QSEP Research Update

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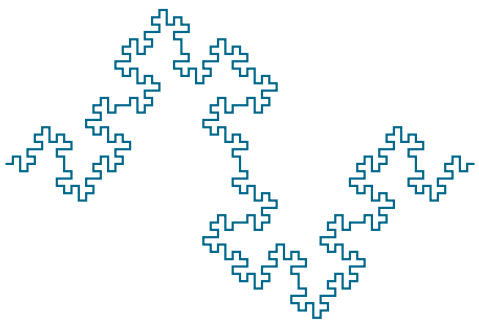
Savvy Sherpa



August 14, 2018

Research Questions

Original

- Can we identify a dataset containing the pediatric illness populations of interest and their immediate family members?
- Can we quantify the outcomes of interest and their relationship to the hypothesized mediating factors?
- Do we see any significant secondary effects of pediatric illness on family members, in comparison to a sensibly-defined control group?

Updated

- Do we see a difference in adult family member spending before and after a child is diagnosed?

Number of children under 16 with each condition, enrolled for more than 3 months, and for whom we have at least one month of spend data before diagnosis.

- Total sick children under 16: 136,791
- Unique Families: 122,588
- Asthma: 87,872
- Autism (ASD): 8,732
- Cancer: 27,466
- Cerebral Palsy: 1,440
- Type 1 Diabetes (T1D): 1,434
- Traumatic Event: 22,313
- Multiple Conditions: 11,756

Data Cleaning

- To identify parents/guardians in the household used the criteria:
  - Same household as sick child
  - Older than 15
  - At least 15 years older than the sick child
  - No more than 60 years older than the sick child
  - Within 15 years of the age of the oldest member of the household
- Use months within 9 months of child's diagnosis.
- Only include adult family members with at least 2 months of claims before diagnosis and 2 months after, including month of diagnosis.

Models

- Goal: model monthly spend per adult family member before and after diagnosis.
- Approach: Use a hierarchical model
  1. Model the probability that monthly spend is non-zero using logistic regression on confounders and indicator of after diagnosis.
  2. Conditioned on the fact that spend is non-zero model the total spend using lognormal regression on confounders and indicator of after diagnosis.
- Models were fit separately by gender of adult.
- Predictions are calculated as the predicted probability of non-zero spend multiplied by the predicted spend given that spend is non-zero.
- Determine confidence intervals for predictions by bootstrapping (re-sample members with replacement and re-calculate predictions)

Confounders

- RAF categories: 0, 0.5, 1, 2.5, 5, 10, 200
- Income categories: 0, 50, 100, 150, 260 (thousands)
- Plan Type: Gated HMO, Choice Plus, Select Plus, Choice, Other
- Indicator of only one adult on the plan that meets the above criteria
- Number of children on plan: 1, 2-4, 5+
- Indicator of multiple sick children
- Age category of youngest child: Infant, Child, Teenager
- Months Enrolled
- Time (natural spline)
- Adult age (natural spline)

Predicted difference in mean monthly spend before and after diagnosis ($)

Averaged across all confounders.

