

Adolescent Substance Use and Aggressive Behaviors in Multiple Structural Peer Contexts

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Introduction

Many changes in health-related behaviors occur during adolescence (Williams, Holmbeck, & Greenley, 2002). Peers can substantially influence these changes in youths' health behaviors (Ryan, 2001). Adolescents tend to adhere to the behavioral norms (i.e., the average level of behavior by peers) conveyed by peers in relevant peer contexts as this will likely enhance their status (Brown & Larson, 2009). As such, adolescents tend to be similar in behavior to their peers (homophily; Lazarsfeld & Merton, 1954).

Since adolescents interact with peers in multiple contexts, adolescent are exposed to multiple, potentially opposing behavioral norms. Therefore, various peer contexts may account for behavioral similarity (additive homophily; Kiesner, Kerr, & Stattin, 2004) and they may mutually amplify or attenuate each other's effects (synergistic homophily).

The current study examined additive and synergistic homophily effects in three structural peer contexts (classroom, school, age-cohort). Structural peer contexts are formal, involuntary peer contexts to which adolescents belong. Further, the current study investigated homophily in multiple adolescent health-risk behaviors including substance use (tobacco, alcohol, cannabis) and aggressive behaviors (bullying, physical fights).

Hypotheses

1. Homophily effects will vary as a function of how proximal and how salient the peer context is to the adolescent. Thus, homophily effects will be stronger for classmates, than for age-mates and schoolmates (H1a). However, homophily effects will also be significant for age-mates and /or schoolmates (H1b)
2. Classroom homophily effects will be stronger if the school and general age-cohort conveyed corresponding behavioral norms; effects will be weaker if the school or general age-cohort conveyed opposing norms (H2)

Method

Participants

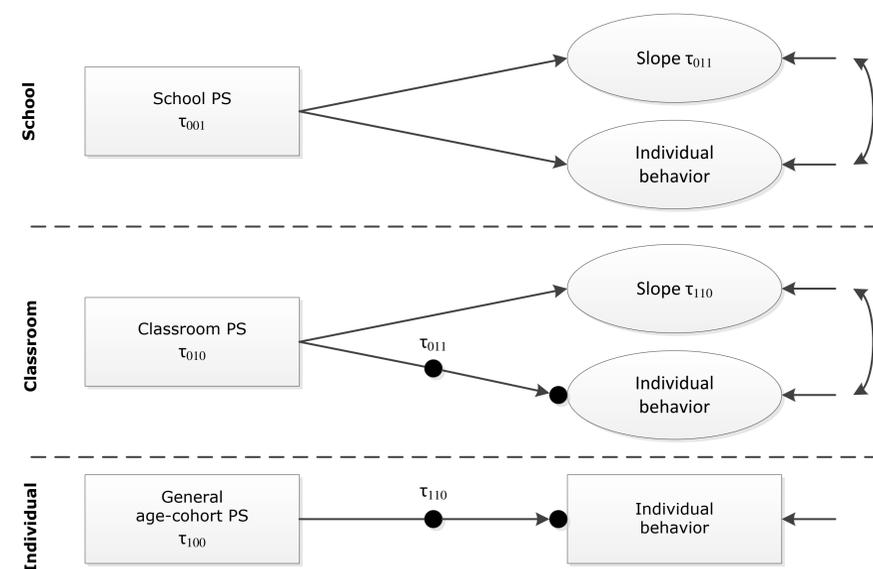
- 5,642 adolescents from grades 7 to 10 ($M_{age} = 14.29$; $SD = 1.26$; 49.2% boys)
- 68 schools, 264 classrooms

Measures

- School-based paper-and-pencil questionnaire
- Tobacco (1-7), alcohol (1-14), cannabis (1-7) use in last four weeks
- Bullying (1-5) in past couple of months, physical fights (1-5) in last 12 months

Analysis Strategy

- The average behavior of all participating peers in a certain context (peer context profile score; PS) was calculated using the odd numbered participants ($n = 2819$) to resolve the problem of endogenous feedback (Erbring & Young, 1979). Even numbered participants were used in the multilevel analyses ($n = 2817$)
- ML design, participants (L1) nested within classrooms (L2) nested within schools (L3)
- Model 1: intercept only, Model 2: including age-cohort profile score (PS), Model 3: including classroom PS, Model 4: including school PS, Model 5: including interactions



Results

Descriptive and correlational statistics are presented in Table 1. Distributions of the behaviors were positively skewed (most adolescents did not engage in them). Table 1 show that most individual scores were positively associated with the peer context profile scores.

