

# Adolescent Substance Use and Aggressive Behaviours in Multiple Structural Peer Contexts

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# Introduction

- **Adolescence**

- Decreasing parental dependence, supervision, and guidance (Gifford-Smith & Brownell, 2003)
- Onset of health-risk behaviours (Williams, Holmbeck, & Greenley, 2002)
- Peer interest intensifies (Ryan, 2001)
- Increasingly concerned with being accepted and achieving high social standing (Brown & Larson, 2009)
- Develop a stable and favorable sense of self (Piehler, 2011)
- Highly susceptible to the influence of peers
- Adhering to behavioural norms likely enhances their status (Prinstein & Dodge, 2008)
- Behavioural similarity → Homophily (Lazarsfeld & Merton, 1954)



# Introduction (cont'd)

- **Homophily**

- Substance use (e.g., Chassin, Hussong, & Beltran, 2009)
- Aggressive/violent behaviours (e.g., Prinstein, Boergers, & Spirito, 2001)

- **Peer contexts**

- What are the most relevant peer contexts?
- Multiple peer contexts
- Exposed to multiple, potentially opposing norms
- Peer contexts vary in proximity and salience
- Homophily effects likely to vary as a function of the physical (proximity) and psychological closeness (salience) of peers (Social Impact Theory; Latané, 1981)



# Current study

- **Investigated homophily effects...**
  - Among 5.642 adolescents ( $M_{\text{age}} = 14.29$ ;  $SD = 1.26$ ; 49.2% boys) from the Dutch HBSC 2009 sample
  - From 68 schools and 264 classrooms
- **...in three structural peer contexts**
  - Formal, involuntary peer contexts to which adolescents belong without having any choice over their membership.
  - General age-cohort, classroom, and school



# Current study (cont'd)

- **...in multiple adolescent health-risk behaviours**
  - Substance use (tobacco, alcohol, cannabis)
  - Aggressive behaviours (bullying, physical fights)
- **Two different modes of homophily**

(Kiesner, Kerr, & Stattin, 2004; Kiesner, Poulin, & Nicotra, 2003; Kindermann & Skinner, 2012)

  - Additive
  - Synergistic



# Two modes of homophily (1)

- **Additive**

- Multiple peer contexts may explain unique variance in adolescent behaviours
- Depend on physical and psychological closeness
- H1a: Significantly stronger homophily effects for classmates, than for age-mates and schoolmates
- H1b: Significant homophily effects for age-mates and/or schoolmates



# Two modes of homophily (2)

- **Synergistic**

- One peer context may amplify or attenuate the effect of another peer context (interaction)
- Classroom as the main peer context
- H2: Opposing norms between classroom context and other two peer contexts would decrease behavioural similarity; corresponding norms would increase behavioural similarity



# Strategy of analyses

- Multivariate multilevel analyses: Participants (1<sup>st</sup> level) nested within classrooms (2<sup>nd</sup> level) nested within schools (3<sup>rd</sup> level)
- DVs (5):
  - Substance use (tobacco, alcohol, cannabis)
  - Aggressive behaviours (bullying, physical fights)





# Strategy of analyses

- Predictors (3): General age-cohort profile score (PS) (1<sup>st</sup> level), classroom PS (2<sup>nd</sup> level), and school PS (3<sup>rd</sup> level)
- Peer context profile score (PS): Average behaviour of all participating peers in a certain peer context
- Cross-level interactions (2)
  - General age-cohort PS (1<sup>st</sup>) BY Classroom PS (2<sup>nd</sup>)
  - Classroom PS (2<sup>nd</sup>) BY School PS (3<sup>rd</sup>)