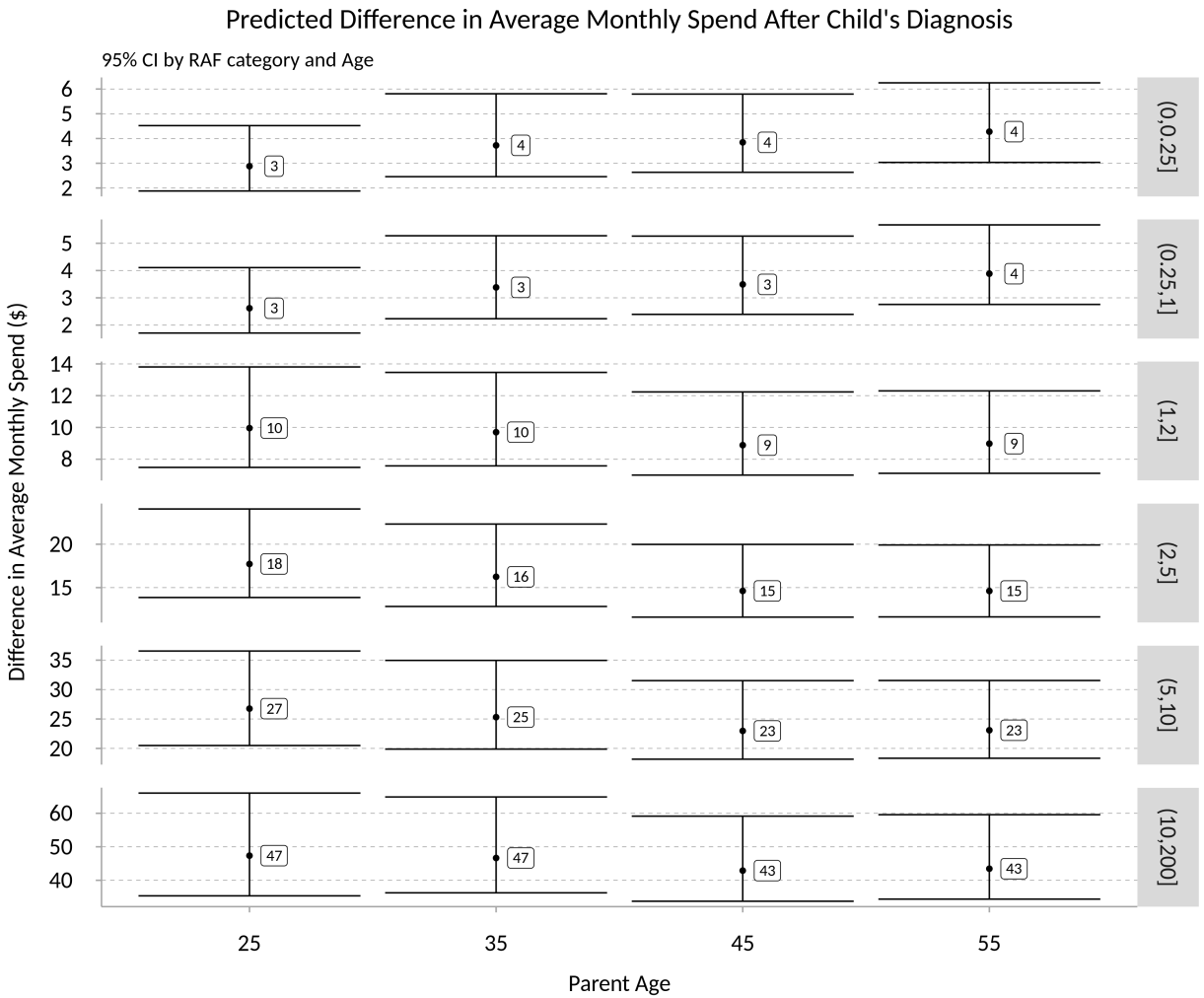
		Gender	LB	Mean	UB
1	T1D	female	−326.60	−148.02	−75.96
2	T1D	female	−121.33	−55.46	−28.14
3	T1D	female	−118.95	−54.04	−27.56
4	Trauma	female	−98.66	−67.82	−51.36
5	T1D	female	−75.50	−34.38	−17.45
6	Trauma	female	−64.05	−44.00	−33.30
7	Trauma	female	−41.84	−28.61	−21.58
8	Cancer	female	−33.51	−19.00	−10.32
9	Trauma	female	−29.13	−19.92	−15.03
10	T1D	female	−23.83	−10.77	−4.60
11	T1D	male	−22.71	10.19	63.42
12	Cancer	female	−21.74	−12.25	−6.58
13	Trauma	female	−20.46	−12.93	−8.59

