

## U01:Early Predictors of FASD in Ukraine

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## Early Predictors of FASD in Ukraine

***Aim 2. Develop risk/resilience profiles based on early markers identified in Aim 1 and other factors that will adequately predict preschool and school age performance***

- ***Aim 2.a.*** Perform analysis of existing & newly obtained prospective cohort data to develop prediction model for FASD outcomes in children using social, environmental, economic, health, & other available data

## Early Predictors of FASD in Ukraine

- Individual growth curves (prenatal for weight and head circumference; postnatal for weight, length and head circumference) for 441 singleton infants combined with clinical variables screened for contribution to improvement in prediction models of performance on BSID-II.

## Early Predictors of FASD in Ukraine

- Growth measures strongly associated with neurodevelopmental outcomes

confounder	MDI	PDI	Categorical	N.MDI	N.PDI
Weight - 20 wks. GA	0.012*	<.001***	No	441	441
Weight - 30 wks. GA	<.001***	<.001***	No	441	441
Weight - Birth	<.001***	<.001***	No	441	441
Weight - 1 month	<.001***	<.001***	No	441	441
Weight - 2 months	<.001***	<.001***	No	441	441
Weight - 3 months	<.001***	<.001***	No	441	441
Weight - 4 months	<.001***	<.001***	No	441	441
Weight - 5 months	<.001***	<.001***	No	441	441
Weight - 6 months	<.001***	<.001***	No	441	441
HC - 20 wks. GA	0.185	0.033*	No	441	441
HC - 30 wks. GA	0.208	<.001***	No	441	441
HC - Birth	<.001***	<.001***	No	441	441
HC - 1 month	<.001***	<.001***	No	441	441
HC - 2 months	<.001***	<.001***	No	441	441
HC - 3 months	<.001***	<.001***	No	441	441
HC - 4 months	<.001***	<.001***	No	441	441
HC - 5 months	<.001***	<.001***	No	441	441
HC - 6 months	<.001***	<.001***	No	441	441
Height - Birth	<.001***	<.001***	No	441	441
Height - 1 month	<.001***	<.001***	No	441	441
Height - 2 months	<.001***	<.001***	No	441	441
Height - 3 months	<.001***	<.001***	No	441	441
Height - 4 months	<.001***	<.001***	No	441	441
Height - 5 months	<.001***	<.001***	No	441	441
Height - 6 months	<.001***	<.001***	No	441	441

## Early Predictors of FASD in Ukraine

- Maternal covariates associated with neurodevelopmental outcomes

confounder	MDI	PDI	Categorical	N.MDI	N.PDI
Maternal age	0.011*	0.424	No	441	441
Paternal age	< .001***	0.002**	No	439	439
GA at enrollment	0.003**	< .001***	No	441	441
GA at birth	0.112	< .001***	No	441	441
Maternal Education	< .001***	< .001***	Yes	441	441
SES	< .001***	< .001***	Yes	437	437
Maternal marital status	0.097	0.211	Yes	440	440
Gravidity	0.002**	0.080	Yes	441	441
Parity	< .001***	< .001***	Yes	441	441
Maternal height	0.339	0.563	No	441	441
Maternal weight	0.808	0.815	No	441	441
Gender	0.455	0.143	Yes	441	441
AADO	< .001***	< .001***	No	440	440
AADD0	< .001***	< .001***	No	440	440
AADXP	< .001***	< .001***	No	441	441
AADDXP	< .001***	< .001***	No	441	441
Cigarettes per day	0.001**	0.007**	No	439	439
Vitamin Group	0.751	0.129	Yes	441	441
Vit. use prior to enrollment	0.007**	< .001***	Yes	440	440
Planned pregnancy	0.016*	0.015*	Yes	440	440
Maternal diabetes	0.547	0.970	Yes	440	440
Maternal high BP	0.252	0.986	Yes	440	440
Number of miscarriages	0.024*	0.027*	Yes	441	441
Number of stillbirths	0.016*	0.003**	Yes	441	441
Number terminated preg.	0.070	0.376	Yes	441	441

