified studies.**

Provider Level Prevention

Educational Interventions

Drug Abuse Prevention & Youth Driver Education

Youth Driver Education

- Safe Drivers Wanted (Haggerty et al. 2006).
- Drugged driving compared to controls **(OR, 0.6; 95% CI, 0.3–1.0).**
  - –Home visit reviewing risk-taking behaviors related to driving & helping parents and teens develop a contract for driving which includes consequences for contract breaches.

HIGH

⊕⊕⊕⊕

Drug Abuse Prevention

- Life Skills Training (Griffin et al. 2004).
  - –7th to 9th grade. Students were taught different cognitive-behavioral skills to build self-esteem, resist peer-pressure, manage emotions, and communicate effectively.
  - –Traffic-offenses after six years: (**OR, 0.8; 95%·CI, 0.6–0.9**).

VERY LOW

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Rehabilitative Interventions

Motivational Interviewing

Most effective strategy

"Client-centered counseling style for eliciting behavior change by helping clients to explore and resolve ambivalence."

Two RCTs with significant effects (Walton et al. 2013; Jones et al. 2012)

- Fewer self-reports of cannabis-impaired driving after 3 months (baseline difference **-13.7%** [p<0.02]; -**50.0%** [p<0.05]).

Some evidence of long-term effects.

- 12 months (Baseline difference**: -20%,** [p<0.05]).

MODERATE

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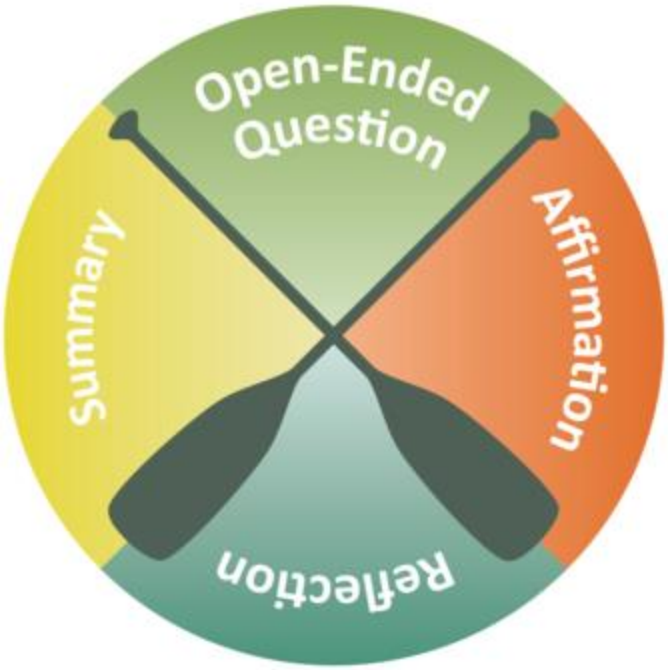

Rollnick S, Butler C C, Kinnersley P, Gregory J, Mash B. Motivational interviewing *BMJ* 2010; 340 :c1900 doi:10.1136/bmj.c1900

Rehabilitative Interventions

Substance Abuse Treatment & Rehabilitation

Substance Abuse Treatment (Macdonald et al. 2004)

- Moderate findings 1 year after treatment.
  - Cannabis-impaired driving, **-26%** ($p<0.001$).
  - Cocaine-impaired driving, **-10%** ($p<0.001$).

VERY LOW

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Rehabilitation (multiple studies)

- Primarily from Germany and Sweden limiting generalizability to U.S.
- One study showed moderate findings with DRUGS (Biehl et al. 2004).
  - After 3 years, recidivism cut by almost a third (8.8% vs. 21.1% [$p<0.02$]). Recidivism included nondrug offenses, however.
  - 4 x 4hour group sessions; discuss role of drugs in their lives to develop behavioral coping strategies to implement for 5 weeks.

VERY LOW

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Unique Challenges & Future Directions

- Previous research on the prevention of drugged driving has implicitly relied on drink driving.

  – **Challenges with cannabis-impaired driving**
    - Perceptions of risk are substantively lower than for drink driving.
    - Research participants commonly report feeling more cautious when drugged driving.
    - Research participants also report little fear of police involvement when driving under the influence of drugs.

- Addressing **social norms** and **perceived riskiness** are likely to be important for prevention as cannabis-impaired driving, for example, is associated with having more friends who use the substance.

Conclusion

- Effective interventions for intermediate outcomes (e.g., knowledge, attitudes) but data are more limited concerning hard outcomes (e.g., morbidity and mortality).

- Avenues for future research include interventions and public education campaigns that emphasize social norms and perceived risks regarding drugged driving—especially among youth.

Thank You!

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