

Adolescent Alcohol Use Trajectories And Binge Drinking In Young Adulthood

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Disclosure Statement

- All authors have no affiliation (financial or otherwise) with a pharmaceutical, medical device or communications organization.

What do we know about adolescent alcohol use and binge drinking?

- Alcohol use is commonly initiated in adolescence. *McCambridge et al 2011*
 - 19% of 7th-9th graders. *Canadian Centre on Substance Abuse and Addiction, 2017*
 - 26% of 8th graders in US. *Miech et al 2016*
- Bingeing (≥ 4 or ≥ 5 drinks on one occasion) is associated with acute and persistent health problems. *Wellman et al 2016; Labhart et al 2018*
 - Frequent bingeing (≥ 3 episodes in past 2 weeks) more at risk to develop alcohol use disorders than occasional or non-bingeing. *Siqueira et al 2015*
- Adolescent alcohol users are more likely to binge drink in adulthood.
 - US Preventive Services Task Force: current evidence is insufficient to recommend screening for alcohol misuse in adolescents. *Moyer et al 2013*
- **Can studies of adolescent alcohol use trajectories provide such evidence?**

What do we know about adolescent alcohol use trajectories?

- Most studies report:
 1. A consistently low use pattern (i.e. abstainers)
 2. A consistently high use pattern
 3. A “normative” trajectory with abstinence at younger ages and increased use in late adolescence. *Nelson et al 2015*
- Adolescents with consistently high use pattern more likely to have alcohol use disorders in young adulthood. *McCambridge et al 2011*

What gaps need to be addressed in the adolescent alcohol use trajectory literature?

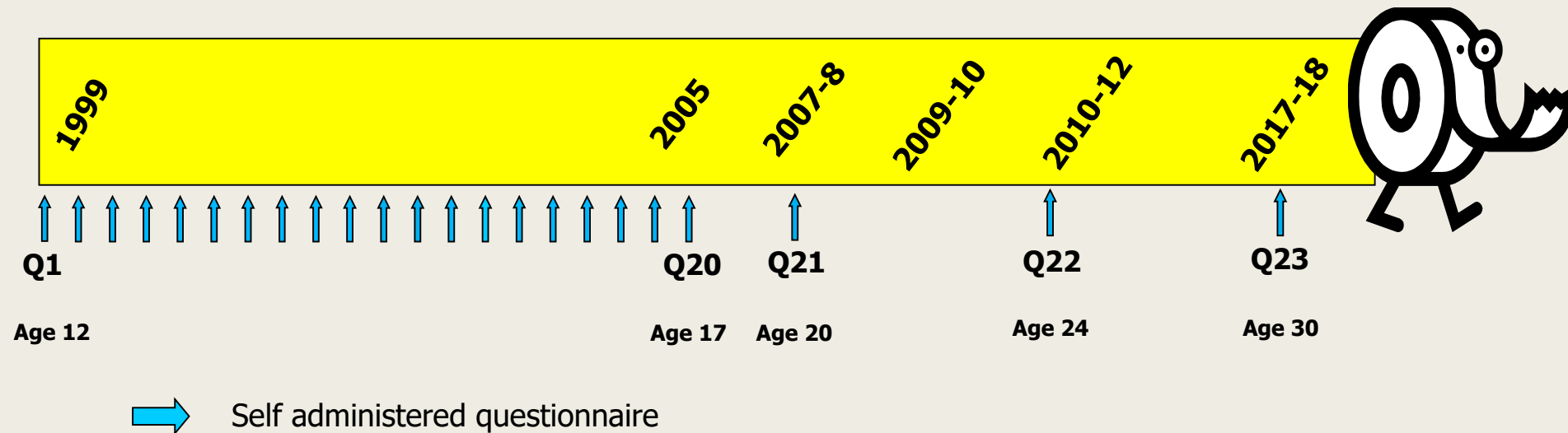
- Early onset of drinking is associated with substance use in late adolescence and early adulthood. *Smit et al 2018*
 - Yet, few studies report longitudinal patterns of alcohol use in this critical period
- Due to high prevalence of adolescent alcohol use, studies need to distinguish among patterns of use rather than simply comparing drinkers to non-drinkers. Canadian Centre on Substance Abuse and Addiction, 2017
- The utility of patterns of alcohol use, as opposed to use at specific time points, has not been assessed.

