

Patterns of Prenatal Alcohol Use And Infant Growth and Development

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Disclosures

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The speaker has no conflicts of interest and nothing to disclose.



Patterns of Prenatal Alcohol Use That Predict Infant Growth and Development

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BACKGROUND: Previous studies have had inconsistent findings regarding the quantity and frequency of prenatal alcohol exposure (PAE) that lead to deficits in growth and neurodevelopment. This may be due to imprecise methods of exposure classification. Our objective in this study was to employ longitudinal trajectory modeling of maternal drinking patterns associated with infant growth or neurodevelopmental deficits to a homogenous sample of mothers and infants.

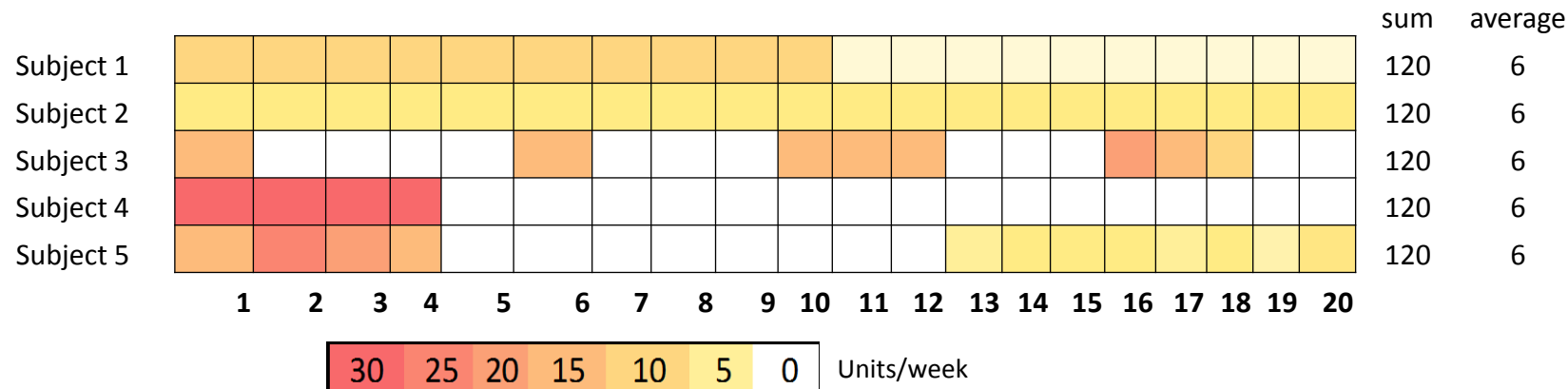
METHODS: From a sample of 471 pregnant women prospectively enrolled in a longitudinal study in the Ukraine, we performed a longitudinal cluster analysis of drinking patterns across gestation. We employed multivariable regression analyses to determine if each trajectory group was associated with infant weight, length, or head circumference at birth or psychomotor or mental deficits in infancy.

RESULTS: We identified 5 distinct PAE trajectory groups: minimal or no PAE throughout gestation, low-to-moderate PAE with discontinuation early in gestation, low-to-moderate PAE sustained across gestation, moderate-to-high PAE with reduction early in gestation, and high PAE sustained across gestation. The highest-trajectory group was associated with deficits in infant weight and length at birth and deficits in psychomotor and mental performance at 6 to 12 months of age. Although confidence intervals overlapped, low-to-moderate sustained use was more strongly associated with most negative infant outcomes

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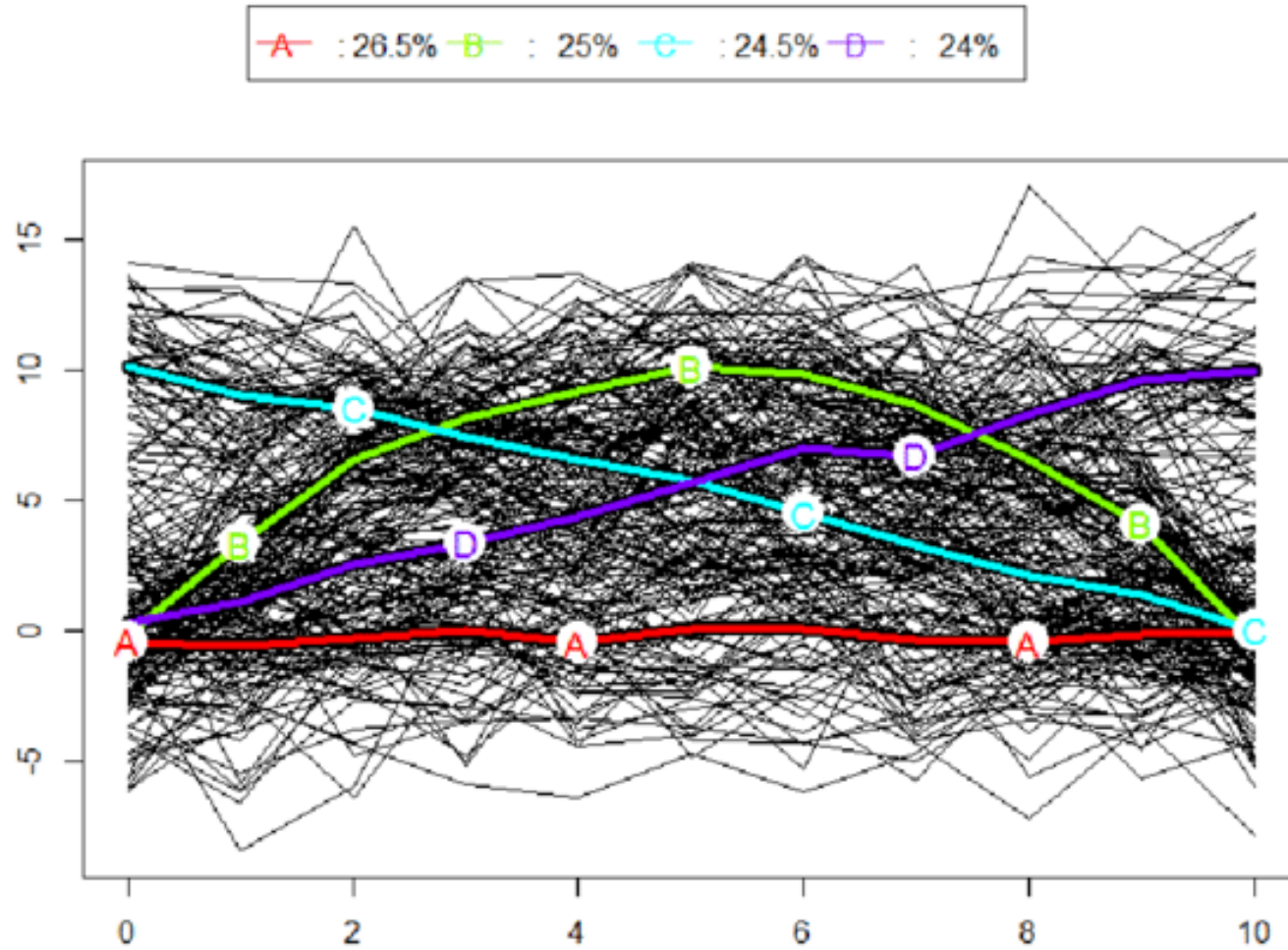
Background