Factor Increase in odds of depression

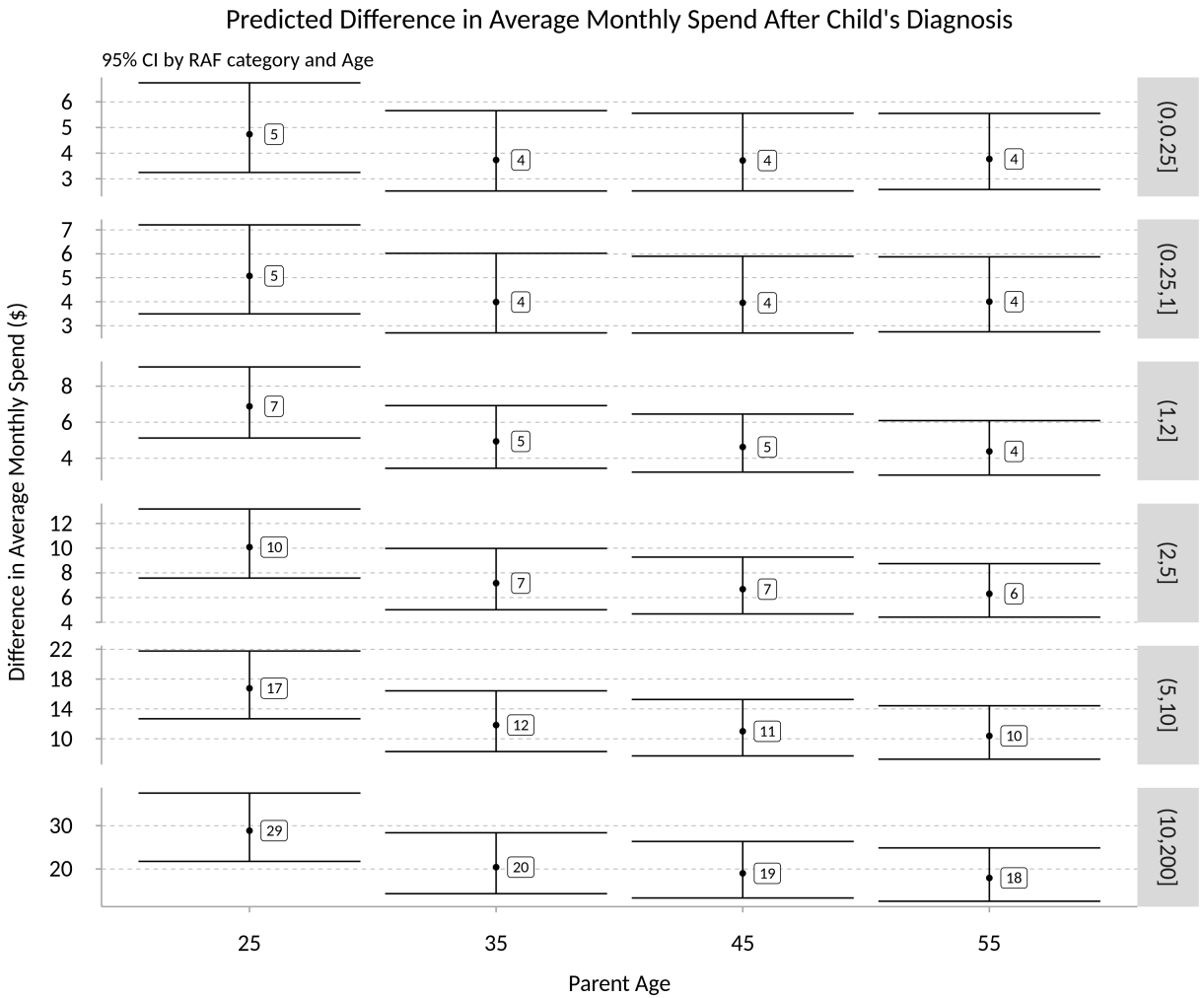
95% confidence intervals

	Condition	Gender	LB	estimate	UB
1	Cerebral	male	0.73	0.88	1.07
2	T1D	male	0.76	0.98	1.26
3	Trauma	male	0.91	0.95	0.98
4	ASD	male	0.94	1.00	1.07
5	T1D	female	0.94	1.11	1.31
6	CA	male	0.99	1.03	1.07
7	ASD	female	1.01	1.06	1.11
8	Asthma	male	1.01	1.04	1.07
9	Asthma	female	1.03	1.05	1.07
10	Trauma	female	1.04	1.07	1.10
11	CA	female	1.05	1.08	1.11
12	Cerebral	female	1.10	1.26	1.45

