The association between organophosphate pesticide exposure and attempted suicide: a structural equation modelling approach

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Introduction

- Pesticides are a commonly-used agent for suicide in many low- and middle-income countries (LMICs) (1).
- However, accumulating evidence suggests that exposure to organophosphate (OP) pesticides may also increase the risk of suicide.
- Household pesticides are often used for the control of insects and rodents in South African homes (2).
- Thus increasing the risk of acute poisoning, but also potentially exposing individuals to low pesticide concentrations over extended periods.

Objectives

To use structural equation modelling (SEM) to investigate the association between household OP pesticide exposure and attempted suicide in adults living in Cape Town, South Africa.

Methods

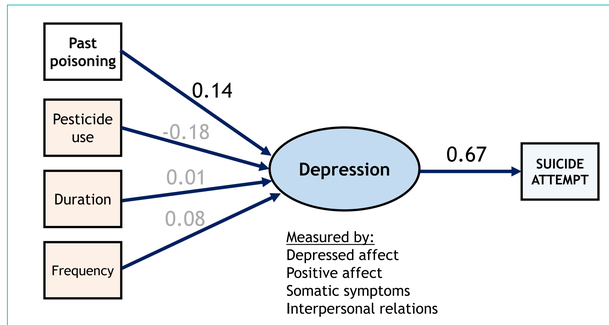
- Hospital-based case-control study (n = 400)
- Pesticide use = household/garden use, frequency & duration of use
- Behavioural measures: depression (CES-D), aggression (BPAQ-SF), impulsivity (BIS-11)
- Four models of the relationship between low dose OP exposure, depression, aggression, impulsivity and attempted suicide were tested using SEM with Mplus software (Muthen & Muthen)
- Method of estimation: weighted least square mean and variance (WLSMV) for non-normal distribution
- Criteria for good model fit: low chi-square (X^2) with non-significant p-value; X^2/df <3; RMSEA < 0.06; TLI ≥ 0.90; CLI ≥ 0.90 and WRMR ≤ 0.90 (3)

Summary of findings

- We found no relationship between domestic pesticide use and attempted suicide.
- Past poisoning with pesticides played a role in attempted suicide, depression and aggression but not impulsivity.

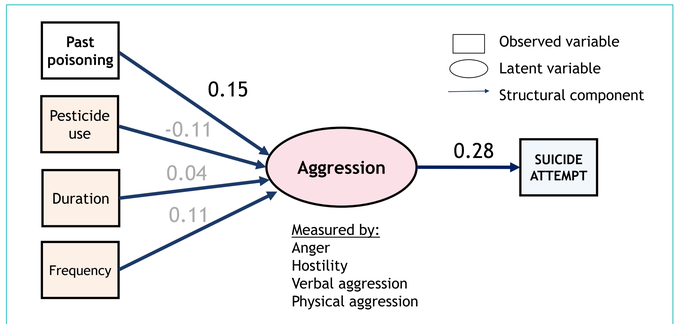
Results

- 85% prevalence of domestic pesticide use



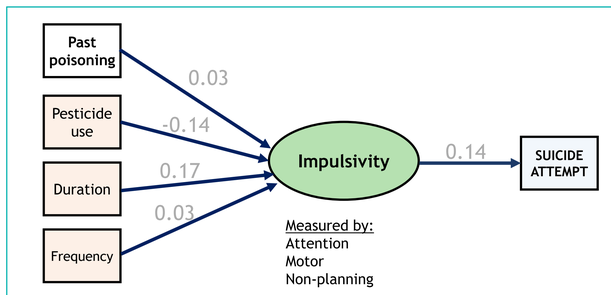
Model 1

- Past poisoning with pesticides was positively associated with depression; and depression was positively associated with suicide.
- When adding alcohol to the pathway as a mediator, the association between past poisoning and depression strengthened (ß=0.46, p<0.001)



Model 2

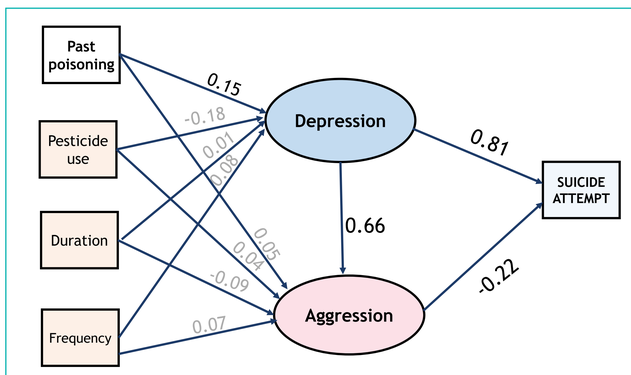
- Past poisoning with pesticides was positively associated with aggression; aggression was positively associated with suicide attempt.
- When adding alcohol to the pathway as a mediator, the association between past poisoning and aggression did not change (ß=0.16, p<0.001)



Model 3

- There was no association between pesticide use and impulsivity and impulsivity and suicide attempt

Model	X^2 (df) p ≥ 0.05	X^2 /df < 3	RMSEA <0.06	TLI ≥ 0.90 CFI ≥ 0.90	WRM R <0.9	Model fit
Model 1	22.72 (21) 0.359	1.08	0.014	0.994 0.992	0.527	Very good (6/6)
Model 2	23.59 (19) 0.212	1.24	0.025	0.987 0.966	0.618	Very good (6/6)
Model 3	22.96 (14) 0.061	1.64	0.040	0.669 0.480	0.880	Reasonable (4/6)
Model 4	95.79 (53) <0.001	1.81	0.045	0.927 0.901	0.727	Good (5/6)



Model 4

- Past poisoning with pesticides was positively associated with depression but not aggression;
- Suicide attempt was positively associated with depression and lower levels of aggression;
- When adding alcohol to the pathway as a mediator, the association between past poisoning and depression (ß=0.09, p=0.067) and depression and suicide attempt (ß=0.24, p=0.031) weakened.

References

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