- Exposure assessment:
 - Dichotomous per trimester
 - Count of binge drinking episodes
 - Average dose across pregnancy
 - Count of drinking days across gestation
- Women often abstain or reduce consumption at pregnancy recognition, however, this point varies markedly.



Background

- Removes exposure information on changes in dose, intensity of use, and coverage gaps.
- Unable to study how timing, dose and cumulative dose of alcohol affects pregnancy and birth outcomes.
- May not align with underlying etiology of multiple outcomes.



Genolini, Christophe & Alacoque, xavier & Sentenac, Mariane & Arnaud, Catherine. (2015). kml and kml3d : R Packages to Cluster Longitudinal Data. Journal of Statistical Software. 65. 1-34. 10.18637/jss.v065.i04.

Objective

- Use longitudinal cluster analysis to classify patterns of prenatal alcohol exposure over gestation.
- Determine whether patterns of exposure are associated with adverse birth and infant outcomes.

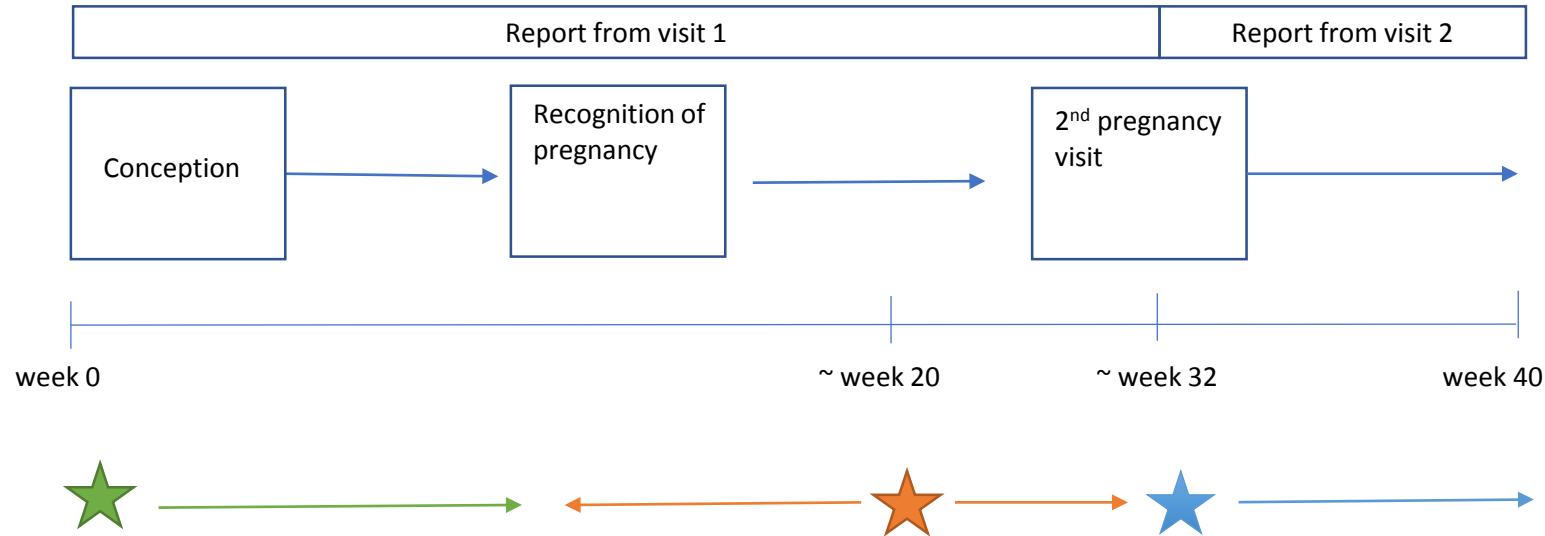
Study design

- Prospective cohort study of pregnant women in western Ukraine conducted as part of the Collaborative Initiative on Fetal Alcohol Spectrum Disorders (CIFASD)

Exposed	Unexposed
At least weekly binge drinking episodes of 4-5 alcoholic drinks per occasion	<2 drinks/occasion
At least 5 episodes of 3-4 drinks	≤2 drinks per week
At least 10 episodes of 1-2 drinks	
In the month around conception and/or the most recent month of pregnancy	