## Early Predictors of FASD in Ukraine

- Results

			Continuous Bayley			Dichotomized Bayley		
			R <sup>2</sup> (in-sample)	MSE (out-of-sample)	R <sup>2</sup> (out-of-sample)	AUC (in-sample)	AUC (out-of-sample)	Generalized R <sup>2</sup> (in-sample)
All infants	Birth	MDI	0.237	114.1	0.129	0.743	0.710	0.174
		PDI	0.250	146.9	0.134	0.820	0.778	0.140
	6 months	MDI	0.243	113.1	0.136	0.747	0.720	0.183
		PDI	0.261	144.5	0.147	0.816	0.766	0.147
Alcohol exposed	Birth	MDI	0.351	129.0	0.123	0.793	0.737	0.248
		PDI	0.297	158.8	0.105	0.848	0.795	0.205
	6 months	MDI	0.374	121.7	0.165	0.809	0.756	0.272
		PDI	0.332	149.0	0.154	0.853	0.809	0.216
Alcohol unexposed	Birth	MDI	0.094	106.3	0 <sup>1</sup>	0.707	0.673	0.128
		PDI	0.151	141.3	0 <sup>1</sup>	0.803	0.784	0.114
	6 months	MDI	0.094	106.3	0 <sup>1</sup>	0.709	0.668	0.134
		PDI	0.144	141.2	0 <sup>1</sup>	0.803	0.784	0.114

## Early Predictors of FASD in Ukraine

- Results

Alcohol exposed group by sex

-

Infant Sex	R <sup>2</sup> Continuous MDI	R <sup>2</sup> Continuous PDI
Female (n = 89)	0.319	0.325
Male (n = 98)	0.447	0.410

## Early Predictors of FASD in Ukraine

- Explained variation for continuous MDI (37%) and PDI (33%); AUC for dichotomous MDI (81%) and PDI (85%) at 6 months of age
- Prediction less robust among the alcohol unexposed infants
- Explained variance accounted for by growth measures alone in alcohol exposed group: continuous MDI (22%) and PDI (25%); AUC dichotomous MDI (71%) and PDI (78%)
- Sex differences noted in the alcohol exposed group with more robust prediction among boys

## Early Predictors of FASD in Ukraine

- Findings suggest individual prediction models may be feasible to use in clinical practice to assign risk scores for children prenatally exposed to alcohol who are at high risk of delay vs. less likely to be impaired as they develop
- Now adding preschool measures as outcomes and recasting the models
- Most of the relevant variables identified in this analysis are available in the CIFASD Phase II-III dataset of children with and without FASD (Aim 2.c)

## Early Predictors of FASD in Ukraine

- Extending this work to examine trajectories of alcohol exposure across gestation and explore relationships with growth and neurobehavioral outcomes
- Tableau data visualization platform supported by IU useful for this purpose



## Early Predictors of FASD in Ukraine

- Prenatal interviews that capture information on daily alcohol use covering 3 different time points were used to construct an alcohol exposure trajectory across gestation for 510 individual women
- Data visualization platform used to visualize relationships between cross-gestation alcohol trajectories vs. FASD, growth, neurobehavioral outcomes by
  - Type of alcohol
  - Hours spent consuming alcohol
  - Change in consumption and cumulative consumption over gestation
  - SES