Objectives

- Early onset of drinking is associated with substance use in late adolescence and early adulthood. *Smit et al 2018*
 - **Describe alcohol use trajectories from age 12 to 17**
- Studies need to distinguish among patterns of use rather than simply comparing drinkers to non-drinkers. Canadian Centre on Substance Abuse and Addiction, 2017
 - **Estimate associations between trajectories and binge drinking in young adulthood**
- The utility of patterns of alcohol use, as opposed to use at specific time points, has not been assessed.
 - **Assess added-value of trajectories over: alcohol use at the 1) beginning and 2) end of high school and the age at onset of 3) alcohol consumption and 4) regular consumption**

NDIT Data Collection

- Nicotine Dependence in Teens Study - prospective cohort investigation of 1293 high school students in Montreal (1999-2000). *O'Loughlin et al 2014, IJE*



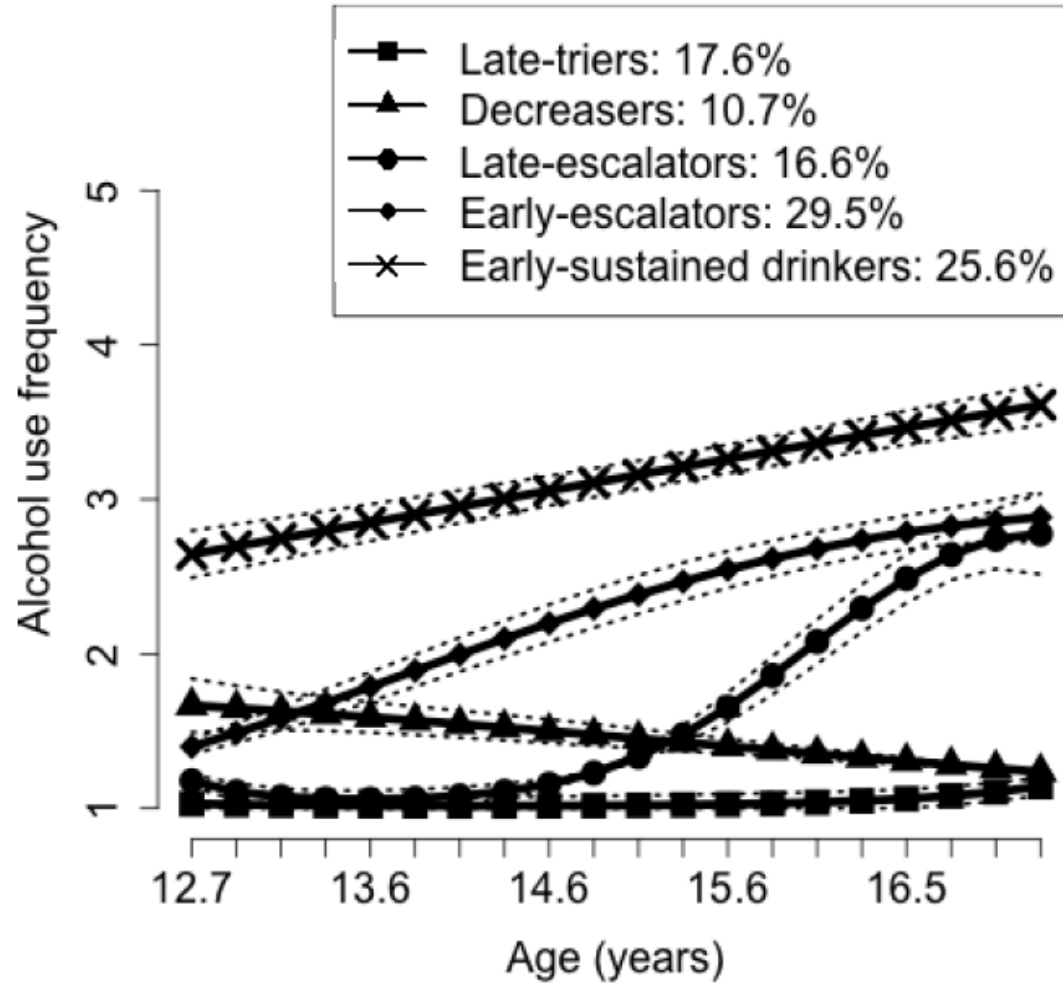
NDIT Data Collection

- Alcohol frequency (12-17 years) – “Over the past three months, how often did you drink alcohol (beer, wine, liquor)?”
 - *‘never’, ‘a bit to try’, ‘1-2 times a month’, ‘1-2 times a week’, ‘usually every day’*
- Age first drank and age at regular alcohol use (i.e. monthly or more)
 - *Never, <12 years, 12-15 years, <15 years*
- Binge drinking frequency (20, 24 years) – In the past 12 months, how often did you drink 5 or more alcoholic beverages on one occasion?”
 - *Frequent = ‘1-6 times per week’ and ‘every day’ vs Non-frequent = ‘never’, ‘less than once a month’ and ‘1-3 times per month’*
- Sustained binge drinking (20, 24 years)
 - *Sustained = frequent at 20 and 24 years vs Non-sustained = frequent at either 20 or 24 years or non-frequent at both*

