

Onset to Alcohol Use in Early Adolescence: A Network Survival Model

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Drinking Clusters in Adolescent Peer Groups

- ◉ Peer influence long suspected (since at least the 1970's)
- ◉ Necessary to identify influence net of
 - Selection ("birds of a feather")
 - Other potential (correlated) candidate causes
- ◉ Difficult to establish in field studies
 - But it is important to try (validity concerns with lab or similar studies)
 - A variety of methods are needed

Enter Networks & SIENA

- ◉ 90's: Changing (longitudinal) network measures capture members' changing relationship "context"
- ◉ 00's: SIENA (implements SAOM) provides a tractable yet statistically sound modeling framework

Recent Findings on Adolescent Alcohol Use

- ◉ Burk, van der Vorst, Kerr, Stattin (JSAD 2012)
 - Covered age 12-18 in 3 cohorts
 - Mostly selection during early adolescence
 - Influence becomes more important in mid to late adolescence
 - Annual data
- ◉ Knecht, Burk, Weesie, Steglich (JRA 2011)
 - Most immediately comparable to our study
 - Early adolescents only
 - Bimonthly data over 1 year (4x)
 - Consistent with Burk et al.: Found mostly selection (also directional but weak influence effects) in EA sample

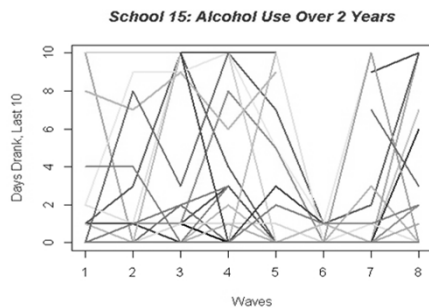
Methodological Advances of DyNet over Knecht et al. Study

- ◉ 4x/school year network & behavior mx
- ◉ ...but for up to 3 years (12 waves)
- ◉ 14 separate schools (2 grades 7-8, 1 grade 6-12, 11 grades 6-7-8)
- ◉ Networks are school-wide (not just within classroom or within grade level)
- ◉ Unlimited nominations are allowed (Holland & Leinhardt, 1979; Wasserman & Faust, 1996)

Focus

- ◉ What does drinking behavior look like over short (~2.5 month) intervals?
- ◉ What do early adolescent social relationships look like at this time scale?
- ◉ ...therefore, what is an appropriate way to model alcohol/peer dynamics for young adolescents?
- ◉ What do we learn when we apply such a model to our data?

Surprise: Drinking Behavior



Surprise : Drinking Behavior

- ◎ The current SAOM in SIENA assumes
 - Drinking $(t+1) = f(\text{network}, \text{drinking})(t)$
 - Data are measured without error
 -but maybe we are more interested in latent change
 - Measures (e.g. actual self-reported drinking frequency) are indicators.
- ◎ But ...maybe amount of drinking is not the main concern in this population anyway

Modeling Onset to Drinking

- ◎ If young adolescents drink alcohol, they can only do so opportunistically
- ◎ ...therefore, measured drinking *levels* are "noisy"
- ◎ Conjecture: for early adolescents, it may be more meaningful to study ONSET TO DRINKING

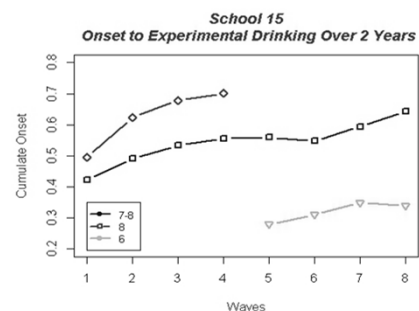
The Network Survival Model (Greenan, 2012)

- ◎ The network part of the model is unchanged
 - ◎ The behavior part:
 - You model conditional rate of behavior change
 - Influence effect: average exposure
= _____
 - ...which is interacted with rate of behavior change
- (In words: the average amount of alcohol use (z) among person i 's direct contacts $\{j\}$, or just the proportion who have onset to alcohol use.)