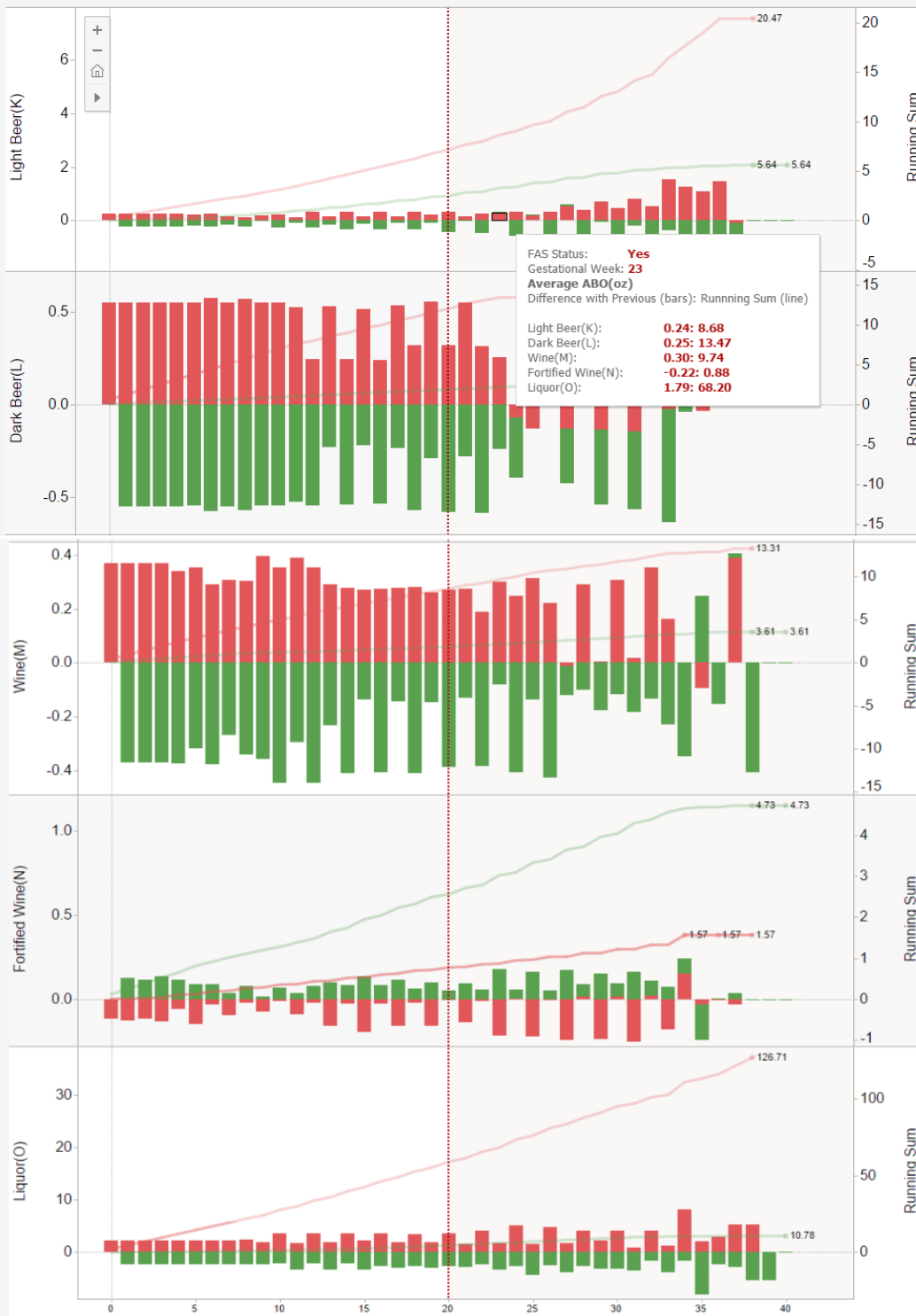




Depicted the trends of ABO (oz) of Light Beer (K), Dark Beer(L), Wine(M), Fortified Wine(N) and Liquor(O) for Gestational Week. The Dark Beer and Wine consumption was significantly reduced among the group with FAS Status in the 3rd trimester. At the same time the amount of Light Beer and Liquor was steadily increasing until the last five to two weeks of pregnancy when the consumption was halted

**Average ABO(oz) per Gestational Week**  
Value Difference with Previous Week (left axis) vs Running Sum (right axis)

Line depicts a running sum of the value. Number shows Max sum value per line  
Bars depict value difference with previous week



SES category  
(All)

NICU  
(All)

Vitamin Prenatal  
(All)

Vitamin Group  
(All)

ETOH Group  
(All)