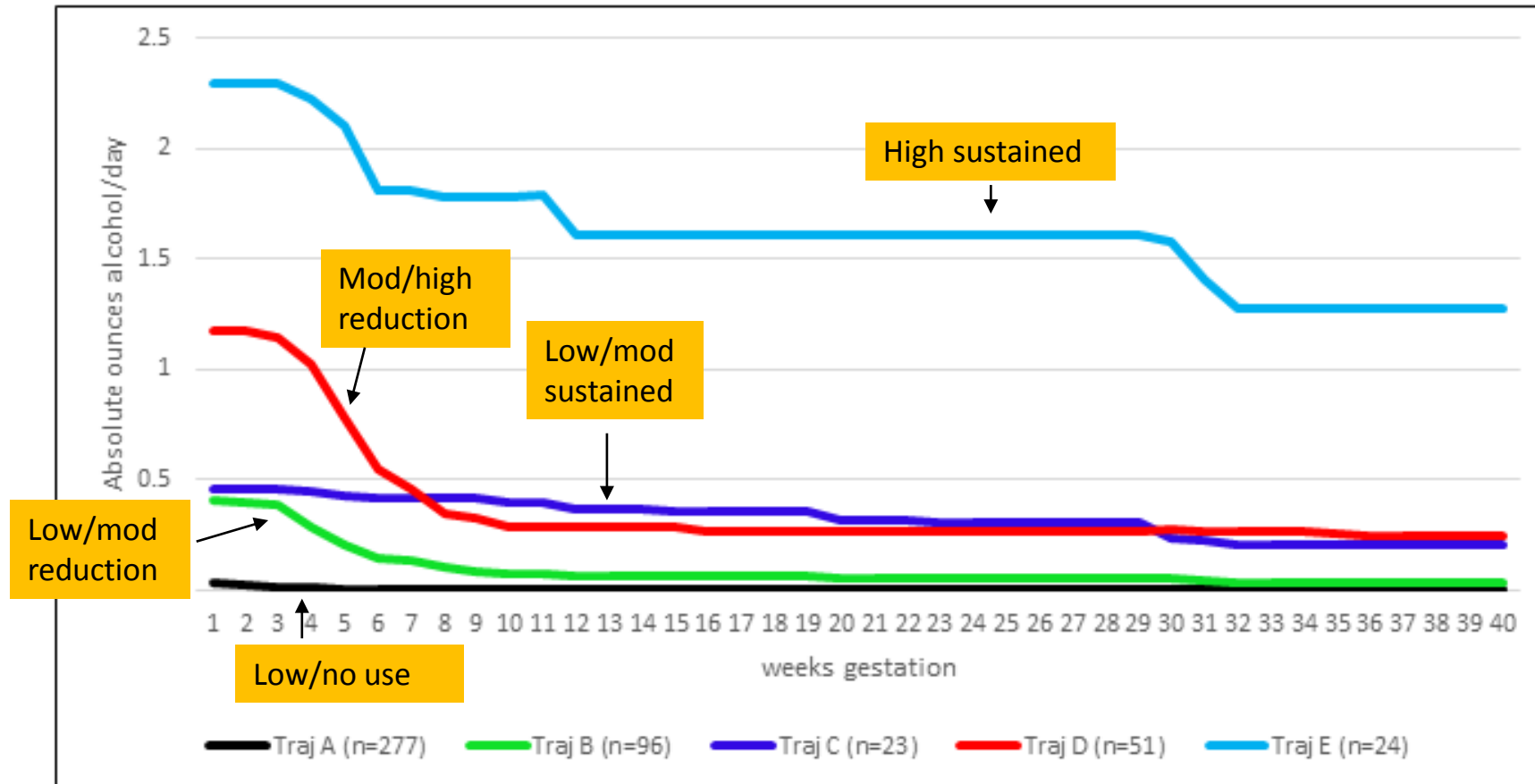
- Timeline follow back assessment of alcohol consumption of type, quantity and frequency in typical week around conception and most recent week

Study design



- 776 women enrolled, 483 completed the 2nd pregnancy visit.
- 471 participants with two pregnancy interviews, report of pregnancy recognition, and singleton, live births.

Trajectory results



Trajectory results

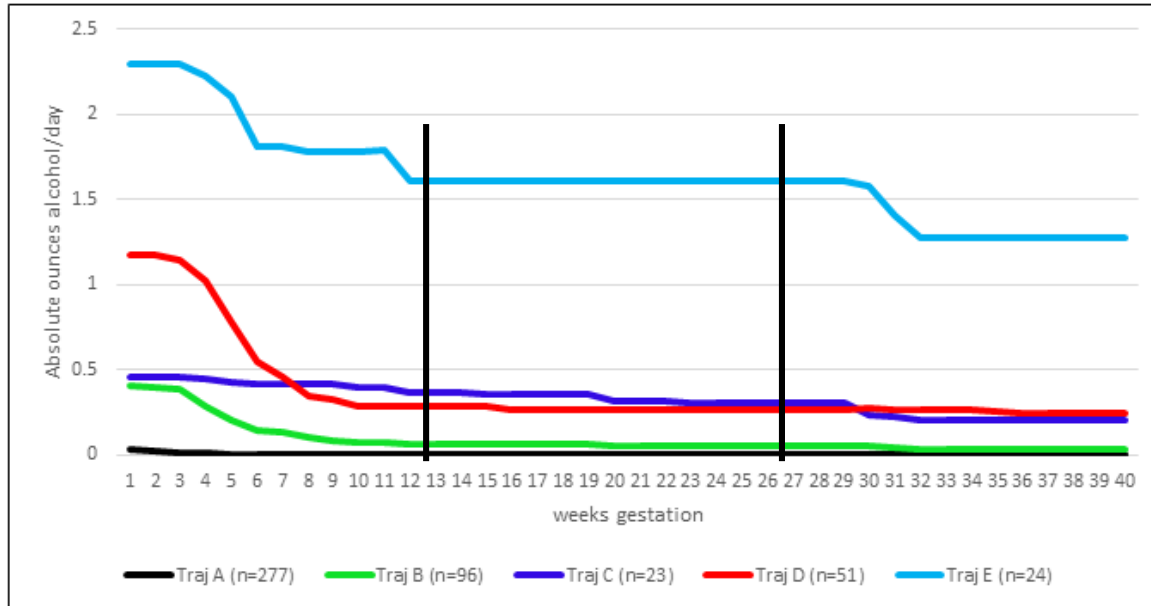
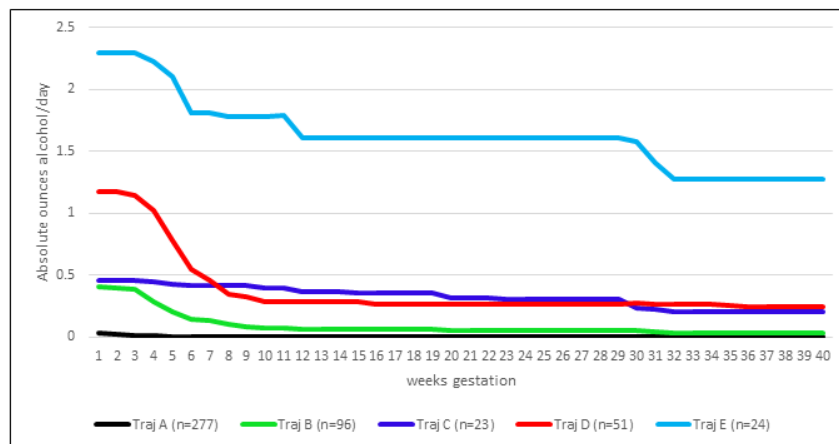


