ISRCTN14041907 https://doi.org/10.1186/ISRCTN14041907

MECHANISMS Study: Using game theory to assess the effects of social norms and social networks on adolescent smoking in schools

Submission date
09/12/2022

Recruitment status
No longer recruiting

Registration date
09/01/2023

Overall study status
Completed

Last Edited
13/02/2024

Condition category
Other

[_] Prospectively registered
[X] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol

Background and study aims
This proof-of-concept study harnesses novel transdisciplinary insights to contrast two school-based smoking prevention interventions among adolescents in the UK and Colombia. We compare schools in these locations because smoking rates and norms are different, in order to better understand social norms-based mechanisms of action related to smoking. We aim to improve the measurement of social norms for smoking behaviors in adolescents and reveal how they spread in schools, to better characterize the mechanisms of action of smoking prevention interventions in schools and learn lessons for future intervention research. The A Stop Smoking in Schools Trial (ASSIST) intervention harnesses peer influence, while the Dead Cool intervention uses classroom pedagogy. Both interventions were originally developed in the UK but were culturally adapted for a Colombian setting. This Game Theoretic approach used allows us to estimate proxies for norms and norm sensitivity parameters and to test for the influence of individual student attributes and their social networks within a Markov Chain Monte Carlo modeling framework. We identify hypothesized mechanisms by triangulating results with qualitative data from participants. The MECHANISMS study is innovative in the interplay of Game Theory and longitudinal social network analytical approaches, and in its transdisciplinary research approach. This study will help us to better understand the mechanisms of smoking prevention interventions in high and middle-income settings.

Who can participate?
Students in three schools for each intervention in the UK and the same in Colombia

What does the study involve?
In a before and after design, we will obtain psychosocial, friendship, and behavioral data (e.g., attitudes and intentions toward smoking and vaping) from ~300 students in three schools for each intervention in the UK and the same number in Colombia (i.e., ~1,200 participants in total). Pre-intervention, participants take part in a Rule Following task, and in Coordination Games that allow us to assess their judgments about the social appropriateness of a range of smoking-related and unrelated behaviors, and elicit individual sensitivity to social norms. After the interventions, these behavioral economic experiments are repeated, so we can assess how social

norms related to smoking have changed, how sensitivity to classroom and school year group norms have changed and how individual changes are related to changes among friends.

What are the possible benefits and risks of participating?
Possible benefits include preventing the uptake of smoking behaviour and the associated known health benefits. There are no risks to participating in the study.

Where is the study run from?
Queen's University Belfast (UK)

When is the study starting and how long is it expected to run for?
March 2018 to June 2019

Who is funding the study?
Medical Research Council (UK)

Who is the main contact?
Prof Ruth Hunter, ruth.hunter@qub.ac.uk

Contact information

Type(s)
Principal investigator

Contact name
Prof Ruth Hunter

ORCID ID
https://orcid.org/0000-0001-7315-0382

Contact details
Centre for Public Health
Institute for Clinical Sciences B
Royal Victoria Hospital
Grosvenor Road
Belfast
United Kingdom
BT12 6BJ
+ 44 (0)2890978944
ruth.hunter@qub.ac.uk

Additional identifiers

Study information

Scientific Title
MECHANISMS Study: Using game theory to assess the effects of social norms and social networks on adolescent smoking in schools

Acronym

MECHANISMS

Study objectives
1. How are individual psychosocial and cognitive traits at baseline related to individual sensitivity to social norms? (H01: that they are independent);

2. How does individual sensitivity to social norms cluster among friendship cliques and across school year groups? (H02: that the individual social norms sensitivities among friendship cliques are un-correlated);

3. How are average social norms, measured at the classroom and year group level, affected by social network structures? (H03: that social norms and social network structures are independent);

4. After each intervention: how are changes in attitudes, intentions and behaviors toward smoking related to social norms sensitivity at the individual level, and to average social norms at the class and year group level? (H04: that the changes in smoking-related attitudes, intentions, and behaviors are independent of norm-sensitivity at the individual level and the same in schools which offered each intervention);

5. After each intervention: have smoking-related social norms changed and how are these changes correlated among friendship cliques? (H05: that any changes in social norms are independent among members of the same friendship clique; we assume that there will be little change in measures of homophily across one semester).

Ethics approval required
Old ethics approval format

Ethics approval(s)
1. Approved 01/09/2018, Queen's University Belfast School of Medicine, Dentistry and Biomedical Sciences ethics committee (Queen’s University Belfast, 63 University Road, Belfast, BT7 1NN, UK; telephone not provided; s.curran@qub.ac.uk), ref: 18:39
2. Approved 01/07/2018, Research Committee of the Universidad de Los Andes, Bogotá (address not provided; tel not provided; osarmien@uniandes.edu.co), ref: 937/2018

Primary study design
Interventional

Study design
Quasi-experiment with a before and after design

Study type(s)
Other

Health condition(s) or problem(s) studied
Prevention of smoking update in adolescents

Interventions
Dead Cool Intervention
Dead Cool is a smoking prevention intervention for pupils aged 12–13 years old designed by Cancer Focus Northern Ireland (a local cancer charity). The intervention is designed to be

delivered by teachers and consists of eight lesson plans and an accompanying DVD of short video clips to supplement each lesson. The intervention aims to reduce the number of young people who start smoking and to examine the influences on smoking behavior from friends, parents, other family members, and the media. Teachers from the school deliver the intervention in their own classes over an 8-weeks period. The lessons last for ~20–30 min. Teachers have a Teachers' Resource Pack and pupils have a Pupil Workbook that contains exercises for each lesson. Before the start of the intervention, pupils have an introductory session to the intervention and teachers receive professional development that outlines the focus and epistemology behind the product design.