Other Filters

Gender  
(All)

Click on the color to highlight selected status. Click on the white area to de-select

The largest ABO is attributed to Liquor. There is a drop in consumption of Dark Beer, and Wine by 34-35 week with increased ABO for Light Beer. Red group (FAS+) primarily consumes Liquor and Dark Beer, whereas Green group (FAS-) prefers Fortified Wine and Light Beer. Even though consumption of Liquor in the green group is high, the Running Sum of ABO by the end of pregnancy is 1.4 the amount of ABO in the red group



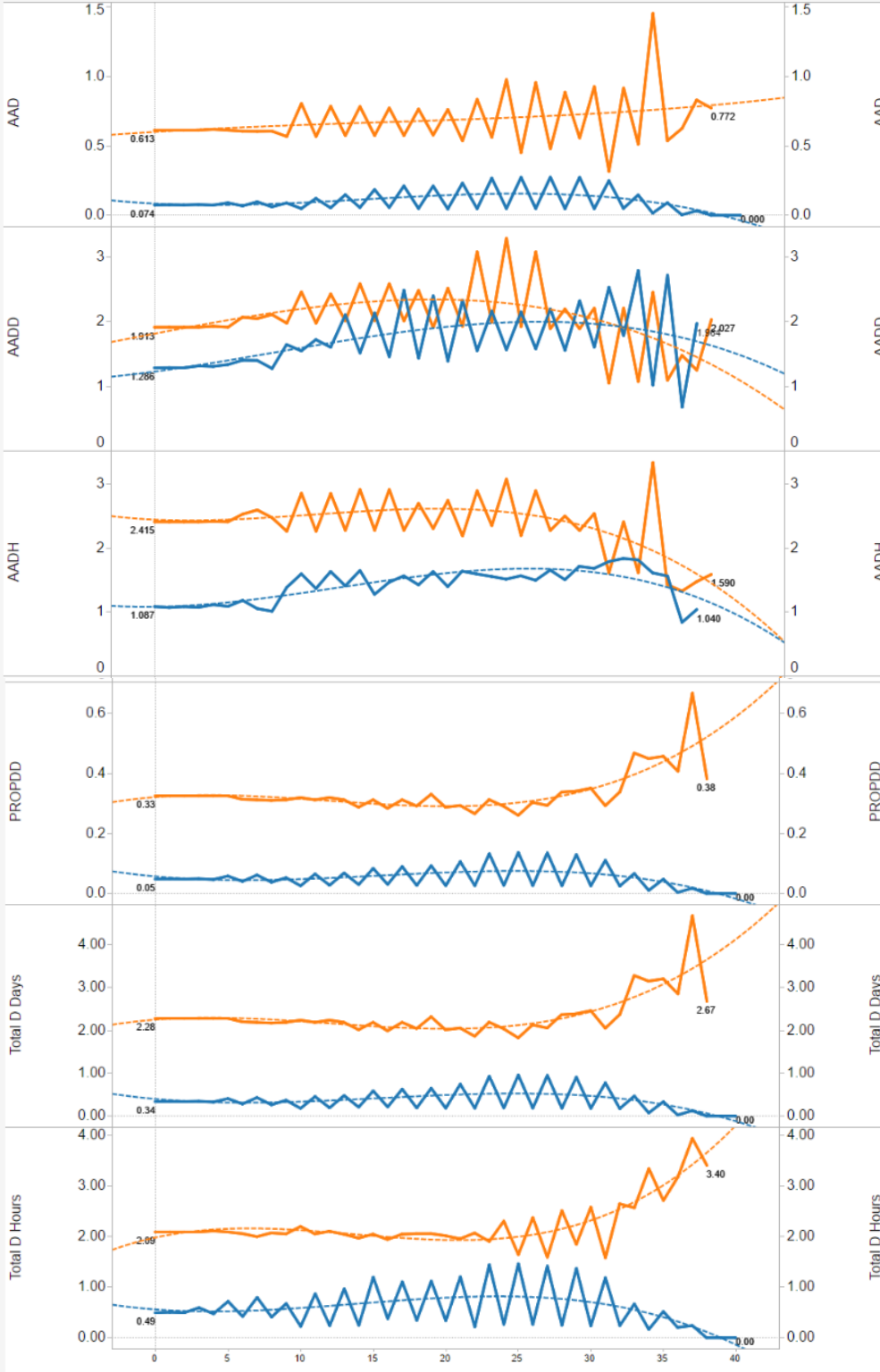
Select measure

PFL

SES category

(All)