Analyses

- **Describe alcohol use trajectories from age 12 to 17**
 - Group-based trajectory modelling *Jones et al 2011; Nagin 2005*
- **Estimate associations between trajectories and binge drinking in young adulthood**
 - Adjusted logistic regression models. Tukey-Kramer method for pairwise comparisons
- **Assess added-value of trajectories over: alcohol use at the 1) beginning and 2) end of high school and the age at onset of 3) alcohol consumption and 4) regular consumption**
 - Adjusted logistic regression models

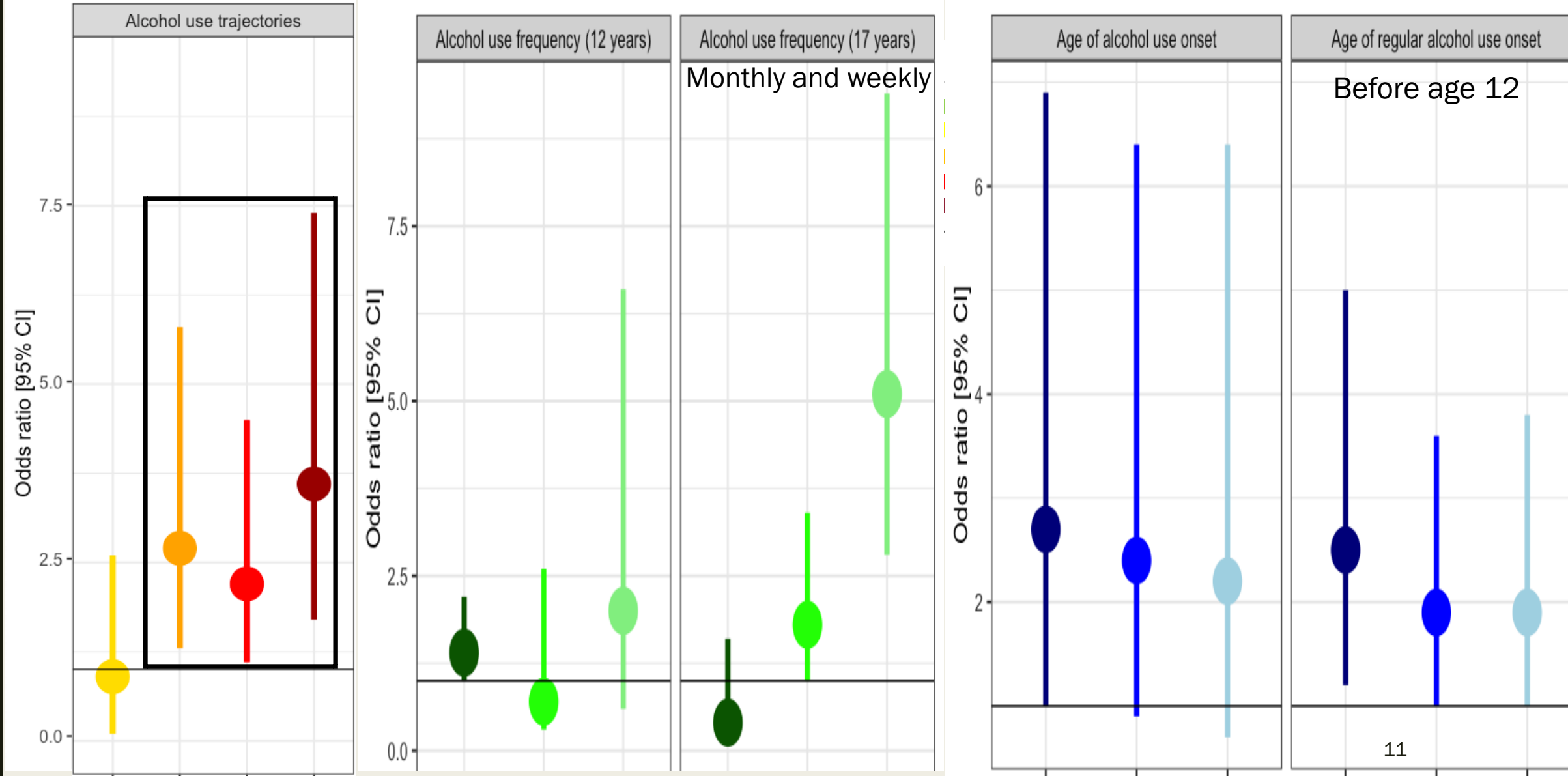
Figure 1. Group-based Trajectories of Adolescent Alcohol Use Frequency, NDIT (1999-2011)