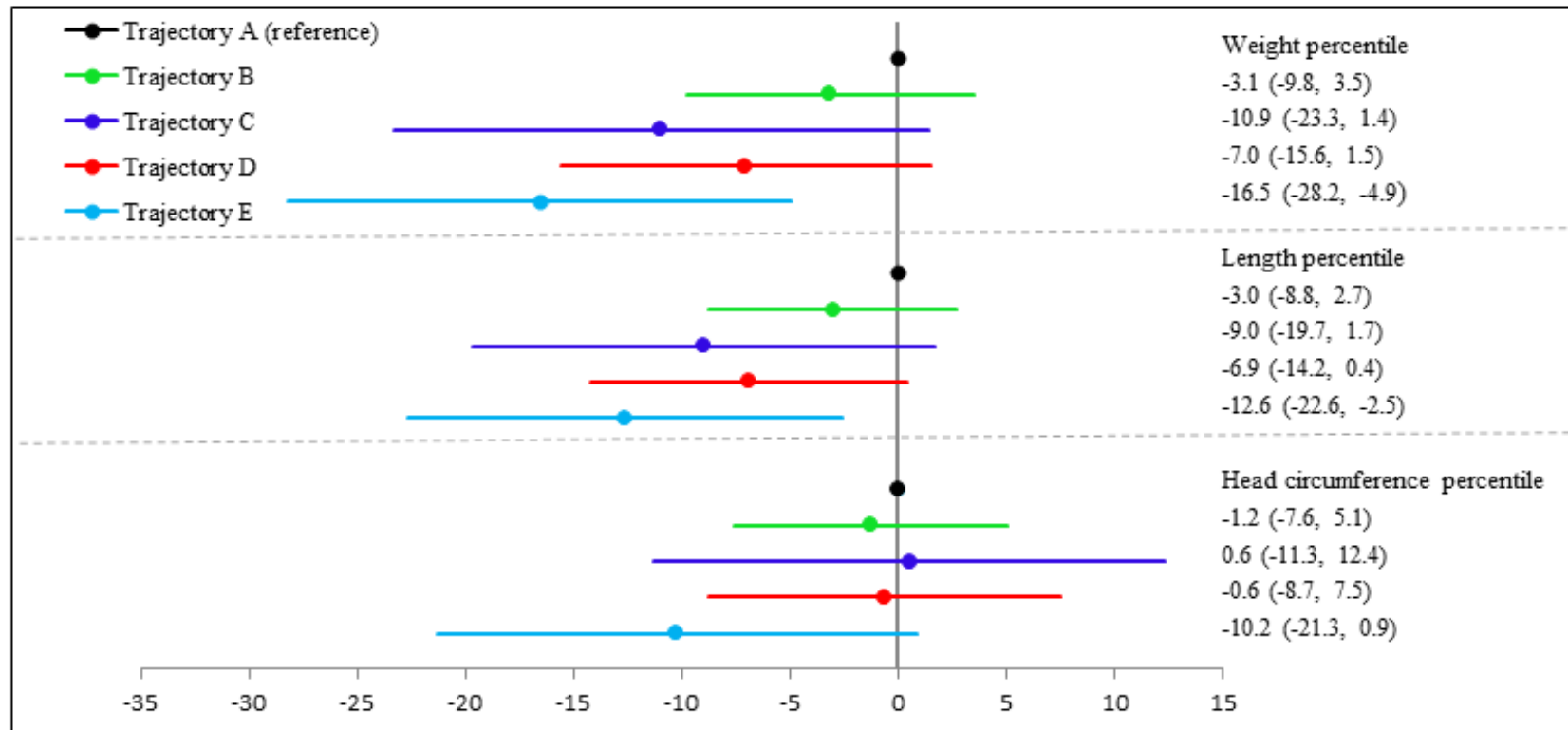
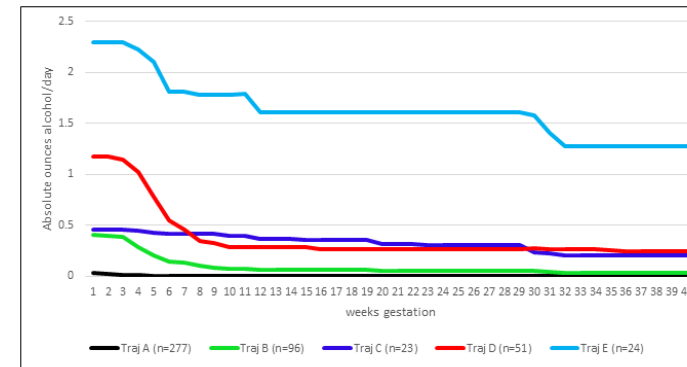
Table 1. Trajectory characteristics by trajectory group

	Low/no use (A) n=277	Low/mod RED (B) n=96	Low/mod SUS (C) n=23	Mod/high RED (D) n=51	High SUS (E) n=24
Mean ozAA/day across gestation (mean (sd))	0.00 (0.01)	0.05 (0.06)	0.31 (0.16)	0.26 (0.32)	1.58 (0.65)
Mean ozAA/day by trimester					
Mean ozAA/day TM1 (mean (sd))	0.01 (0.02)	0.18 (0.08)	0.42 (0.12)	0.62 (0.41)	2.14 (1.22)
Mean ozAA/day TM2 (mean (sd))	0.00 (0.01)	0.06 (0.06)	0.33 (0.14)	0.27 (0.32)	1.61 (0.65)
Mean ozAA/day TM3 (mean (sd))	0.00 (0.02)	0.04 (0.06)	0.23 (0.16)	0.24 (0.33)	1.36 (0.68)

