

A systematic review and meta-analysis of the relationship between smoking and intelligence measures

Giang T. Vu^{1,2}, Daniel Stjepanović¹, Tianze Sun^{1,2}, Janni Leung^{1,2}, Yaqi Qiu², Phong Thai³, Jason Connor^{1,2,4}, Coral Gartner⁵, Wayne Hall^{1,3}, Gary Chan¹

¹ National Centre for Youth Substance Use Research (NSYCUR), The University of Queensland, Brisbane, Australia, ² School of Psychology, The University of Queensland, Brisbane, Australia, ³ Queensland Alliance for Environmental Health Sciences (QAEHS), The University of Queensland, 20 Cornwall Street, Woolloongabba, Queensland 4102, Australia, ⁴ Discipline of Psychiatry, The University of Queensland, Brisbane, Australia, ⁵ NHMRC Centre of Research Excellence on Achieving the Tobacco Endgame, School of Public Health, Faculty of Medicine, The University of Queensland

Presenter's email: g.vu@uq.edu.au

Introduction: It is unclear if smoking influences cognitive/ intellectual abilities, assessed by intelligence quotient (IQ) test scores. In this study, we systematically reviewed and synthesize results of studies concerning the association between tobacco smoking and IQ.

Method: We systematically searched PubMed, Embase, Scopus, Web of Science and PsycINFO and employed an AI research tool to conduct additional search for publications on the association between tobacco smoking (including second-hand exposure) and IQ, published up to 23 April 2022. Data on study details, measurement of smoking and measurement of IQ were extracted from each article. Quality was assessed using the Newcastle-Ottawa Quality Assessment Scale. A meta-analysis using a random effects model was also conducted.

Results: A total of 15 publications (out of 1,030 identified) were included. The studies had low appraisal scores (average of 5.5 over 10). Eleven cross-sectional papers concerned young adults, adolescents and children. Among three studies that focused on second-hand smoke, two reported significant negative influence of second-hand smoking on IQ. Meta-analysis of four methodologically comparable cross-sectional studies found a significant association between smoking and lower IQ (pooled mean difference = 4.79, 95% CI: 3.11 - 6.48, I² = 47.7%). Findings were robust to sensitivity analyses. Four longitudinal studies concerned older adult populations (aged 64 to 80). All found significantly lower IQ scores among people who currently smoke.

Discussions and Conclusions: We found a modest association between tobacco smoking and lower IQ, when measured through standardised testing. Further studies are warranted to investigate suggestive evidence of cognitive recovery after quitting smoking and to explore whether the difference is explained by residual confounding or reflects adverse cognitive effects of cigarette smoking.

Disclosure of Interest Statement: GV and TS are funded by Higher Degree by Research scholarships provided by The University of Queensland. GC and JL are funded by a NHMRC Investigator Grant. CG is funded by NHMRC Centre of Research Excellence Grant. NCYSUR is supported by Commonwealth funding from the Australian Government provided under the Drug and Alcohol Program. The funding bodies had no role in the study design, collection, analysis or interpretation of the data, writing the manuscript, or the decision to submit the paper for publication.