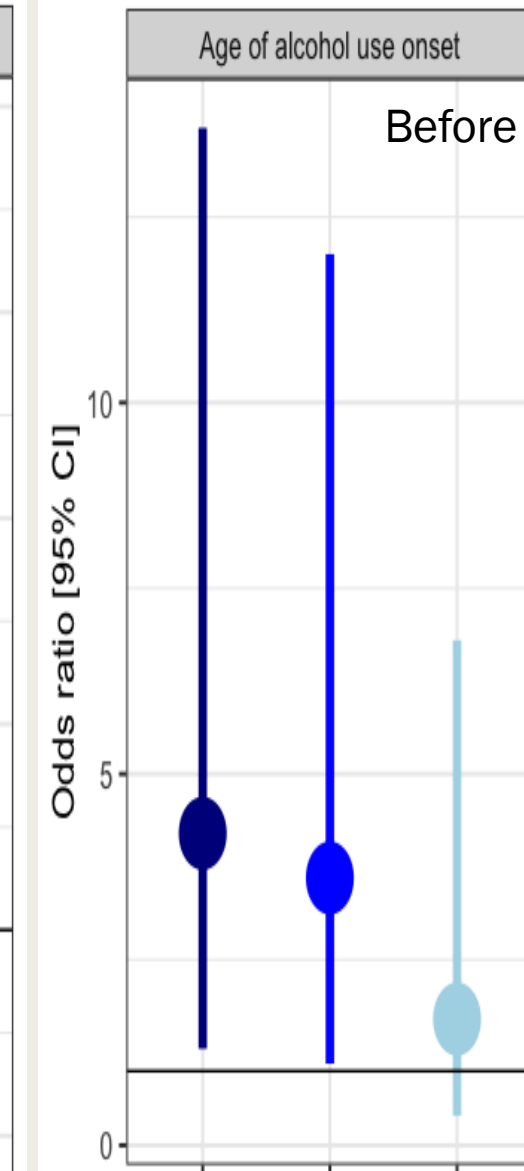
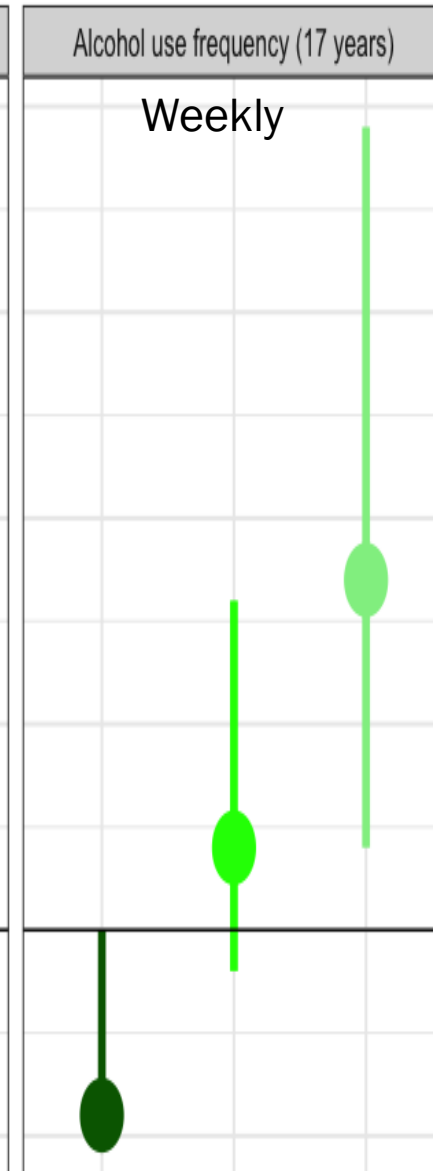
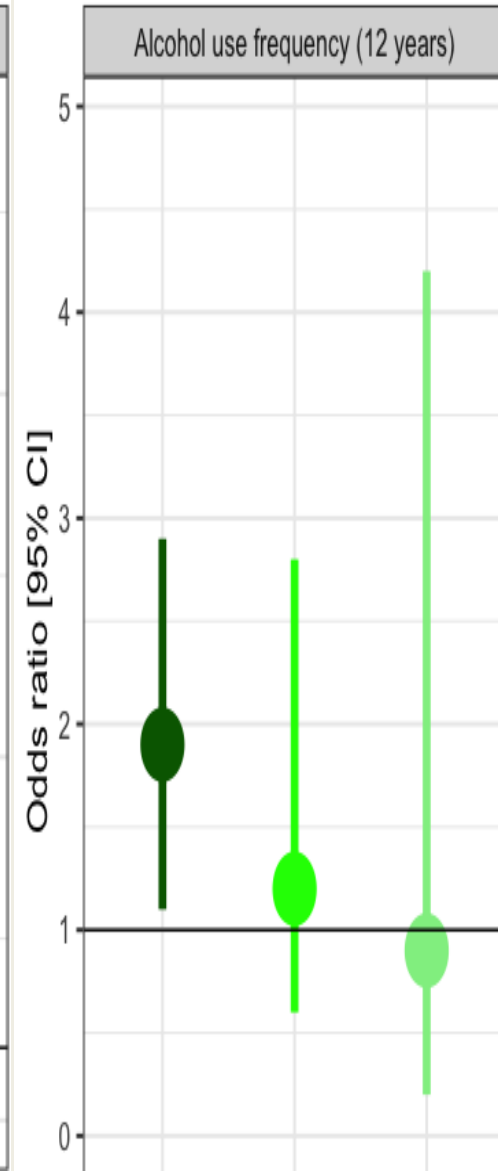
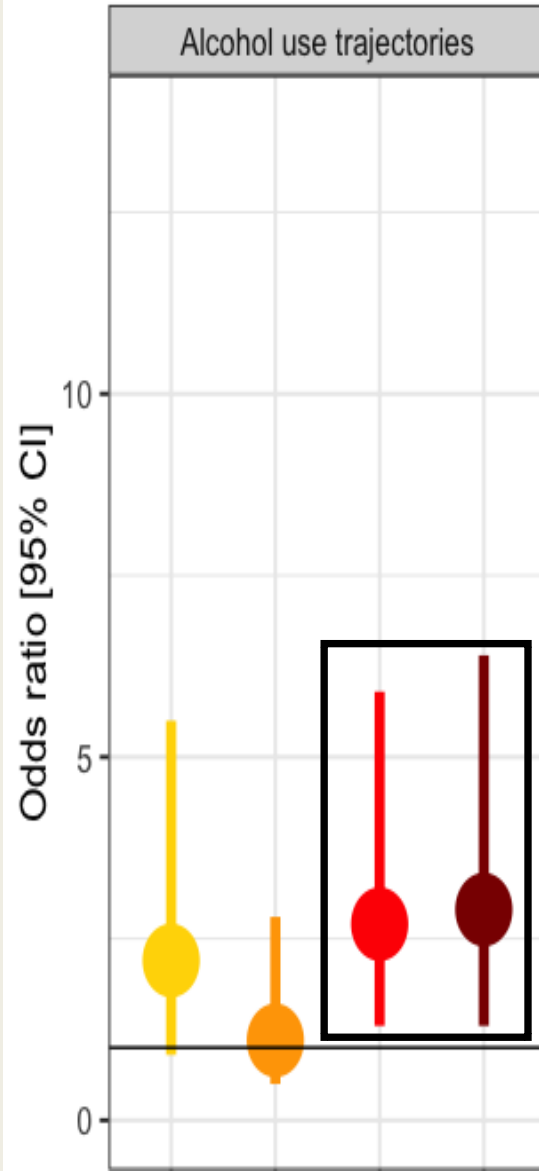
Note: Alcohol use frequency in the past 3 months was coded as 1 = 'never'; 2 = 'a bit to try'; 3 = '1-2 times a month'; 4 = '1-2 times a week'; 5 = 'usually every day'.