	Low/no use (A)	Low/mod RED (B)	Low/mod SUS (C)	Mod/high RED (D)	High SUS (E)	p-value
	n=277	n=96	n=23	n=51	n=24	
	n (%)	n (%)	n (%)	n (%)	n (%)	
Gestation weeks at enrollment (mean (sd))	17.0 (5.4)	18.5 (5.4)	24.6 (8.6)	20.0 (8.4)	20.6 (7.9)	<0.0001
Maternal age (mean (sd))	26.1 (4.6)	26.3 (5.8)	25.1 (6.3)	24.4 (4.8)	29.1 (5.7)	0.005
Gestational weeks at pregnancy recognition (mean (sd))	4.7 (2.3)	5.9 (3.2)	9.1 (6.2)	5.9 (2.2)	9.5 (5.9)	<0.0001
Cohabitation status						
Single, separated, or divorced	11 (4.0)	11 (11.5)	6 (26.1)	12 (23.5)	2 (8.3)	<0.0001
Maternal education						
Less than college degree	116 (41.9)	61 (63.5)	20 (86.9)	32 (62.8)	19 (79.2)	<0.0001
Socioeconomic status						
Low SES (HH<30)	38 (13.7)	29 (30.2)	13 (56.5)	20 (39.2)	11 (45.8)	<0.0001
Vitamin use in pregnancy						
No	53 (19.1)	22 (22.9)	10 (43.5)	14 (27.5)	12 (50.0)	0.001
Maternal smoking						
Active/former pregnancy smoking	37 (13.4)	52 (54.2)	14 (60.9)	29 (56.9)	7 (29.2)	<0.0001
missing	4 (1.4)	0 (0.0)	1 (4.3)	0 (0.0)	1 (4.2)	

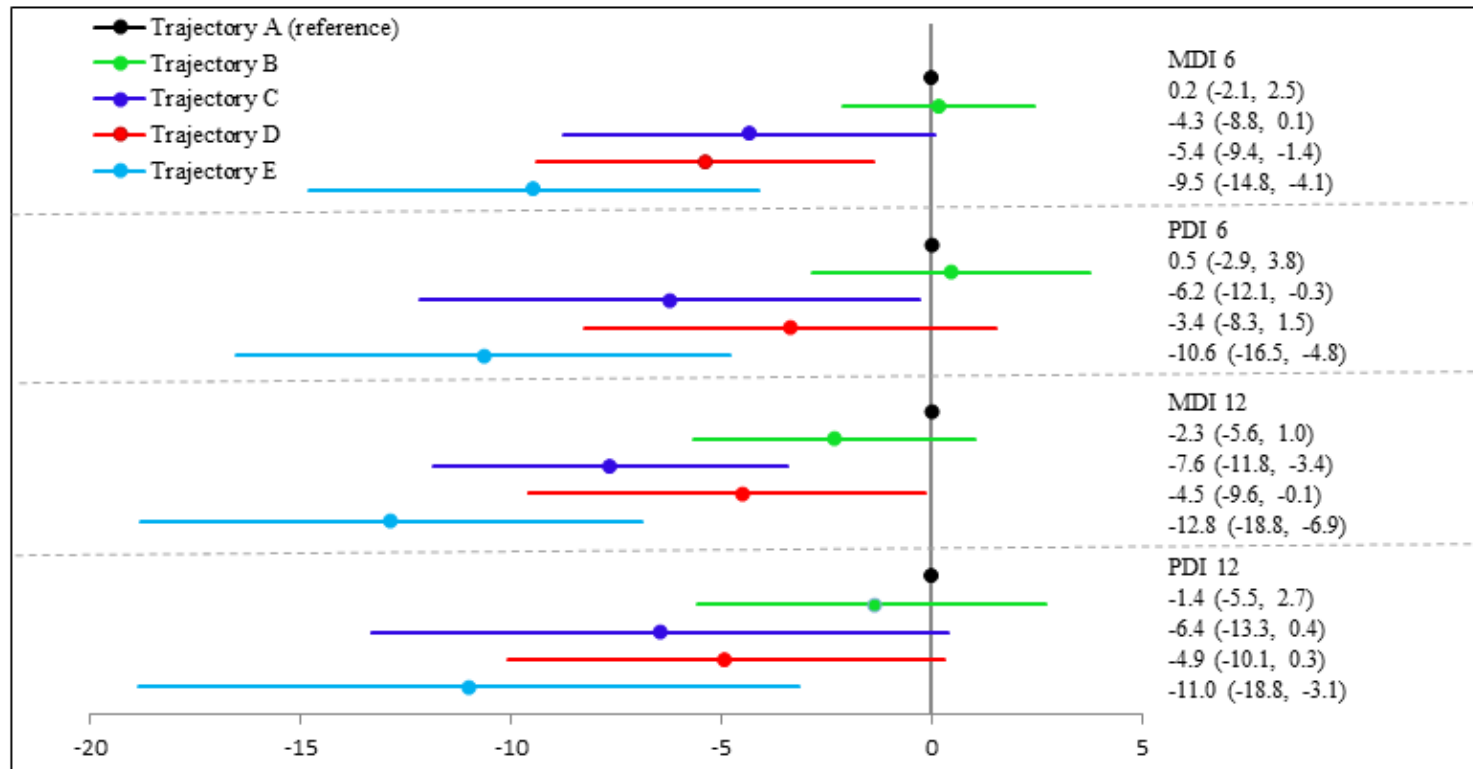
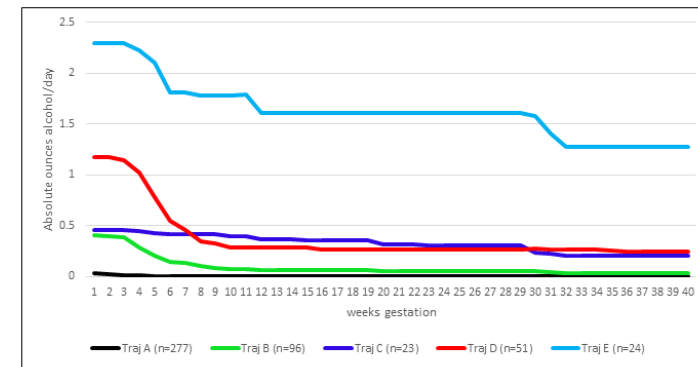


Birth outcomes



Models were adjusted for vitamin use in pregnancy, Hollingshead SES, maternal age at enrollment, maternal smoking status and gestational age at enrollment

