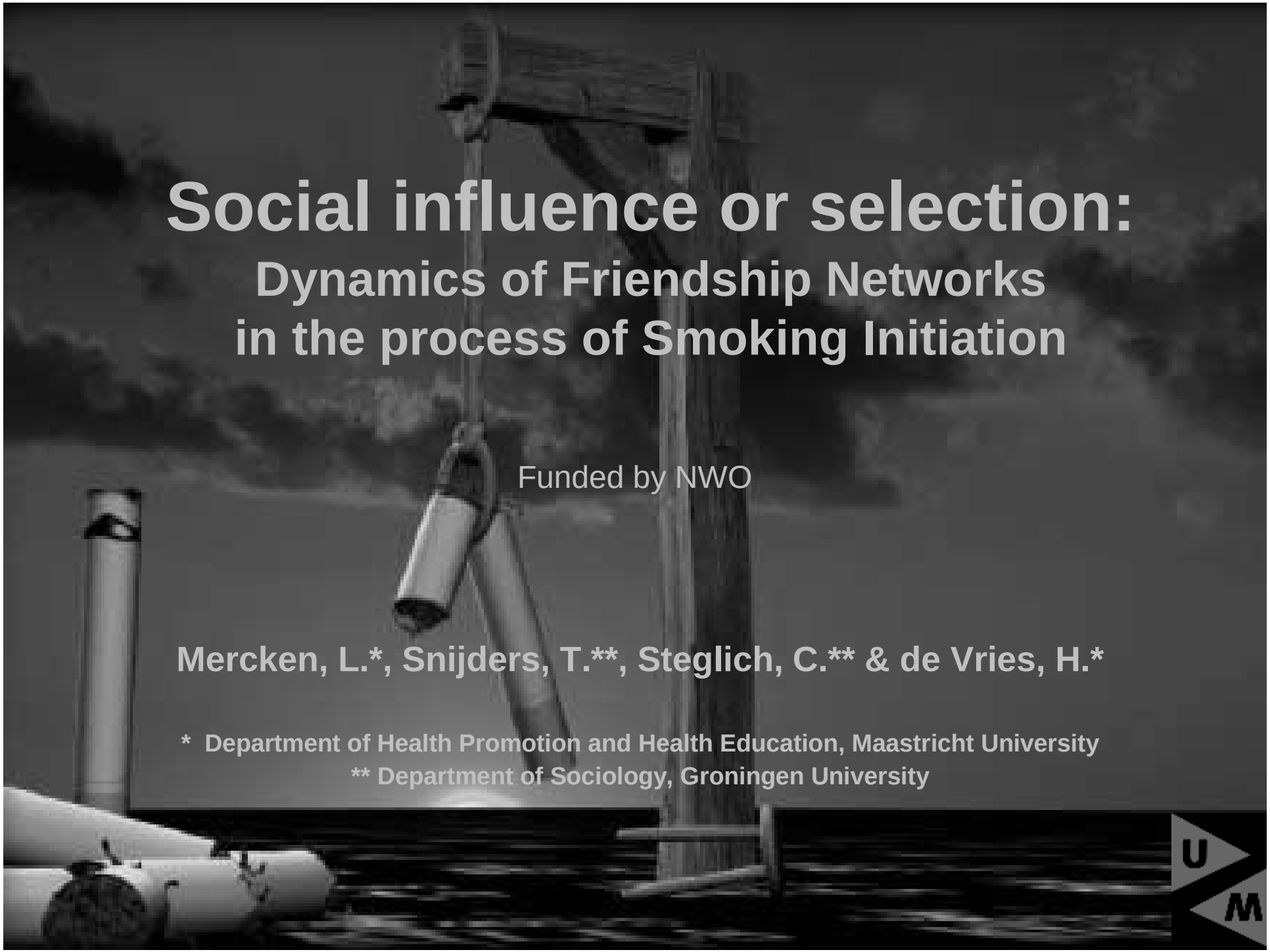

Social influence or selection:
Dynamics of Friendship Networks in the process of Smoking Initiation

Funded by NWO

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Why does smoking behavior tend to be similar among friends during adolescence?