Alcohol use trajectory groups

Adolescent alcohol use and binge drinking at age 20



Adolescent alcohol use and binge drinking at age 24



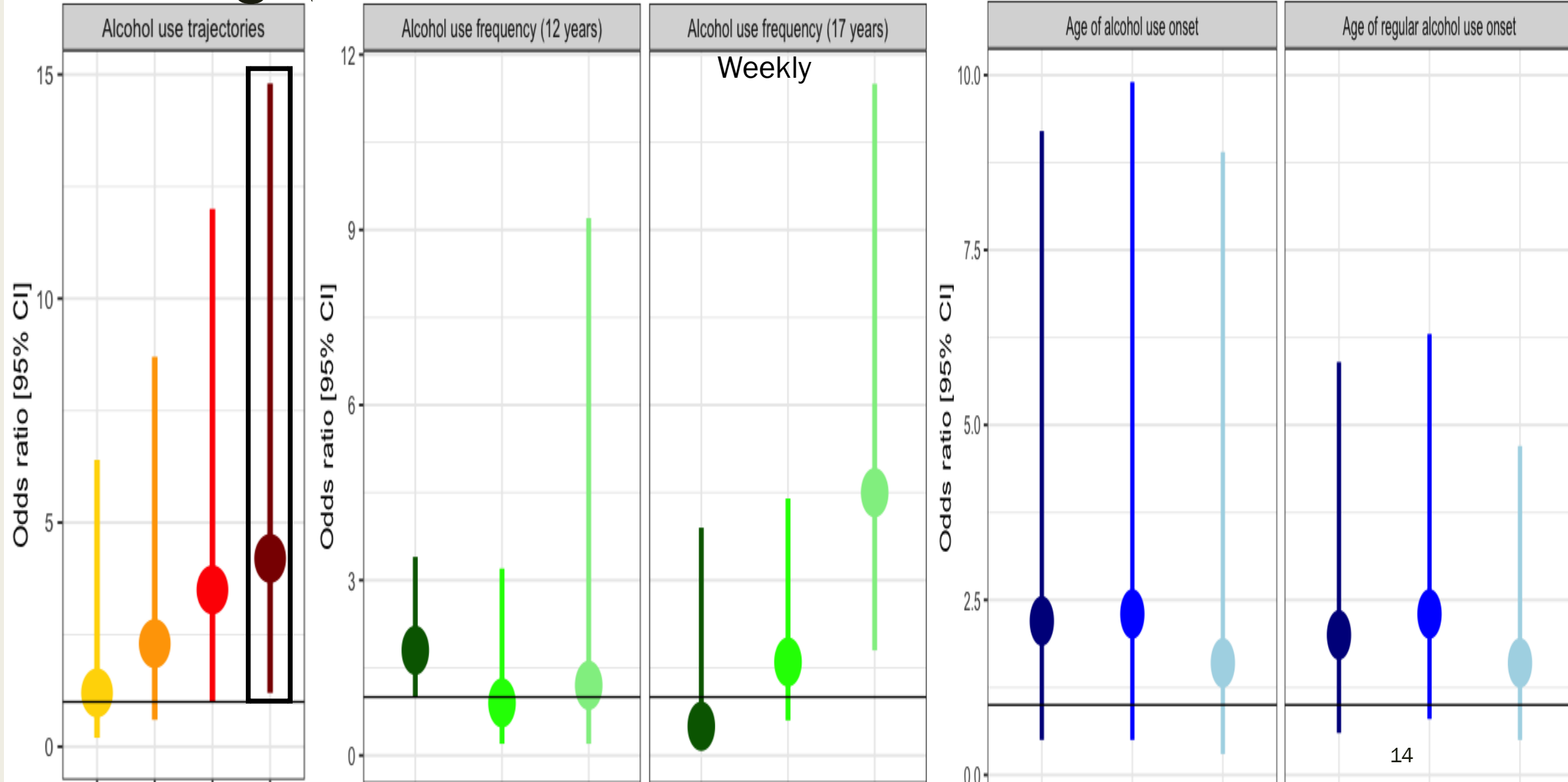
Adolescent alcohol use and binge drinking at age 24

Table S4. Chi-squared Post-hoc Pairwise Comparisons (Holm Procedure) of Binge Drinking Frequency in Young Adulthood Across Adolescent Alcohol Use Trajectory Groups (N=1293) in the Nicotine Dependence in Teens Study (Canada) study

b. Binge drinking frequency (24 years)

		p-value
Late-riers	Decreasers	0.732
Late-riers	Late escalators	1.000
Late-riers	Early escalators	0.450
Late-riers	Early-sustained drinkers	0.004
Decreasers	Late escalators	0.745
Decreasers	Early escalators	1.000
Decreasers	Early-sustained drinkers	0.732
Late escalators	Early escalators	0.605
Late escalators	Early-sustained drinkers	0.006
Early escalators	Early-sustained drinkers	0.296

Adolescent alcohol use and sustained binge drinking (ages 20 and 24)



Early onset of drinking is associated with substance use in late adolescence and early adulthood

- Early, consistently high trajectories of alcohol use were associated with frequent and sustained binge drinking in young adulthood
- Early-sustained drinkers were distinguishable from all other groups at baseline due to higher levels of self-reported stress and depressive symptoms
 - Targeted interventions in pre-adolescence may be helpful for this group

Studies need to distinguish among patterns of use rather than simply comparing drinkers to non-drinkers

Early-sustained drinkers were more likely than late-escalators to binge drink frequently at age 24

- There were no differences between adolescent drinkers in risk for both frequent binge drinking at age 20 and sustained binge drinking

The utility of patterns of alcohol use, as opposed to use at specific time points, has not been assessed

- Trajectories were useful in identifying early-sustained pattern of use which was distinguishable from other trajectory groups
- However, weekly alcohol use before age 12 and at the end of high school were also associated with increased risk of frequent binge drinking
 - Sixty percent of sample was drinking weekly at 17 years. Universal intervention before transition to university and work may be warranted

Can studies of adolescent alcohol use trajectories provide such evidence?

- US Preventive Services Task Force: current evidence is insufficient to recommend screening for alcohol misuse in adolescents. Moyer et al 2013
 - Trajectories may be useful in identifying sub-group of early users with higher levels of stress and depressive symptoms
 - Screening for alcohol misuse in these young adolescents may help decrease their risk of frequent and sustained binge drinking in young adulthood

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Thank You!