Neurodevelopmental outcomes

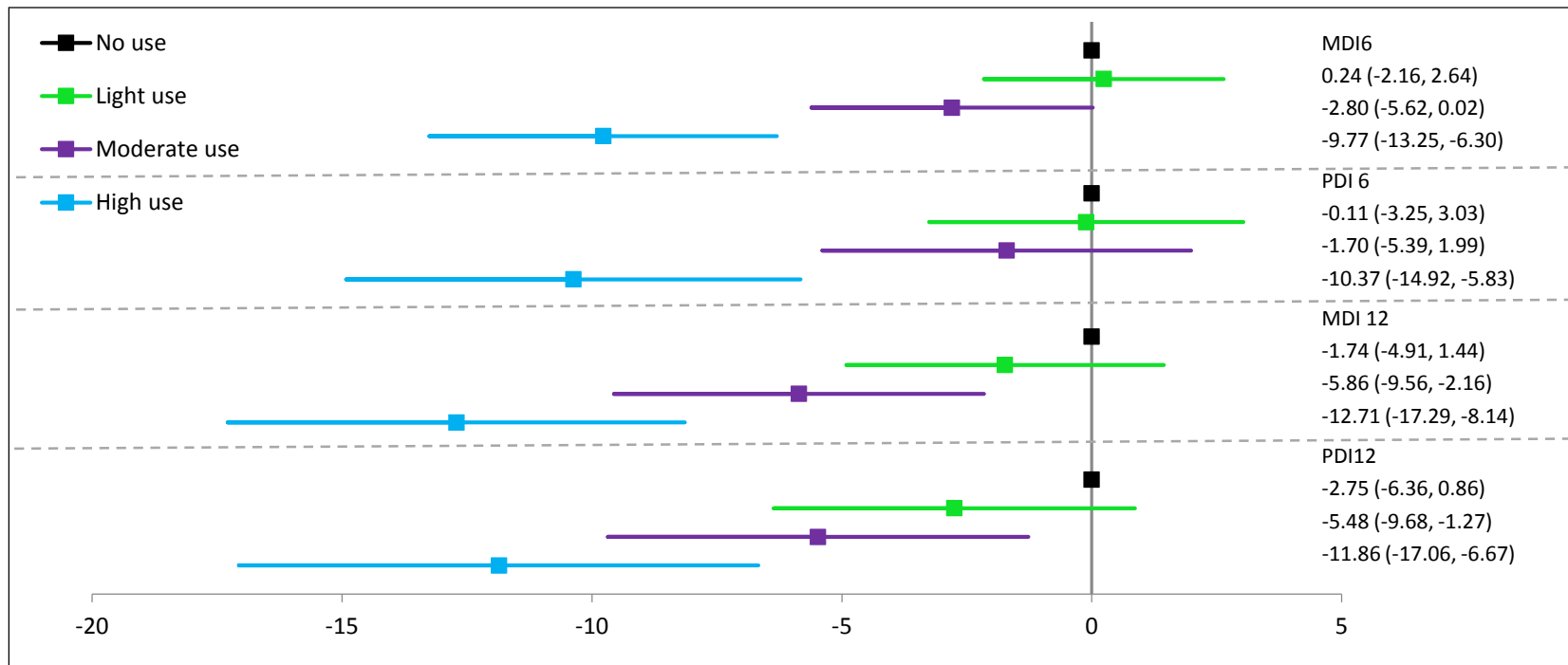


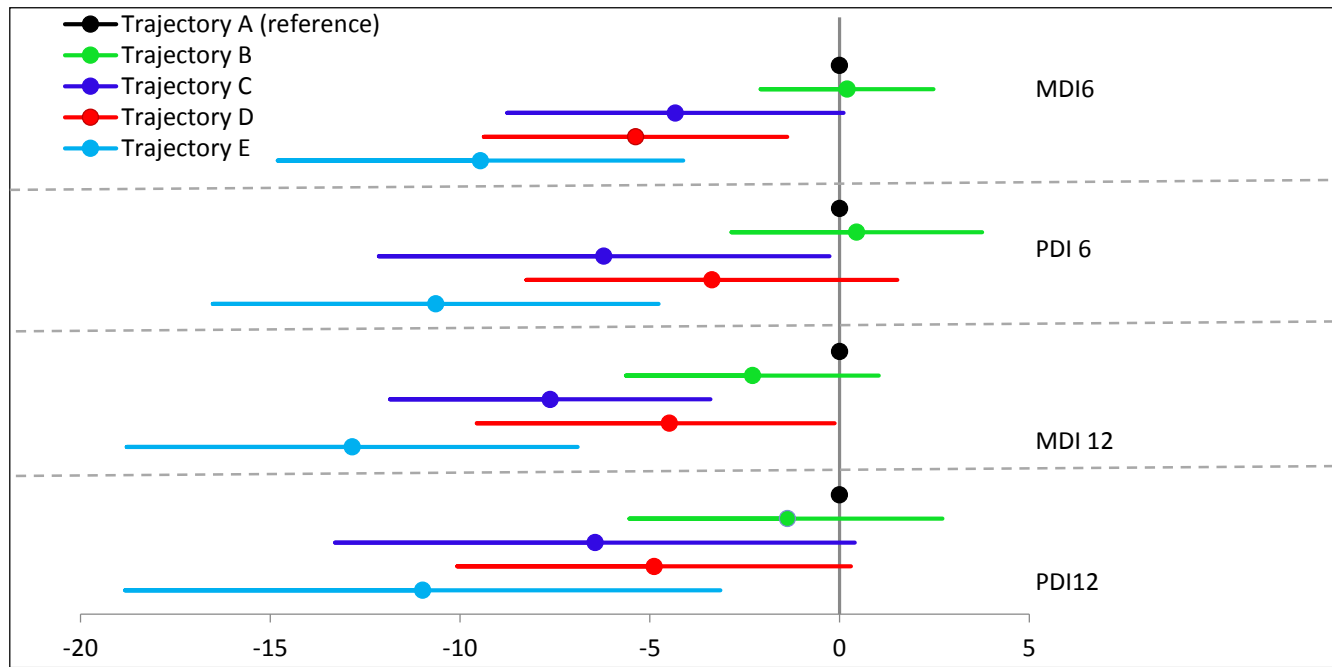
N=351; vitamin use in pregnancy, Hollingshead SES, maternal age at enrollment, maternal smoking status and gestational age at enrollment. Stabilized inverse probability censoring weights were applied to account for loss to follow up.