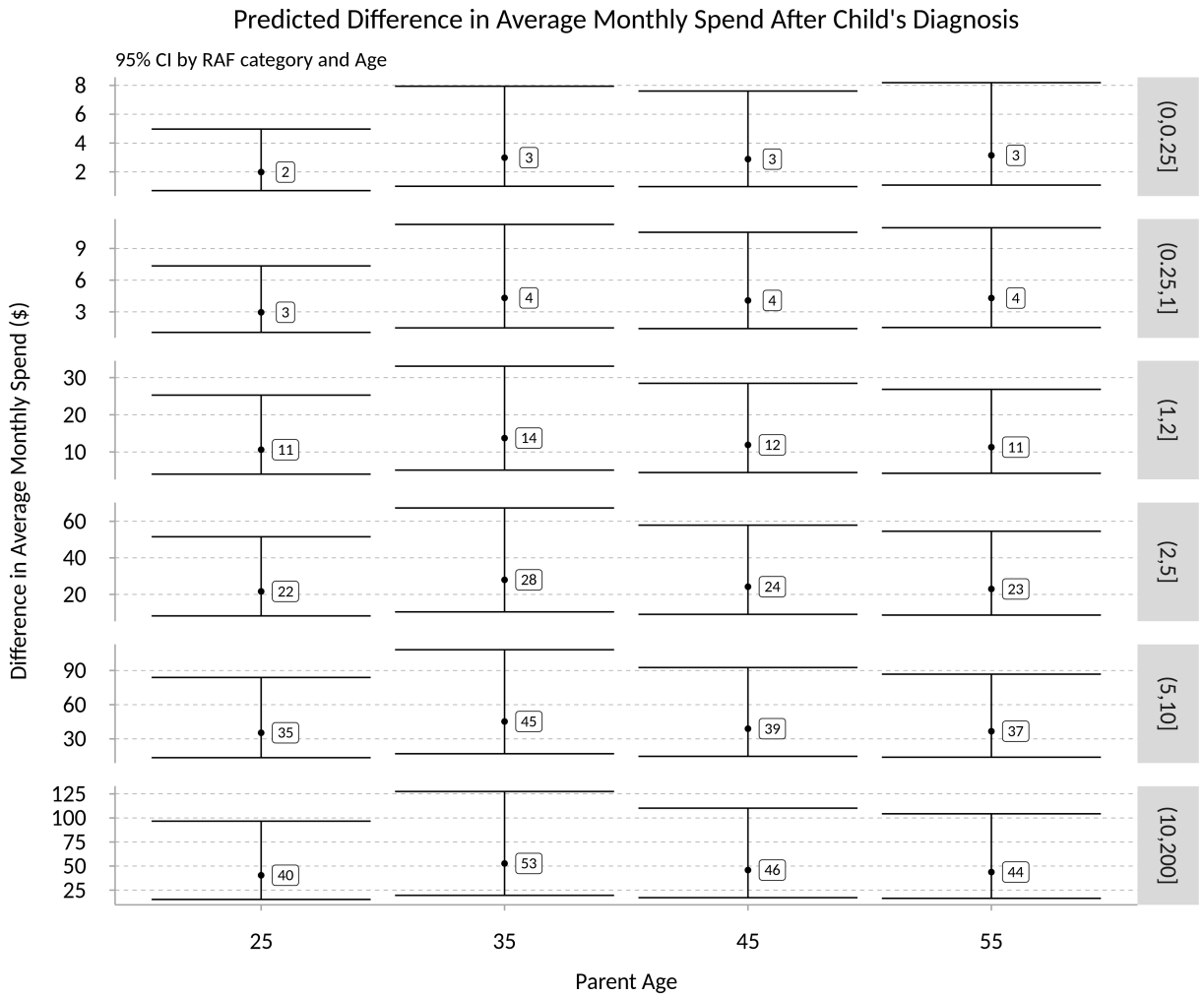
ASD effect on men's spending



ASD EFFECT ON WOMEN'S SPENDING