Smoking Similarity

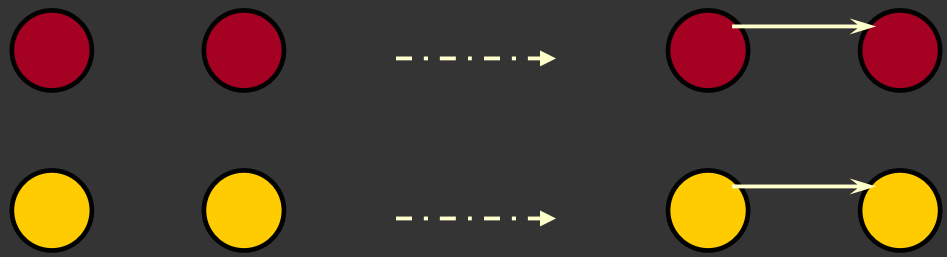
- Social Selection Paradigm
- Social Influence Paradigm

Social selection

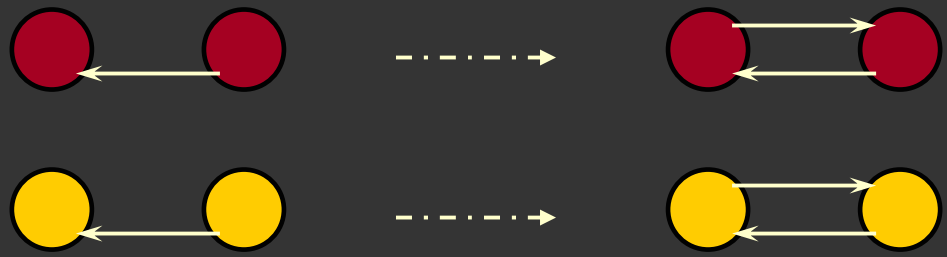
- Smoking behavior causes the formation of homogenous peer groups
- Adolescents choose peers with similar behavior
- Adolescents choose to drop peers whose behavior is unlike theirs

Selection example

- Selection of similar new friends



- Selection of similar reciprocating friends

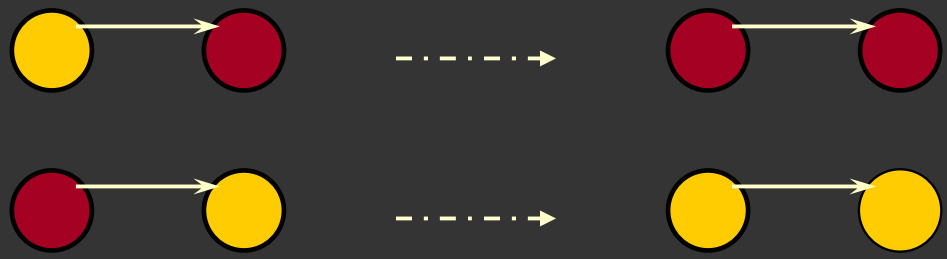


Social influence

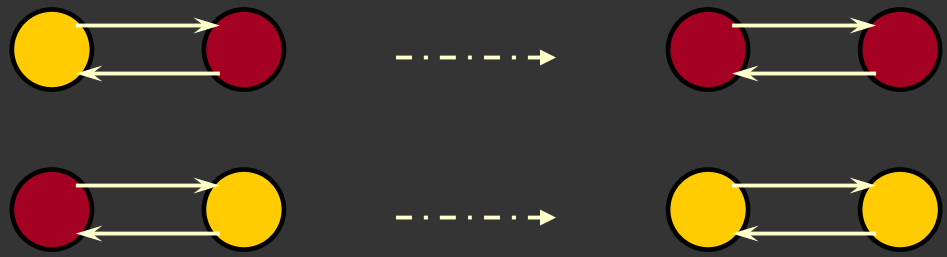
- Peer groups transmit smoking behavior
- Adolescents initiate smoking in response to pressure or example of their peers

Influence example

- Influence within a unilateral friendship



- Influence within a reciprocal friendship



Hypotheses

- Adolescents will prefer selecting a unilateral friend with similar smoking behavior (+)
- Interaction with reciprocity: Adolescents will not prefer selecting a reciprocal friend with similar smoking behavior (-)
- Adolescents' smoking behavior will not become more similar to the smoking behavior of a desired friend (-)
- Interaction with reciprocity: Adolescents' smoking behavior will become more similar to the smoking behavior of a true friend (+)

ESFA

- European Smoking prevention Framework Approach (ESFA) 1998-2001
- Six European member states: Denmark, Finland, The Netherlands, Spain, Portugal, UK
- Longitudinal: 4 measurements
- Challenges to the peer Influence Paradigm: Results from six European Countries
  (de Vries, Candel, Engels & Mercken, submitted)

Methods

- Structural Equation Modeling
  - ✗ No friendship changes
  - ✗ Insufficient control for structural effects
  - ✗ Selection over-estimated
- Social Network Analysis
  - ✓ Identifies peer groups
  - ✓ Examines behavior in network context

Methods

SIENA Multilevel analysis:

- 2 step approach
  - Micro level: relational ties within each school
  - Macro level: combination of single group studies
- Meta-analysis of micro-level networks

Methods

Micro level: actor-driven model

SIENA assumptions
(Snijders, 2005)

- Actors are members of a network
- Each actor has a value for behavior
- Individual network & behavior decisions
- One change at a time
- Dynamic influence of network & behavior
- Myopic actors
- Decision to optimize the objective function