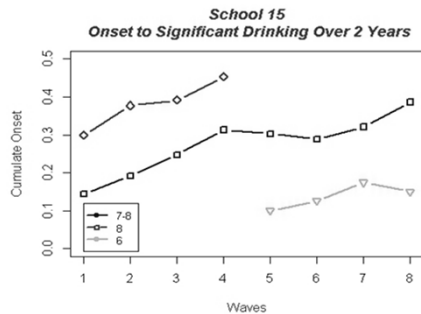
Analysis Notes

- ◎ Two types of onset:
 - Experimentation (defined as any use, but 1 or more whole drinks)
 - Frequent use (used $\geq 4x$ lifetime prior to study, OR $\geq 3x$ at any wave)
- ◎ 8 of 14 schools examined (so far)
- ◎ Waves 1-8 only (faster estimation runs)
 - Only waves 1-4 available for school 6 (dropped out)
 - School 4 not available for experimentation analysis (some waves with 0 onset).
- ◎ No time dummies (spot checks suggested no substantive impact)
- ◎ Convergence on all models was excellent (not shown)

Onset to Experimental Drinking



Onset to Significant Drinking



Results: Onset/Experimentation

Network Dynamics	Parameter Estimates														
	1	2	3	4	6	10	12	15							
net rate	37.425	13.567	7.120	Not Available	19.087	28.279	25.433	18.899							
net rate	17.098	18.957	6.077	Available	15.685	14.924	24.011	19.0621							
net rate	15.471	14.469	9.901		9.156	13.336	14.902	13.2388							
net rate	21.572	25.215	10.140		19.852	23.896	15.6183								
net rate	18.270	17.551	7.566		14.895	16.998	16.2119								
net rate	13.940	15.248	5.517		18.118	19.132	11.1129								
net rate	10.858	12.896	3.993		15.409	13.376	22.7059								
outdegree (density)	-3.261	-2.831	-3.114		-3.295	-3.529	-2.815	-3.1244							
reciprocity	1.539	1.332	1.152		1.470	1.703	1.365	1.6631							
transitive triplets	0.481	0.441	0.553		0.552	0.529	0.429	0.6925							
3-cycles	-0.386	-0.458	-0.485		-0.483	-0.489	-0.412	-0.6457							
sameEth	0.126	0.06	0.175					-0.051							
sex ego	-0.086		0.167					0.083							
sex alter	0.060	-0.095						-0.092							
same sex	0.385	0.389	0.274		0.494	0.489	0.408	0.485							
grade ego		0.122			0.167	0.198	0.113	0.197							
grd alter	-0.092	-0.064	-0.072		-0.085	-0.206	-0.107	-0.188							
grd similarity	1.613	0.995	2.173		0.921	1.786	1.077	0.678							
alco ego								-0.069							
alco alter								-0.040							
same alco0	0.028	0.051	0.155		0.119	0.092	0.081	0.075							
Analysis N:	594	291	118	186	373	626	331	375							

Results: Onset/Experimentation

Behavior Dynamics	Parameter Estimates							
	1	2	3	4	6	10	12	15
rate alco0	0.073	0.243	0.227		0.106	0.287	0.218	0.566
rate alco0	0.036	0.161	0.292		0.127	0.133	0.133	0.469
rate alco0	0.019	0.094	0.124		0.384	0.033	0.065	0.069
rate alco0	0.020	0.125	0.408		0.103	0.060	0.065	
rate alco0	0.056	0.242	0.117		0.056	0.054	0.132	
rate alco0	0.044	0.142	0.190		0.021	0.038	0.157	
rate alco0	0.022	0.108	0.092		0.073	0.018	0.177	
average exposure to alco0	3.063	0.291	0.551		1.525	1.123	1.242	-0.5816
grade x av exposure alco0		0.231						
Analysis N:	594	291	173		373	626	331	375