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Additional Information

Results - sample characteristics

Table 1. Characteristics of Participants in the Nicotine Dependence in Teens Study (1999-2011) study by Alcohol Use Trajectory Group

	Alcohol Use Trajectory Group					N missing	p-value ^a
	Late-tryers (n=228)	Decreasers (n=138)	Late-escalators (n=215)	Early-escalators (n=381)	Early-sustained drinkers (n=331)		
Male, %	54.4	63.0	52.9	37.8	47.1	0	<.0001
Age [year, mean (SD)]	12.7 (0.4)	12.8 (0.6)	12.7 (0.4)	12.7 (0.5)	12.9 (0.7)	26	<.0001
Mother university-educated, %	36.9	40.4	50.0	46.5	44.7	315	0.136
Single-parent family, %	11.1	6.6	9.1	9.4	9.7	31	0.726
French spoken at home, %	23.6	34.6	43.1	27.8	30.1	30	<.0001
No. cig/month [median(IQR)]	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (2.3)	84	<.0001
Baseline alcohol use, %	2.8	52.3	24.5	39.9	83.4	79	<.0001
Parents smoke, %	29.9	45.1	29.7	40.1	47.2	43	<.0001
Friends smoke, %	18.7	31.6	19.6	34.8	64.9	30	<.0001
Depressive symptoms [mean(SD)]	2.0 (0.6)	2.1 (0.7)	2.0 (0.5)	2.1 (0.6)	2.3 (0.7)	69	<.0001
Family stress [median(IQR)]	1.2 (0.4)	1.2 (0.4)	1.0 (0.4)	1.2 (0.4)	1.2 (0.8)	81	<.0001
Other stress [median(IQR)]	1.4 (0.4)	1.4 (0.4)	1.4 (0.4)	1.4 (0.4)	1.6 (0.8)	74	<.0001
Impulsivity [median(IQR)]	1.8 (1.1)	2.0 (1.3)	2.0 (1.1)	2.3 (1.1)	2.4 (1.4)	397	<.0001
Novelty-seeking [mean(SD)]	2.5 (0.8)	2.9 (0.9)	2.9 (0.8)	2.9 (0.8)	3.2 (0.9)	394	<.0001
Moderate physical activity [times/week^b, median(IQR)]	6.0 (9.0)	10.0 (11.0)	8.0 (12.0)	8.0 (10.0)	8.0 (11.5)	26	0.007
Vigorous physical activity [times/week^b, median(IQR)]	1.0 (4.0)	2.0 (7.0)	2.0 (5.0)	2.0 (5.0)	2.0 (7.0)	26	0.251
Engagement in ≥1 team sport, %	55.1	67.7	62.1	64.2	59.9	26	0.110

^a Categorical variables (%) were compared using chi-square tests. For continuous variables, ANOVA was used to compare those with normal distributions (mean (SD)) and Kruskal Wallis tests were used for non-normally distributed variables (median (IQR)).

^b For each activity, the participant reported number of days per week (1–7) on which he/she participated in that activity for 5 minutes or more at one time. This variable represents the mean number of days across all activities.

Results – binge drinking frequency across trajectory groups

Table 2. Binge Drinking in Young Adulthood in by Alcohol Use Trajectory Group, NDIIT (1999-2011)

	Alcohol Use Trajectory Group					p-value
	Late-riers (n=228)	Decreasers (n=138)	Late-escalators (n=215)	Early-escalators (n=381)	Early-sustained drinkers (n=331)	
Binge drinking frequency (20 years), %						<.0001
<i>Never, less than monthly, monthly</i>	91.7	91.0	83.1	86.4	76.6	
<i>Weekly (1-7 times per week)</i>	8.3	9.0	16.9	13.6	23.4	
Binge drinking frequency (24 years), %						<.0001
<i>Never, less than monthly, monthly</i>	92.5	86.0	91.7	85.7	77.8	
<i>Weekly (1-7 times per week)</i>	7.5	14.0	8.3	14.3	22.2	
Never weekly binge drinking, %	76.1	64.7	72.5	63.3	53.4	<.0001
Weekly binge drinking at 20 years only, %	5.5	5.1	10.6	7.3	11.5	0.105
Weekly binge drinking at 24 years only, %	4.3	9.1	3.1	7.3	9.8	0.056
Sustained weekly binge drinking, %	2.5	3.0	5.0	5.2	10.3	0.008

Results – post-hoc comparisons

Table S4. Chi-squared Post-hoc Pairwise Comparisons (Holm Procedure) of Binge Drinking Frequency in Young Adulthood Across Adolescent Alcohol Use Trajectory Groups (N=1293) in the Nicotine Dependence in Teens Study (Canada) study

a. Binge drinking frequency (20 years)