Average of AAD total values in relation to <10% or >10% of child's PFL



AAD  
AADD  
AADH  
PROPPD  
Total D Days  
Total D Hours

(All)

(All)

(All)

(All)

(All)

Other Filters

(All)

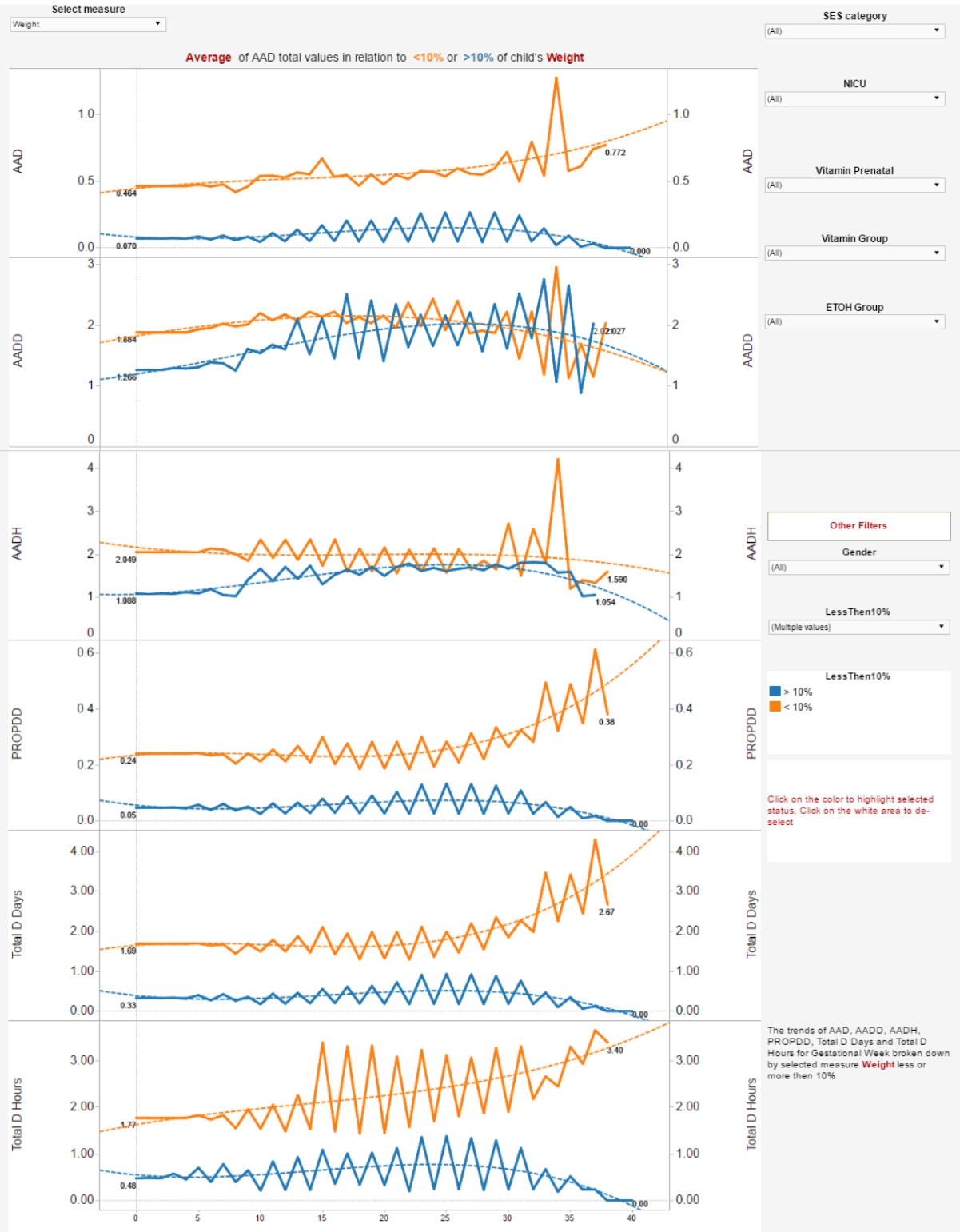
(Multiple values)