# Multilevel results

Table 2  
Fixed and Random Parameter Estimates for Model 5 by Dependent Variable

	Tobacco use	Alcohol use	Cannabis use	Bullying	Physical fights
	<i>B (SE)</i>	<i>B (SE)</i>	<i>B (SE)</i>	<i>B (SE)</i>	<i>B (SE)</i>
<i>Fixed effects</i>					
Intercept ( $\tau_{000}$ )	1.526 (0.039) ***	2.447 (0.098) ***	1.089 (0.015) ***	1.409 (0.017) ***	1.597 (0.022) ***
PS <sub>age-group</sub> ( $\tau_{100}$ )	0.625 (0.088) ***	0.506 (0.106) ***	0.548 (0.178) **	0.279 (0.470)	0.417 (0.233)
PS <sub>classroom</sub> ( $\tau_{010}$ )	0.347 (0.076) ***	0.409 (0.094) ***	0.178 (0.146)	0.217 (0.064) ***	0.188 (0.087) *
PS <sub>school</sub> ( $\tau_{001}$ )	0.238 (0.069) ***	0.116 (0.171)	0.243 (0.123) *	0.323 (0.123) **	0.509 (0.124) ***
<i>Cross-level interactions</i>					
PS <sub>age-group</sub> x PS <sub>classroom</sub> ( $\tau_{110}$ )	0.096 (0.114)	0.076 (0.035) *	-0.080 (1.120)		
PS <sub>classroom</sub> x PS <sub>school</sub> ( $\tau_{011}$ )	0.155 (0.099)	-0.025 (0.033)	0.561 (0.535)		
<i>Random effects</i>					
Participant level ( $\sigma^2_{eijk}$ )	1.936 (0.159) ***	6.177 (0.503) ***	0.291 (0.052) ***	0.563 (0.033) ***	1.069 (0.062) ***
Classroom level ( $\sigma^2_{u0jk}$ )	0.038 (0.095)	0.197 (0.732)	0.006 (0.025)	0.015 (0.007) *	0.014 (0.015)
School level ( $\sigma^2_{u0jk}$ )	0.010 (0.032)	0.066 (0.238)	0.002 (0.003)	0.001 (0.006)	0.002 (0.007)
<i>Model summary</i>					
$\Delta$ Deviance ( $\Delta df$ ) <sup>a</sup>	-148.12 (10) ***	-205.12 (10) ***	-90.31 (10) ***	-16.44 (3) ***	-27.29 (3) ***
<i>Explained variance <math>R^2</math> (% of total <math>\sigma^2</math>)<sup>b</sup></i>					
Participant level	13.6% (85.2%)	24.6% (72.6%)	3.9% (92.4%)	1.5% (95.7%)	3.2% (95.3%)
Classroom level	72.9% (13.4%)	79.2% (26.9%)	40.1% (6.9%)	18.9% (3.9%)	38.6% (1.7%)
School level	52.4% (1.5%)	54.9% (0.5%)	22.1% (0.6%)	9.9% (0.3%)	40.8% (3%)

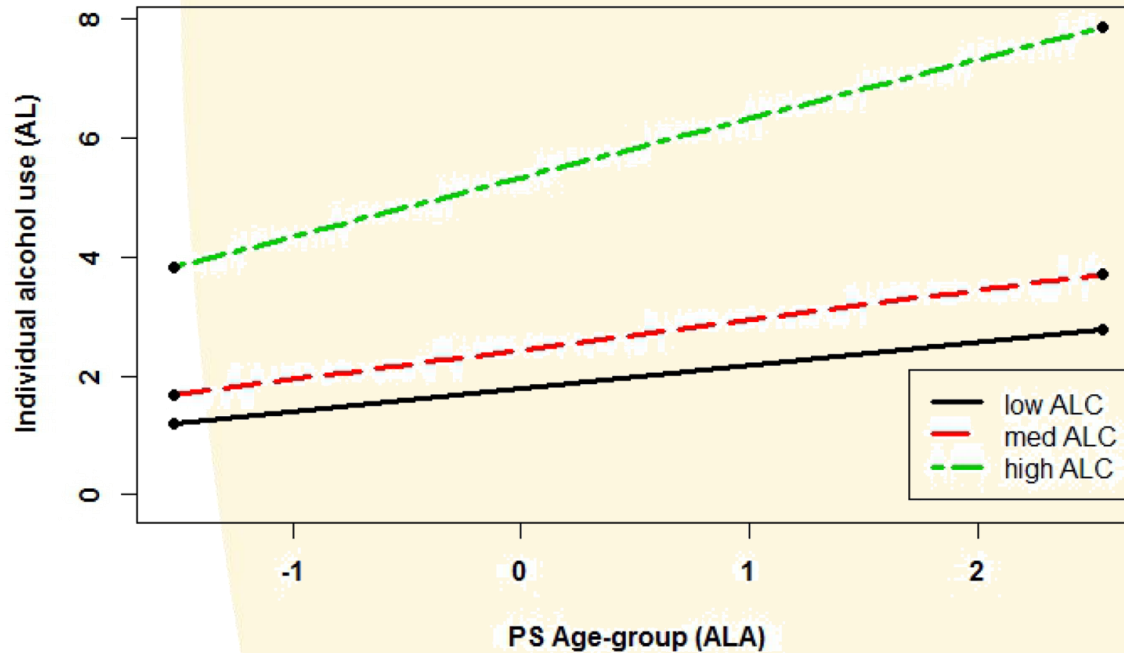
Note. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

<sup>a</sup> The difference in the deviance statistic and df compared to the intercept-only model is provided.

<sup>b</sup> Modelled (explained) variance was calculated using the formulae by Snijders & Bosker (1994) to diminish the possibility of negative  $R^2$ .



# Cross-level interaction



*Figure 1.* Cross-level interaction alcohol use.

Simple slopes for PS age-cohort alcohol use (ALA) by PS classroom alcohol use (ALC).