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

^a All correlation coefficients significant at $p < .01$, unless otherwise specified. A Bonferroni correction was applied to control for FWER in multiple comparisons ($p < .015$).
^b For each DV, correlation coefficients that share a subscript are not significantly different from each other in a Fisher's r -to- z test ($p < .05$).
^c $SE_{sk} = .046-.047$, $SE_{kt} = .093-.094$.

Results of the final multilevel Model 5 (including all fixed and random effects) are presented in Table 2. Analyses revealed significant homophily effects of age-cohort and classroom norms on substance use, and significant homophily effects of classroom and school norms on aggressive behaviors. Cannabis use, however, was related to school norms and not classroom norms. Furthermore, classroom's effect on individual alcohol use was moderated by age-cohort alcohol use. Classroom alcohol use was more strongly associated with

Results (cont'd)

individual alcohol use for adolescents whose age-mates scored high on alcohol use ($B = .58$, $SE_B = .06$), compared to adolescents whose age-mates scored medium ($B = .40$, $SE_B = .07$) or low ($B = .30$, $SE_B = .10$, all $ps < .001$) on alcohol use.

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

	Tobacco use	Alcohol use	Cannabis use	Bullying	Physical fights
	B (SE)				
Fixed effects					
Intercept (τ_{000})	1.526 (0.039) ***	2.447 (0.098) ***	1.089 (0.015) ***	1.409 (0.017) ***	1.597 (0.022) ***
PS age-group (τ_{100})	0.625 (0.088) ***	0.506 (0.106) ***	0.548 (0.178) **	0.279 (0.470)	0.417 (0.233)
PS classroom (τ_{010})	0.347 (0.076) ***	0.409 (0.094) ***	0.178 (0.146)	0.217 (0.064) ***	0.188 (0.087) *
PS school (τ_{001})	0.238 (0.069) ***	0.116 (0.171)	0.243 (0.123) *	0.323 (0.123) **	0.509 (0.124) ***
Cross-level interactions					
PS age-group \times PS classroom (τ_{110})	0.096 (0.114)	0.076 (0.035) *	-0.080 (1.120)		
PS classroom \times PS school (τ_{011})	0.155 (0.099)	-0.025 (0.033)	0.561 (0.535)		
Random effects					
Participant level (σ^2_{eijk})	1.936 (0.159) ***	6.177 (0.503) ***	0.291 (0.052) ***	0.563 (0.033) ***	1.069 (0.062) ***
Classroom level (σ^2_{idjk})	0.038 (0.095)	0.197 (0.732)	0.006 (0.025)	0.015 (0.007) *	0.014 (0.015)
School level (σ^2_{idjk})	0.010 (0.032)	0.066 (0.238)	0.002 (0.003)	0.001 (0.006)	0.002 (0.007)
Model summary					
Δ Deviance (Δdf) ^a	-148.12 (10) ***	-205.12 (10) ***	-90.31 (10) ***	-16.44 (3) ***	-27.29 (3) ***
Explained variance R^2 (% of total σ^2)^b					
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. * $p < .05$, ** $p < .01$, *** $p < .001$.
^a The difference in the deviance statistic and df compared to the intercept-only model is provided.
^b Modelled (explained) variance was calculated using the formulae by Snijders & Bosker (1994) to diminish the possibility of negative R^2 .

Conclusion

This study evidenced additive homophily (H1b); all three structural peer contexts were associated with adolescent substance use and aggressive behaviors (except age-cohort with aggressive behaviors, school with alcohol use, and classroom with cannabis use). Contrary to H1a, the classroom context – although assumed to be the most proximal and salient peer context – did not account for significantly stronger homophily effects than the other two peer contexts.

Little evidence was found for synergistic homophily (H2); only the association between classroom alcohol use and individual alcohol use was moderated by age-cohort alcohol use. The significant interaction between classroom and age-cohort substance use suggests a protective effect of the classroom context on individual alcohol use. This study showed that high age-cohort alcohol use combined with low classroom alcohol use resulted in significantly lower levels of individual alcohol use than when adolescents were in classrooms with equally high alcohol use as age-cohort's alcohol use.

To conclude, substance use appears to be a more age-related phenomenon, whereas aggressive behaviors appear to be more affected by direct interactions (classmates) or common environments (schoolmates). Similarly, common environments may also play an important role in cannabis use. These results help policy makers to determine which peer context to target first to promote adolescent health.