LessThen10%

- > 10%
- < 10%

Click on the color to highlight selected status. Click on the white area to de-select

The trends of AAD, AADD, AADH, PROPPD, Total D Days and Total D Hours for Gestational Week broken down by selected measure PFL less or more than 10%



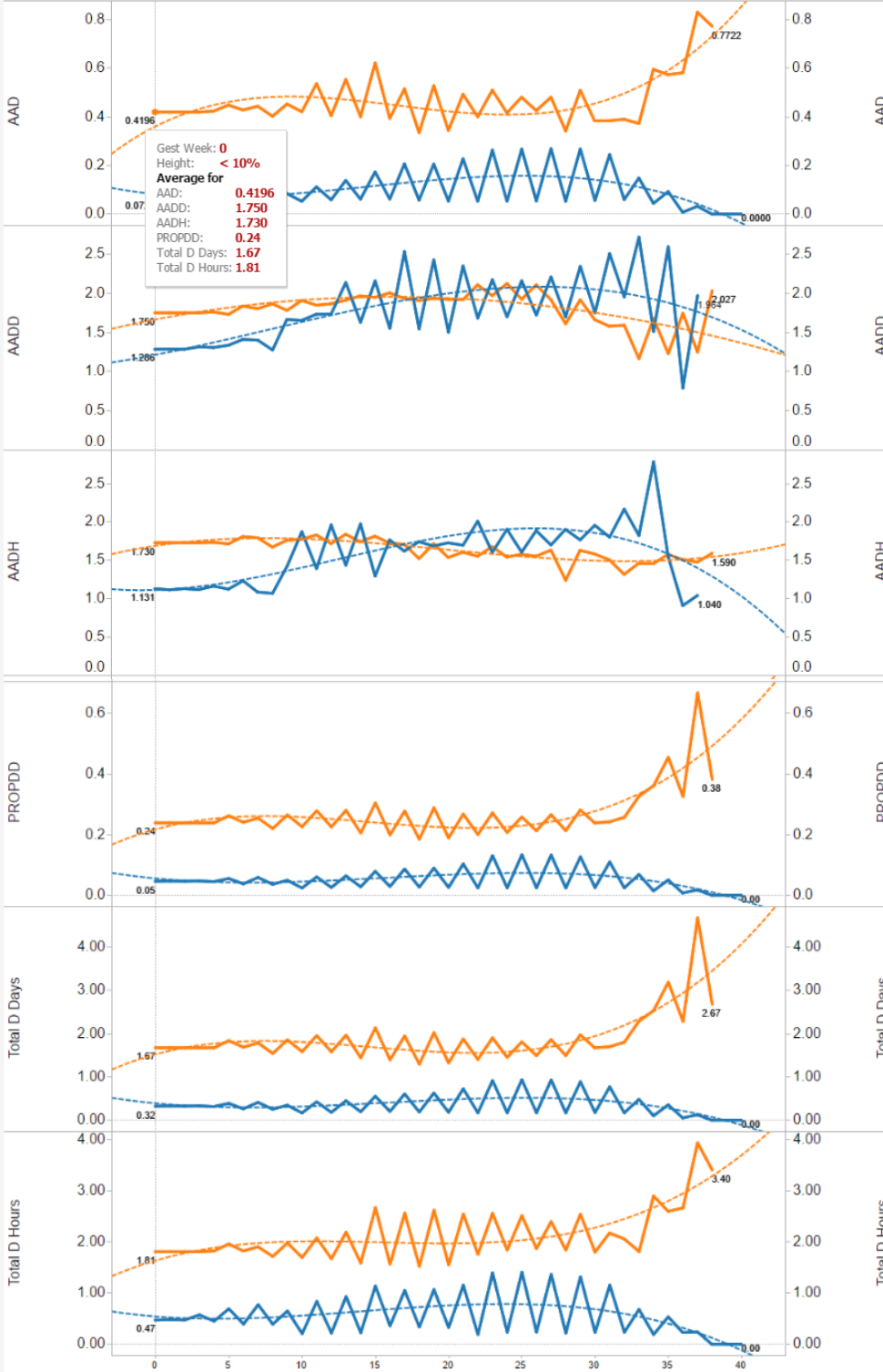
Select measure

Height

SES category

(All)