Results: Onset/Significant Use

Network Dynamics	Parameter Estimates														
	1	2	3	4	6	10	12	15							
net rate	37.273	13.560	5.654	20.783	19.209	28.370	25.338	18.821							
net rate	17.075	18.997	4.769	10.759	15.659	14.909	24.038	19.072							
net rate	15.448	14.871	7.016	17.399	9.164	13.335	14.892	13.305							
net rate	21.602	25.162		16.863		19.394	23.323	15.862							
net rate	18.240	17.575		11.599		14.882	17.028	16.177							
net rate	13.926	15.279		11.160		18.142	19.143	11.106							
net rate	10.833	12.902		12.306		15.402	13.435	23.007							
outdegree (density)	-3.260	-2.828	-3.149	-2.774	-3.297	-3.527	-2.814	-3.194							
reciprocity	1.539	1.330	1.197	1.319	1.474	1.700	1.366	1.662							
transitive triplets	0.481	0.441	0.544	0.468	0.551	0.527	0.429	0.695							
3-cycles	-0.385	-0.459	-0.433	-0.623	-0.481	-0.489	-0.413	-0.644							
sameEth	0.127	0.061	0.020	0.117											
sex ego	0.061		0.328	-0.172			0.082								
sex alter	-0.085	-0.078		-0.087			-0.091	0.046							
same sex	0.385	0.387	0.279	0.493	0.495	0.489	0.408	0.485							
grade ego		0.121		-0.076	0.165	0.196	0.112	0.190							
grd alter	-0.092	-0.064	-0.060		-0.081	-0.205	-0.107	-0.186							
grd similarity	1.622	0.994	2.122	1.186	0.924	1.785	1.077	0.677							
alco ego								-0.062							
alco alter								-0.144							
same alco2	0.026	0.051	0.375	-0.045	0.119	0.090	0.080	0.168							
Analysis N:	594	291	118	186	373	626	331	375							

Results: Onset/Significant Use

Network Dynamics	Parameter Estimates							
	1	2	3	4	6	10	12	15
rate alco2	0.074	0.241	0.062	0.056	0.110	0.288	0.220	0.016
rate alco2	0.037	0.182	0.026	0.030	0.132	0.133	0.134	0.009
rate alco2	0.019	0.095	0.022	0.036	0.039	0.033	0.066	0.009
rate alco3	0.020	0.126		0.030		0.102	0.060	0.002
rate alco4	0.056	0.242		0.027		0.056	0.054	0.003
rate alco5	0.044	0.142		0.011		0.033	0.036	0.005
rate alco6	0.022	0.108		0.008		0.074	0.018	0.005
average exposure to alco2	3.050	0.289	3.584	3.655	1.513	1.129	1.222	5.548
Analysis N:	594	291	118	186	373	626	331	375

Summary of Results

- Selection effects
 - 6 of 7 schools for experimentation onset
 - 5 of 8 schools for frequent use onset
- Influence effects
 - 1 of 7 schools for experimentation onset
 - 2 of 8 schools for frequent use onset
- All in all, quite similar to Burk and Knecht studies (cited earlier)

Comments

- ◉ Modeling “alcohol use” with annual data may amount to “smoothing” both nomination and behavior change
 - May not work for all behaviors of interest
 - ...but seems to work for adolescent alcohol use
- ◉ For early adolescents, studies of onset may be equally (more?) important vs. studies of use.

Convergence of Results Suggests Progress

- ◉ 3 Different studies with slightly different
 - Longitudinal structure
 - Measures of relationships
 - Populations (US, Sweden, the Netherlands)
 - Models (use v. onset)
- ◉ ...yet essentially consistent results
- ◉ Next steps:
 - Will onset studies yield richer results once we have a better suite of effects available?
 - Timing of effects