Testing Gateway and Reverse-Gateway Explanations for Smoking and E-Cigarette Use across Adolescence and Early Adulthood: A Longitudinal Study

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BACKGROUND

Associations between adolescent e-cigarette use and later cigarette smoking are often interpreted as evidence of a gateway effect. A reverse-gateway pathway has also been proposed.

AIM

To examine gateway and reverse-gateway pathways from adolescence into adulthood using nationally representative data.

METHODS

Data

Growing Up in Ireland Cohort '98 (GUI '98), Waves 3 (age 17/18) and 4 (age 20); n = 4,663.

Exposures at 17/18

- E-cigarette use
- Smoking

Outcomes at age 20

- Current smoking
- Current e-cigarette use
- Dual current use (smoking and e-cigarette)

RESULTS

1. PREVALENCE OF NICOTINE USE

Outcome	Age 17/18 (Wave 3) 2015/16	Age 20 (Wave 4 2018/19	Age 25 (Wave 5) 2023/24
Ever e-cigarette use	31.2%	-	-
Ever smoked	46.8%	-	-
Current smoking	-	37.4%	25.0%
Current e-cigarette use	-	12.8%	38.4%
Dual current use (smoking and e-cigarette)	-	9.1%	15.6%

2. CONCEPTUAL PATHWAYS EXAMINED

Gateway pathway

E-cigarette use at 17/18 → Smoking at 20

E-cigarette use → Smoking

Reverse-gateway pathway

Smoking at 17/18 → E-cigarette use at 20

Smoking → E-cigarette use

3. GATEWAY AND REVERSE-GATEWAY: LOGISTIC REGRESSION RESULTS (Age 20 outcomes)

E-cigarette use at 17/18 predicting smoking at age 20 (gateway pathway)

All participants	Never smokers at 17/18
3.08 [2.39-3.96]	1.77 [1.23-2.55]

Smoking at 17/18 predicting e-cigarette use at age 20 (reverse-gateway pathway)

All participants	Never e-cigarette users at 17/18
2.42 [1.93-3.02]	2.04 [1.54-2.71]

4. TRANSITIONS TO NICOTINE USE OUTCOMES AT AGE 20

Multinomial logistic regression (reference: never e-cigarette users at 17/18)

	Dual use (smoking and e-cigarette)	Exclusive e-cigarette use	Exclusive smoking
E-cigarette use at 17/18	2.95 [2.14-4.05]	2.91 [2.07-4.08]	2.61 [1.89-3.59]

aOR (95% CI)

All models adjusted for: sex, socioeconomic position, urban/rural status, parental smoking, peer smoking and early alcohol use.

5. KEY FINDINGS

1. Smoking and e-cigarette use were both common across adolescence and early adulthood.
2. E-cigarette use in adolescence was associated with later smoking.
3. The reverse pathway was also evident, and transitions between products commonly involved dual use.

CONCLUSION

We provide support for a unidirectional e-cigarette gateway to smoking and strong evidence for reverse gateway and bidirectional transitions.

Prevention strategies should address cumulative and reciprocal nicotine exposures rather than e-cigarettes alone as a gateway product.

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