Average of AAD total values in relation to <10% or >10% of child's Height



AAD

AADD

AADH

PROPPD

Total D Days

Total D Hours

NICU

(All)

Vitamin Prenatal

(All)

Vitamin Group

(All)

ETOH Group

(All)

Other Filters

Gender

(All)

LessThan10%

(Multiple values)

LessThan10%

> 10%

< 10%

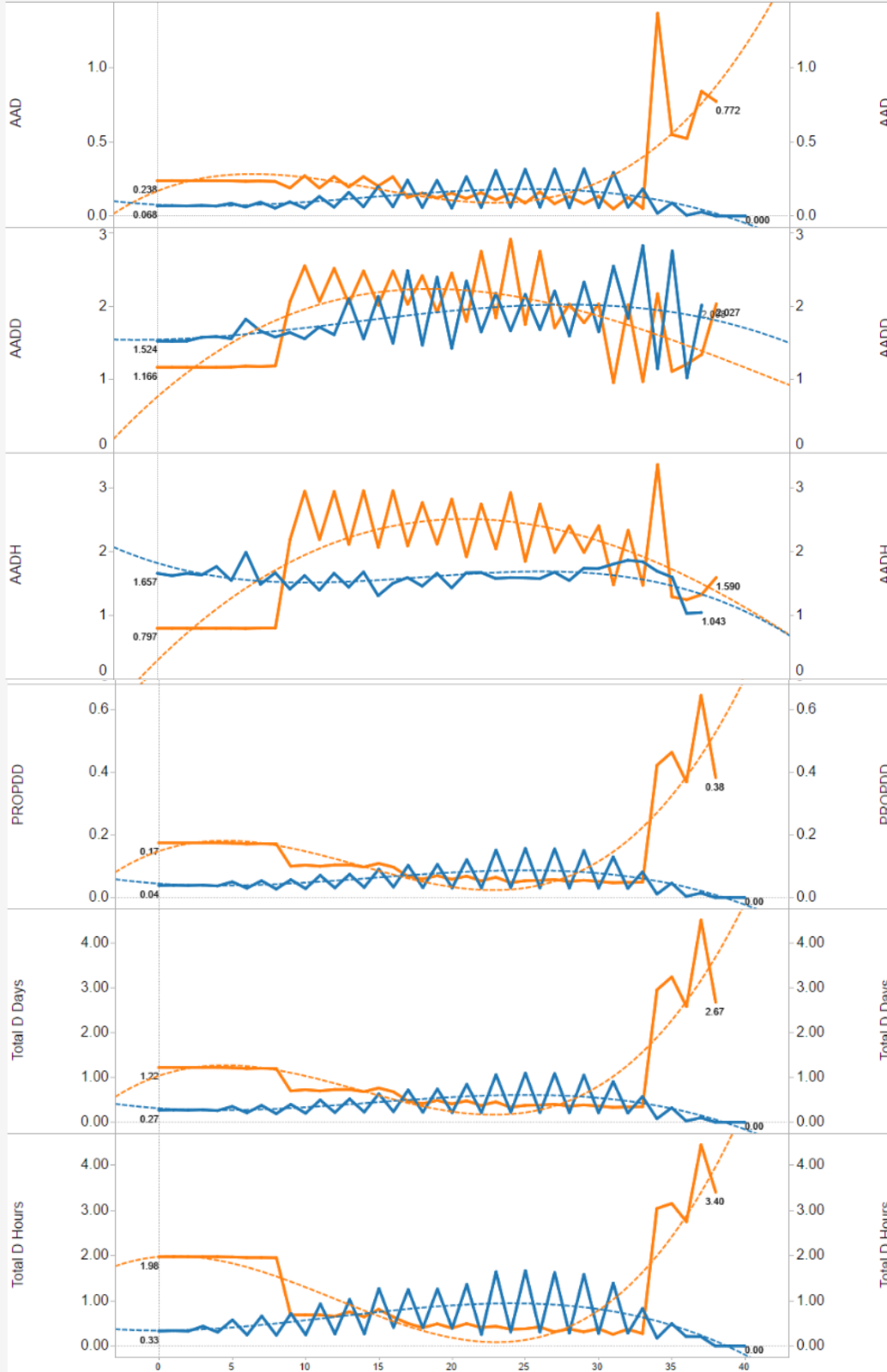
Click on the color to highlight selected status. Click on the white area to de-select