Methods

Micro level: actor-driven model

⇨ Outcome tendencies of preferences represented by two objective functions

- Network objective function: modeling network evolution
- Behavior objective function: modeling behavior evolution

Methods

Macro level:

- Results of all participating schools combined
- Only datasets that allow for identification of particular parameter
- Example: effect of drug use on smoking
  - Micro level: fixation at 0
  - Macro level: excluded ‘casewise’

Methods

- 4877 adolescents in 18 schools
- Mean age: 12.80 years
- 50.12% males
- 76.20% Dutch adolescents
- Questionnaires:
  - Adolescent smoking behavior
  - Friendship networks
  - Control for variables: gender, age, race, alcohol…

Meta-analysis

School	N	Mean % missing	Smoke t1	Smoke t2	Smoke t3	Smoke t4	Mean % missing
1.	619	11	0,20	0,67	0,86	1,12	2.11
2.	156	11	0,06	0,26	0,45	0,56	0.61
3.	270	11	0,09	0,55	0,75	0,99	0.41
4.	131	24	0,90	0,93	1,31	1,38	2.53
5.	162	23	0,31	0,89	1,27	1,55	9.69
6.	117	18	0,58	1,13	1,62	1,69	4.88
7.	298	10	0,16	0,43	0,73	0,89	0.32
8.	518	15	0,18	0,32	0,77	1,01	2.83
9.	408	21	0,16	0,37	0,63	0,66	2.95
10.	127	09	0,10	0,34	0,72	0,59	0.47
11.	234	10	0,11	0,21	0,78	0,96	3.68
12.	326	10	0,07	0,31	0,75	0,90	1.26
13.	282	09	0,04	0,28	0,66	0,79	1.35
14.	247	14	0,17	0,45	0,45	0,73	1.43
15.	63	06	0,04	0,15	0,35	0,21	0.46
16.	434	11	0,12	0,42	0,77	1,00	3.25
17.	286	16	0,68	1,08	1,53	1,65	4.66
18.	199	11	0,32	0,41	0,68	0,82	0.62

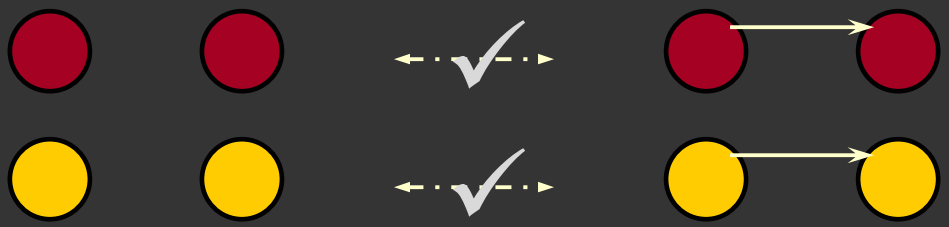
Meta-analysis

Network objective function	Estimate	(s.e.)
Outdegree	**-3.51*** **	**(0.03)**
Reciprocity	**2.42*** **	**(0.04)**
Transitivity	**0.59*** **	**(0.02)**
SMOKE selection (unilateral friendship)	**1.23*** **	**(0.13)**
SMOKE selection x Reciprocity	**-1.56*** **	**(0.25)**
Smoke ego	**-0.06*** **	**(0.02)**
Smoke alter	**0.18*** **	**(0.01)**
Age similarity: selection	0.28***	(0.05)
Gender similarity: selection	1.33***	(0.03)
Gender ego	-0.08*	(0.04)
Gender alter	0.06	(0.03)
Race similarity: selection	0.14***	(0.03)
Alcohol similarity: selection	0.02	(0.06)
Drug use similarity: selection	0.03	(0.05)

Meta-analysis

Network parameter	Estimate	(s.e.)
SMOKE selection (unilateral friendship)	1.23***	(0.13)

***p<.001 **p<.01 *p<.05



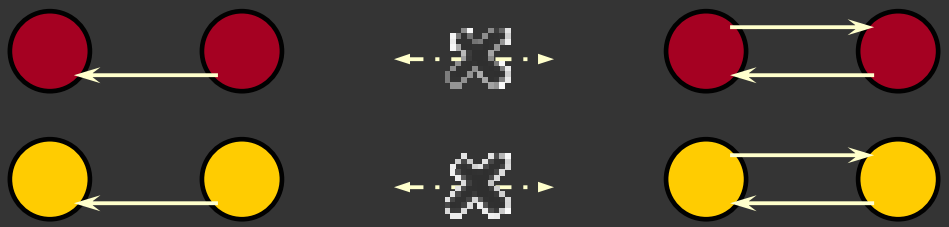
➔ Selection processes cause smoke similarity within unilateral friendships

Meta-analysis

Network parameter	Estimate	(s.e.)
SMOKE selection x Reciprocity	-1.56***	(0.25)