ASSIST (A Stop Smoking in Schools Trial) Intervention
The ASSIST intervention is designed to train influential pupils to use informal contacts with peers in their school year group to encourage them not to smoke. The effectiveness of the ASSIST intervention for smoking prevention has previously been established in a cluster RCT. The logic model depicts assumed pathways of change for participants receiving the ASSIST intervention. Underpinned by Diffusion of Innovations Theory, its core elements include the identification and recruitment of peer supporters (through a process of nominating pupils), who are then trained to diffuse prevention messages through informal conversations with their classmates.

Outcomes
A hand-held PICOAdvantage Smokerlyzer (Bedfont) was used to measure expelled air carbon monoxide from the pupils at the two testing time points. This is an electrochemical sensor which measures carbon monoxide in parts per million (ppm). It measures a range of 0–150 ppm with an accuracy of 2 ppm/5% (whichever is greater).

Intervention Type
Behavioural

Primary outcome(s)
Smoking behavior measured using a hand-held carbon monoxide monitor (administered by a trained member of the research team) at baseline and at 12 weeks (immediately post-intervention)

Key secondary outcome(s)
All assessed at baseline and at 12 weeks (1-week post-intervention):
1. The game theory experiments included several incentivized tasks. Part 1 included a rule-following task measuring individuals' social norms sensitivities. Parts 2-3 included incentivized coordination games to elicit injunctive and descriptive norms for smoking and vaping in whole school year groups. Part 4 assessed participants' willingness to pay to support anti-smoking norms
2. Self-report injunctive smoking norms were assessed with seven items enquiring about perceived approval of smoking from groups of important others
3. Self-report descriptive smoking norms were assessed with two scales. The first scale consisted of five items enquiring about how often groups of important others engaged in smoking behaviour. Pupils provided their answers on a five-point scale (“very often” to “never”/“don’t know”). The second scale consisted of three items enquiring about the proportion of groups of important others who are smokers
4. Self-report smoking outcomes included past/current smoking behaviour, smoking intentions and susceptibility
5. Hypothesised mediators measured using smoking knowledge, attitudes towards smoking, self-

efficacy (emotional, friends, and opportunity subscales), perceived risks (physical, social, and addiction subscales), perceived benefits, perceived behavioural control (easy to quit smoking), and perceived behavioural control (to avoid smoking)
6. Social networks measured by asking pupils to name up to ten of their closest friends in their school year group
7. Pro-sociality measured using the Need to Belong Scale, Fear of Negative Evaluation Scale, and Pro-Social Behavior Scale
8. Adolescent personality traits (Openness, Extraversion, Agreeableness, Conscientiousness, Emotional Stability) measured using the Big Five Trait Short Questionnaire (BFPTSQ)
9. Well-being measured using a self-perceived well-being scale

Completion date
30/06/2019

Eligibility

Key inclusion criteria
All pupils in the school year were invited to participate

Participant type(s)
Healthy volunteer

Healthy volunteers allowed
No

Age group
Other

Sex
All

Total final enrolment
1656

Key exclusion criteria
Parents/Guardians who did not wish their child to take part were asked to return completed Opt-Out Forms.

Date of first enrolment
01/09/2018

Date of final enrolment
30/09/2018

Locations

Countries of recruitment
United Kingdom

Northern Ireland

Colombia

Study participating centre
Queen's University Belfast
Centre for Public Health
Institute of Clinical Sciences B
Royal Victoria Hospital
Grosvenor Road
Belfast
United Kingdom
BT12 6BJ

Study participating centre
University of the Andes
Cra. 1 #18a-12, La Candelaria
Bogota
Colombia
NA

Sponsor information

Organisation
Queen's University Belfast

ROR
https://ror.org/00hswnk62

Funder(s)

Funder type
Research council

Funder Name
Medical Research Council

Alternative Name(s)
Medical Research Council (United Kingdom), UK Medical Research Council, Medical Research Committee and Advisory Council, MRC

Funding Body Type

Government organisation

Funding Body Subtype
National government

Location
United Kingdom

Results and Publications

Individual participant data (IPD) sharing plan
The datasets generated during and/or analysed during the current study are available from the corresponding author upon reasonable request to Professor Ruth Hunter, ruth.hunter@qub.ac.uk.
1. The type of data that will be shared: Socio-demographic data and all outcomes measures at both time points in a csv file
2. Dates of availability: No restrictions
3. Whether consent from participants was required and obtained: Written informed consent to participate in this study was provided by the participant's legal guardian/next of kin
4. Comments on data anonymization: Data is fully anonymised. No identifiable data will be shared
5. Any ethical or legal restrictions: Ethics approval has already been sought

IPD sharing plan summary
Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article	personality and cognitive traits associated with adolescents' sensitivity to social norms in a cross-sectional sample - secondary outcome	09/09/2022	20/12/2022	Yes	No
Results article	smoking susceptibility - secondary outcome	09/12/2021	20/12/2022	Yes	No
Results article		21/02/2023	13/02/2024	Yes	No
Protocol article	protocol	04/08/2020	12/12/2022	Yes	No
Other publications	comparing incentivized experiments with self-report methods using MECHANISMS study baseline data	25/09/2020	20/12/2022	Yes	No
Other publications	cultural adaptation of the interventions	26/04/2021	20/12/2022	Yes	No