Traditional analysis of prenatal alcohol exposure

Traditional exposure: average consumption over 40 weeks categorized into:

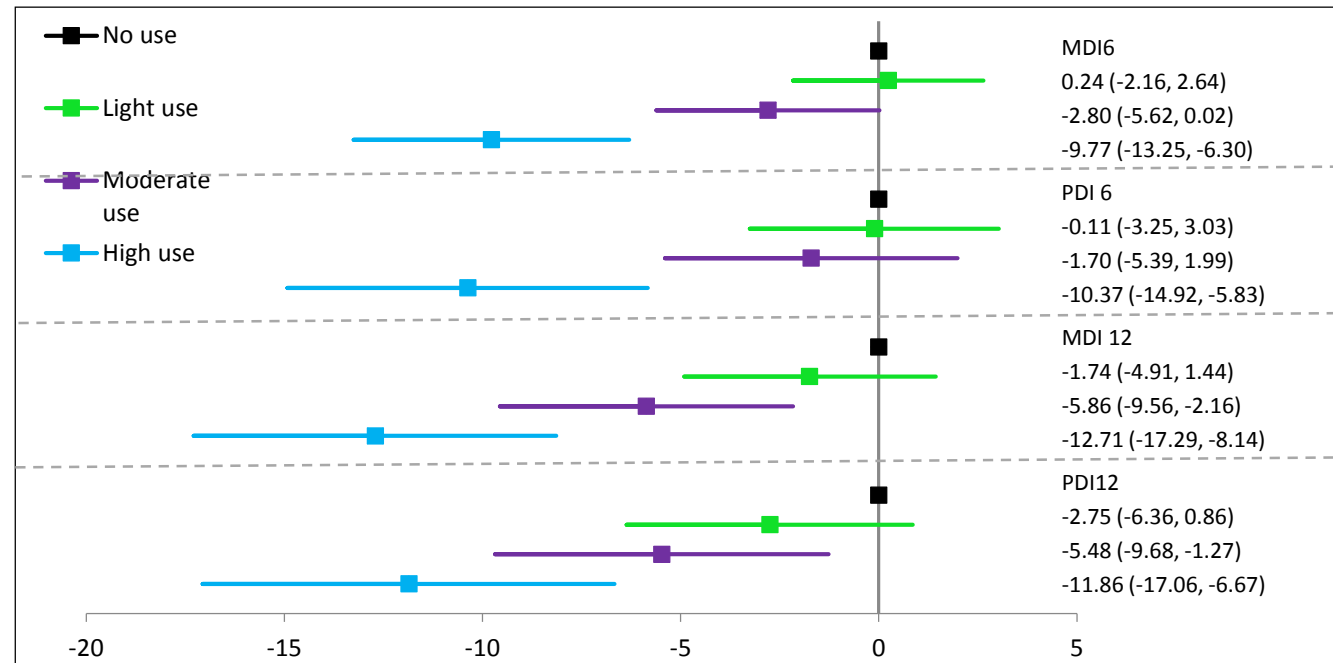
- no use
- light use (less than 1.5 drinks/week)
- moderate use (1.5 drinks/week to less than one drink/day)
- heavy use (one or more drinks per day)





Trajectory analysis

Traditional analysis





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Drinking and smoking patterns during pregnancy: Development of group-based trajectories in the Safe Passage Study



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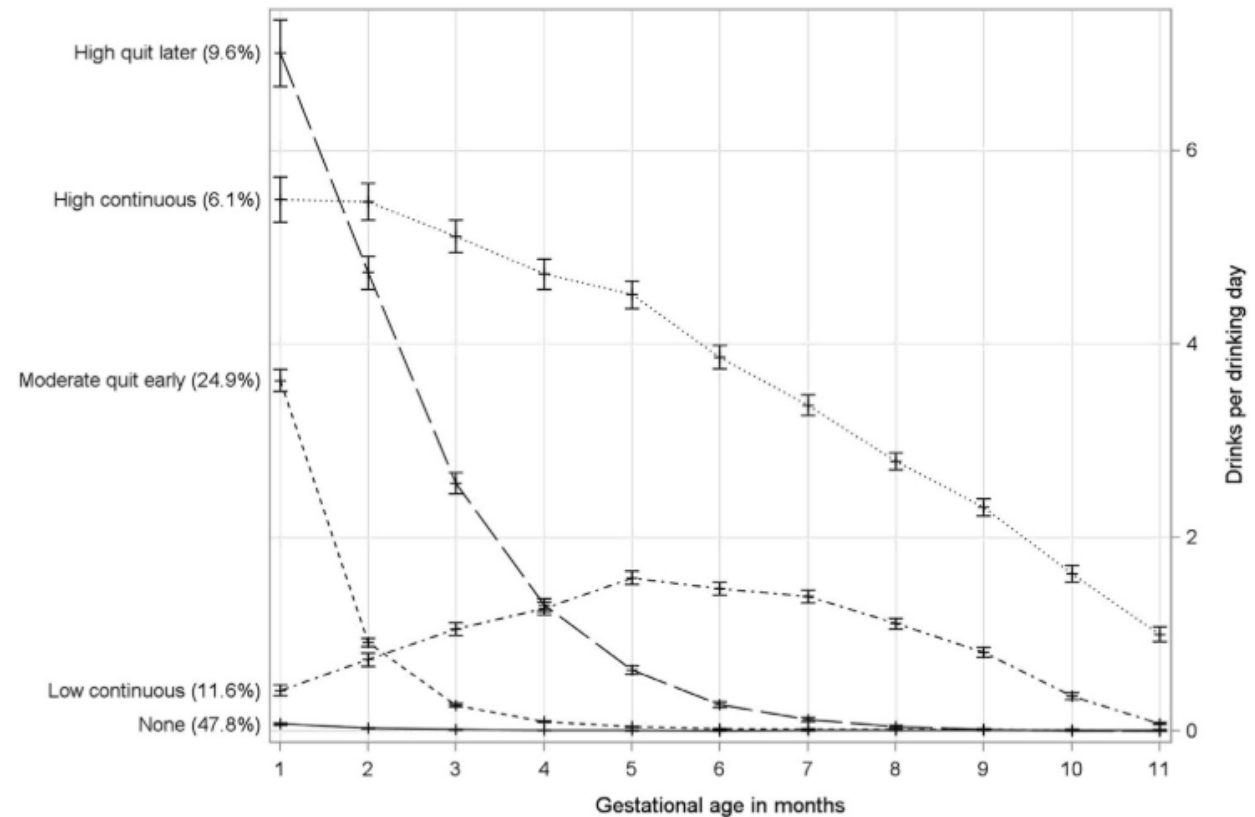


Fig. 2. Drinking trajectory groups based on drinks per drinking day in each month of pregnancy (n = 11,692 pregnancies).