# Conclusions (1)

- All three peer contexts related to adolescent health-risk behaviours (except school for alcohol use, classroom for cannabis use, and age-cohort for aggressive behaviours)
- Confirmed:
  - H1b: Significant homophily effects for age-mates and/or schoolmates
  - Additive homophily



# Conclusions (2)

- Classroom was not necessarily the most important peer context nor the strongest source of normative social influence
- Rejected:
  - H1a: Significantly stronger homophily effects for classmates, than for age-mates and schoolmates



# Conclusions (3)

- Effect of age-cohort on individual alcohol use was moderated by classroom alcohol use
- Low classroom alcohol use weakened the effect of age-cohort alcohol use on individual alcohol use
- High classroom alcohol use strengthened the effect of age-cohort alcohol use on individual alcohol use
- Confirmed:
  - H2: Opposing norms between classroom context and other two peer contexts would decrease behavioural similarity; corresponding norms would increase behavioural similarity
  - Synergistic homophily (only for alcohol use)



# Discussion

- Cross-sectional, unable to distinguish between selection and influence
- Behavioural similarity varies as a function of peer context and specific behaviour, but why? E.g.:
  - Substance use symbolizes adult privilege which becomes worth pursuing during adolescence? (Moffitt, 1993)
  - Normative smoking and drinking important for one's social standing within the classroom context?  
(Brown & Larson, 2009; Prinstein & Dodge, 2008)
  - Cannabis use less normative in the classroom context, but strongly related to other contextual (school) factors (e.g., school characteristics, selection effect?)



# Discussion

- Behavioural similarity varies as a function of peer context and specific behaviour, but by which mechanism?
  - Identity-based theories of influence (conformity to social norms for identity shaping) (Piehler, 2011)
  - Behaviourally-based theories of influence (direct interactions, social reinforcements, modeling) (Piehler, 2011)
  - Selection effects (shared environment, school climate)







# Thank you for your attention!

Any questions or comments?

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# Preliminary results

Table 1  
Descriptive Statistics, Correlational Coefficients with Peer Context Profile Scores, and ICCs and DEs for Classroom and School Level by Dependent Variables

Dependent variable	N	M	SD	Skewness <sup>c</sup>	Kurtosis <sup>c</sup>	Correlations <i>r</i> with Peer Context Profile Scores (PSs) <sup>a,b</sup>			Intraclass correlations $\rho$ (DE)	
						PS <sub>age-group</sub>	PS <sub>classroom</sub>	PS <sub>school</sub>	Classroom level	School level
Tobacco [1-7]	2794	1.57	1.54	2.76	6.23	.28 <sup>x</sup>	.33 <sup>y</sup>	.21 <sup>z</sup>	.132 (2.26)	.017 (1.68)
Alcohol [1-14]	2752	2.57	2.97	2.27	4.41	.42 <sup>x</sup>	.46 <sup>y</sup>	.21 <sup>z</sup>	.269 (3.54)	.005 (1.20)
Cannabis [1-7]	2768	1.10	.58	7.34	59.55	.16 <sup>x</sup>	.17 <sup>x</sup>	.11 <sup>y</sup>	.069 (1.65)	.008 (1.32)
Offender of bullying [1-5]	2711	1.41	.77	2.47	7.01	.03 <sup>x</sup>	ns	.12 <sup>y</sup>	.038 (1.35)	.006 (1.23)
Physical fight [1-5]	2699	1.59	1.06	1.99	3.22	.05 <sup>x</sup>	ns	.15 <sup>y</sup>	.020 (1.18)	.030 (2.16)

<sup>a</sup> All correlation coefficients significant at  $p < .01$ , unless otherwise specified. A Bonferroni correction was applied to control for FWER in multiple comparisons ( $p < \alpha/15$ ).

<sup>b</sup> For each DV, correlation coefficients that share a subscript are not significantly different from each other in a Fisher's r-to-z test ( $p < .05$ ).

<sup>c</sup>  $SE_S = .046-.047$ ,  $SE_K = .093-.094$ .

- Average scores low and positively skewed (i.e., the majority of adolescents did not engage in these behaviours).
- Individual tobacco and alcohol use associated with general age-cohort PS and classroom PS, significantly stronger than with school PS
- Similar for cannabis use, except no significant difference between age-cohort and classroom PSs
- Aggressive behaviours more strongly related to classroom and school PSs



# Multilevel modeling

- Five models/steps:
  - Model 1: Intercept-only model
  - Model 2: Including age-cohort PS (1<sup>st</sup>)
  - Model 3: Including classroom PS (2<sup>nd</sup>)
  - Model 4: Including school PS (3<sup>rd</sup>)
  - Model 5: Including cross-level interactions
- ML Equation
  - $$Y_{ijk} = \tau_{000} + \tau_{100}agecohort_{jk} + \tau_{010}class_{jk} + \tau_{001}school_k + \tau_{110}(agecohort_{jk} \times class_{jk}) + \tau_{011}(class_{jk} \times school_k) + v_{10k}agecohort_{jk} + v_{01k}class_{jk} + v_{11k}(agecohort_{jk} \times class_{jk}) + u_{1jk}agecohort_{jk} + v_{00k} + u_{0jk} + e_{ijk}$$