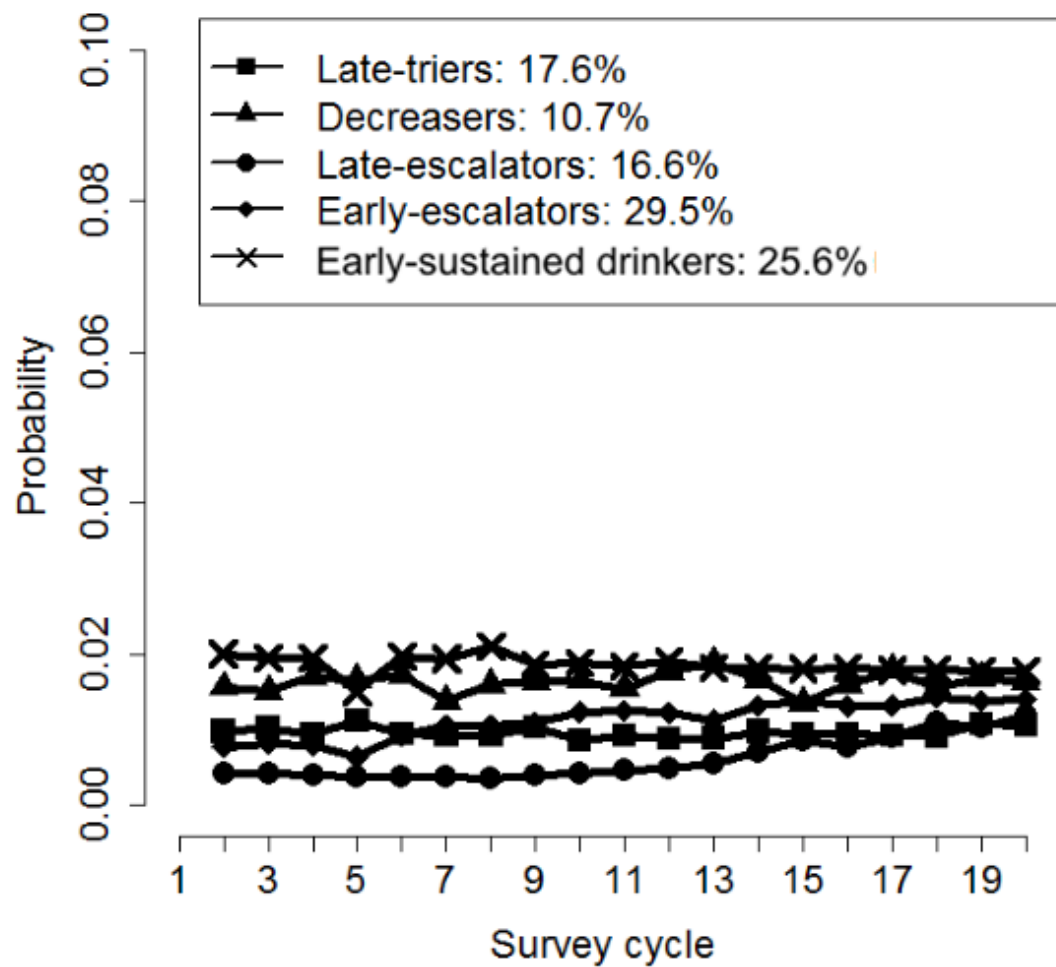
		p-value
Late-riers	Decreasers	1.000
Late-riers	Late escalators	0.249
Late-riers	Early escalators	0.789
Late-riers	Early-sustained drinkers	0.002
Decreasers	Late escalators	0.789
Decreasers	Early escalators	1.000
Decreasers	Early-sustained drinkers	0.054
Late escalators	Early escalators	1.000
Late escalators	Early-sustained drinkers	0.789
Early escalators	Early-sustained drinkers	0.060

Results – post-hoc comparisons

c. Sustained weekly binge drinking

		p-value
Late-riers	Decreasers	1.000
Late-riers	Late escalators	1.000
Late-riers	Early escalators	1.000
Late-riers	Early-sustained drinkers	0.053
Decreasers	Late escalators	1.000
Decreasers	Early escalators	1.000
Decreasers	Early-sustained drinkers	0.418
Late escalators	Early escalators	1.000
Late escalators	Early-sustained drinkers	0.640
Early escalators	Early-sustained drinkers	0.418

Figure S1. Estimated Probability of Loss-To-Follow-Up by Trajectory Group in the Nicotine Dependence in Teens Study (Canada) study



Note: At each cycle, data on participants' age, sex, mother university-educated, and single-parent family from the previous cycle were used to predict loss-to-follow-up.

Results – attrition in trajectory groups