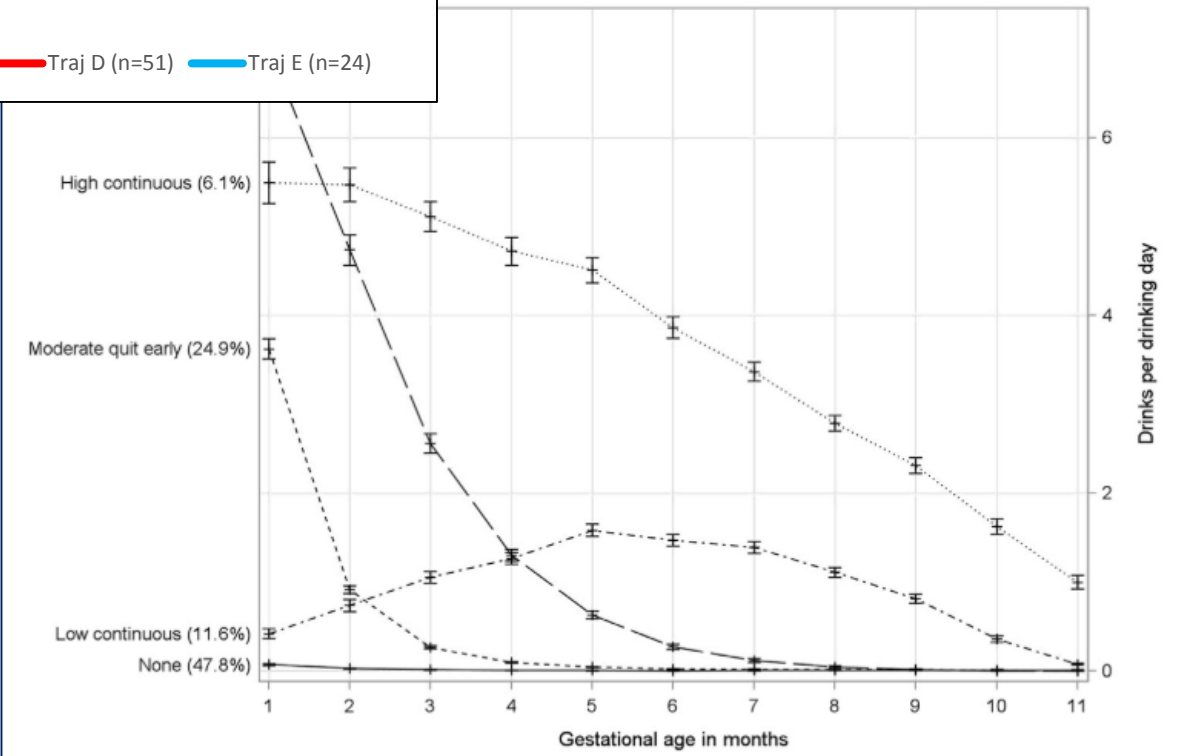
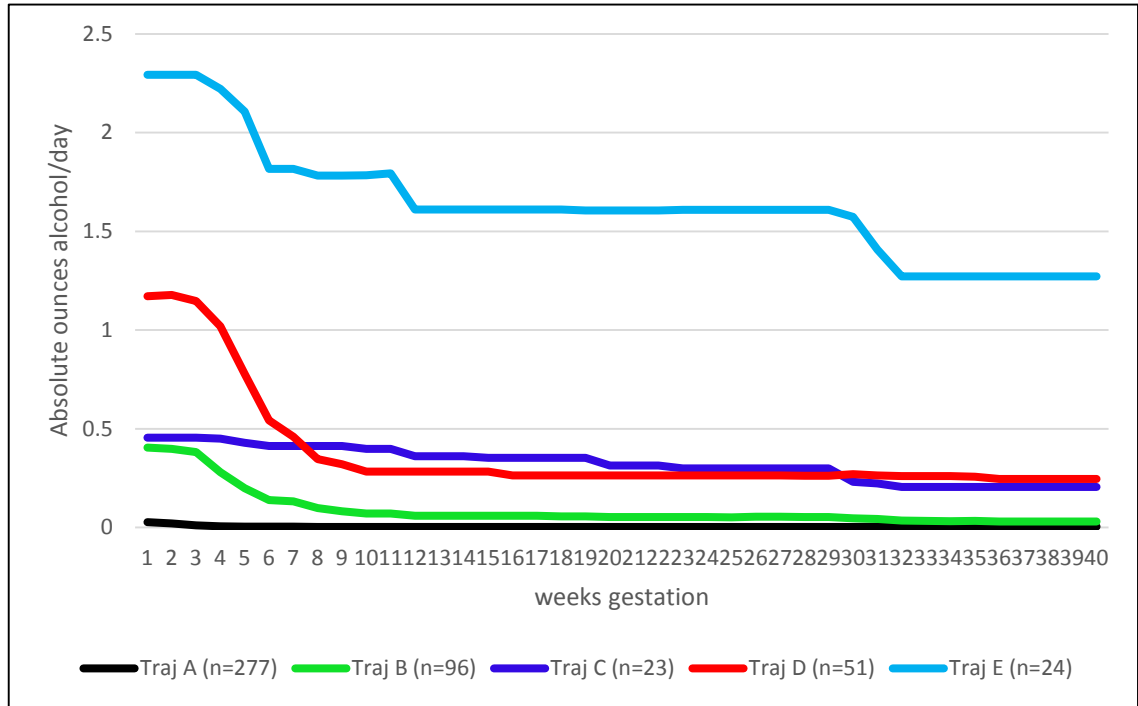


Fig. 2. Drinking trajectory groups based on drinks per drinking day in each month of pregnancy (n = 11,692 pregnancies).

Conclusions

- Classifying prenatal alcohol exposure using group based trajectory methods provides a more nuanced approach for describing complex exposure patterns
- High, sustained prenatal alcohol exposure confers the highest risk for adverse infant outcomes.
- Even low/moderate prenatal alcohol exposure continued across gestation is associated with certain deficits.
- No matter the initial amount of consumption, cessation increases the chances for improved offspring outcomes.
- Supports continued use of the methodology to further delineate risk by different patterns of consumption.

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 - Claire Coles, Julie Kable, Wladimir Wertelecki, Lyubov Yevtushok, Natalya Zymak-Zakutnya, Alan Wells, Irina Granovska, Alla Pashtepa, Christina Chambers
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- Full paper: Bandoli G, Coles CD, Kable JA, et al. Patterns of Prenatal Alcohol Use That Predict Infant Growth and Development. *Pediatrics*. January 2019:e20182399. doi:10.1542/peds.2018-2399.