The trends of AAD, AADD, AADH, PROPPD, Total D Days and Total D Hours for Gestational Week broken down by selected measure Height less or more than 10%

Select measure

SES category

Average of AAD total values in relation to <10% or >10% of child's OFC



NICU

Vitamin Prenatal

Vitamin Group

ETOH Group

Other Filters

Gender

LessThen10%

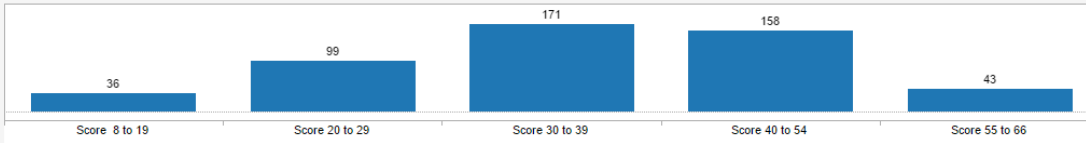
LessThen10%  
 > 10%  
 < 10%

Click on the color to highlight selected status. Click on the white area to de-select

The trends of AAD, AADD, AADH, PROPPDD, Total D Days and Total D Hours for Gestational Week broken down by selected measure OFC less or more then 10%

(Multiple values)

Number of records per SES Category



Average for various Preschool Neuro values subdivided by FAS status and SES categories (colored table) and MDI vs PDI (area table)

	SES category / FAS Status									
	Score 8 to 19		Score 20 to 29		Score 30 to 39		Score 40 to 54		Score 55 to 66	
	No	Yes	No	Yes	No	Yes	No	Yes	No	
EC %	67.54	51.28	35.14	44.98	51.74	86.88	62.21	73.13	62.76	
EMI %	70.96	69.81	77.45	39.40	65.80	93.95	75.58	76.34	76.49	
FI %	79.22	51.02	63.88	44.50	55.43	82.39	50.33	78.07	67.59	
Inhibit %	95.25	54.68	32.50	22.59	59.57	72.42	73.23	54.16	67.45	
ISCI %	94.49	52.92	34.78	31.56	57.96	83.07	71.74	65.74	67.96	
PO %	71.72	52.04	65.70	30.36	54.42	94.11	58.70	64.97	64.10	
WM %	62.08	74.09	79.90	41.40	69.60	91.57	80.02	80.04	76.92	
Picture Similarities %	35.94	4.96	51.41	0.20	42.33	26.84	41.55	50.07	50.04	
Pattern Construction %	30.60	18.88	71.30	5.00	64.33	34.76	68.68	58.24	77.05	

NICU

(All)

Vitamin Prenatal

(All)

Vitamin Group

(All)

ETOH Group

(All)

Other Filters

Gender

(All)