***p<.001 **p<.01 *p<.05

1.23 – 1.56 = -0.33 (p>.05)



➔ Selection processes do not cause smoke similarity within reciprocal friendships

Meta-analysis

Network objective function	Estimate	(s.e.)
Outdegree	**-3.51*** **	**(0.03)**
Reciprocity	**2.42*** **	**(0.04)**
Transitivity	**0.59*** **	**(0.02)**
SMOKE selection (unilateral friendship)	**1.23*** **	**(0.13)**
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Race similarity: selection	0.14***	(0.03)
Alcohol similarity: selection	0.02	(0.06)
Drug use similarity: selection	0.03	(0.05)

Meta-analysis

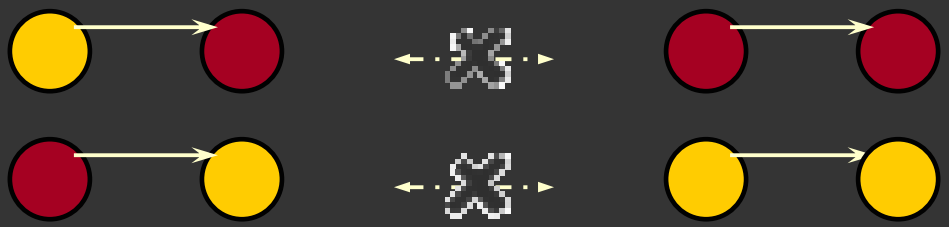
Behavior objective function	Estimate	(s.e.)
Smoke tendency	**-0.95*** **	**(0.07)**
Smoke indegree	**0.07****	**(0.02)**
SMOKE influence (unilateral friendship)	**-0.57****	**(0.21)**
SMOKE influence x reciprocity	**2.22****	**(0.79)**
Smoke: Effect Age	0.19***	(0.04)
Smoke: Effect Gender	0.22***	(0.05)
Smoke: Effect Race	0.07	(0.08)
Smoke: Effect Alcohol	0.23***	(0.04)
Smoke: Effect Drug use	0.82***	(0.10)
Smoke: Effect Parental smoking behavior	0.36***	(0.05)
Smoke: Effect Sibling smoking behavior	0.60***	(0.07)

***p<.001 **p<.01 *p<.05

Meta-analysis

Behavior objective function	Estimate	(s.e.)
SMOKE influence (unilateral friendship)	-0.57**	(0.21)

***p<.001 **p<.01 *p<.05



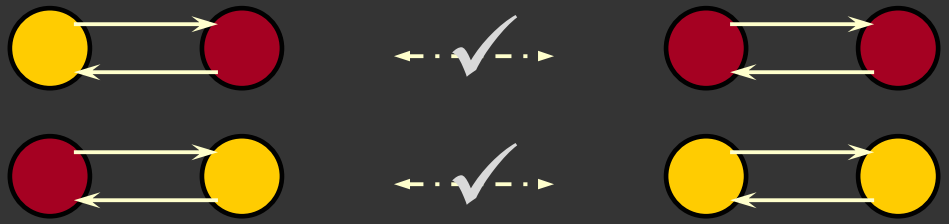
➔ Influence processes do not cause smoke similarity within unilateral friendships

Meta-analysis

Behavior objective function	Estimate	(s.e.)
SMOKE influence x reciprocity	2.22**	(0.79)

***p<.001 **p<.01 *p<.05

-0.57 + 2.22 = 1.65 (p<.05)



➔ Influence processes cause smoke similarity within reciprocal friendships

Meta-analysis

Behavior objective function	Estimate	(s.e.)
Smoke tendency	**-0.95*** **	**(0.07)**
Smoke indegree	**0.07****	**(0.02)**
SMOKE influence (unilateral friendship)	**-0.57****	**(0.21)**
SMOKE influence x reciprocity	**2.22****	**(0.79)**
Smoke: Effect Age	0.19***	(0.04)
Smoke: Effect Gender	0.22***	(0.05)
Smoke: Effect Race	0.07	(0.08)
Smoke: Effect Alcohol	0.23***	(0.04)
Smoke: Effect Drug use	0.82***	(0.10)
Smoke: Effect Parental smoking behavior	0.36***	(0.05)
Smoke: Effect Sibling smoking behavior	0.60***	(0.07)

***p<.001 **p<.01 *p<.05

Conclusions

- Selection processes cause smoke similarity within unilateral friendships
- Selection processes do not cause smoke similarity within reciprocal friendships
- Influence processes do not cause smoke similarity within unilateral friendships
- Influence processes cause smoke similarity within reciprocal friendships

Conclusions

Smoke similarity is

CAUSED BY SELECTION
of desired friends with similar smoking behavior

and

STRENGTHENED BY INFLUENCE
when the friendship has become reciprocal

The End

Thank You

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