CEREBRAL PALSY EFFECT ON MEN'S SPENDING



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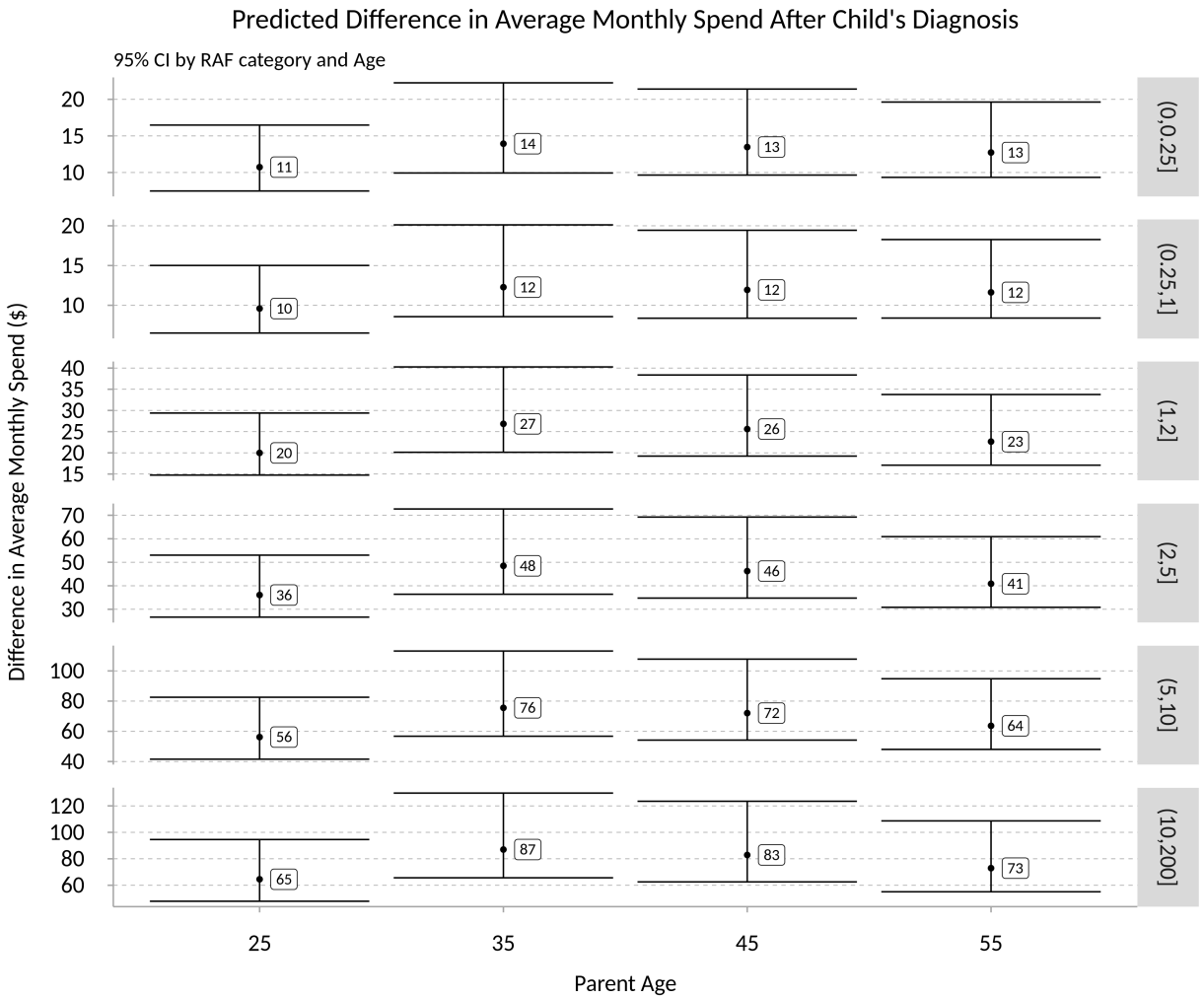
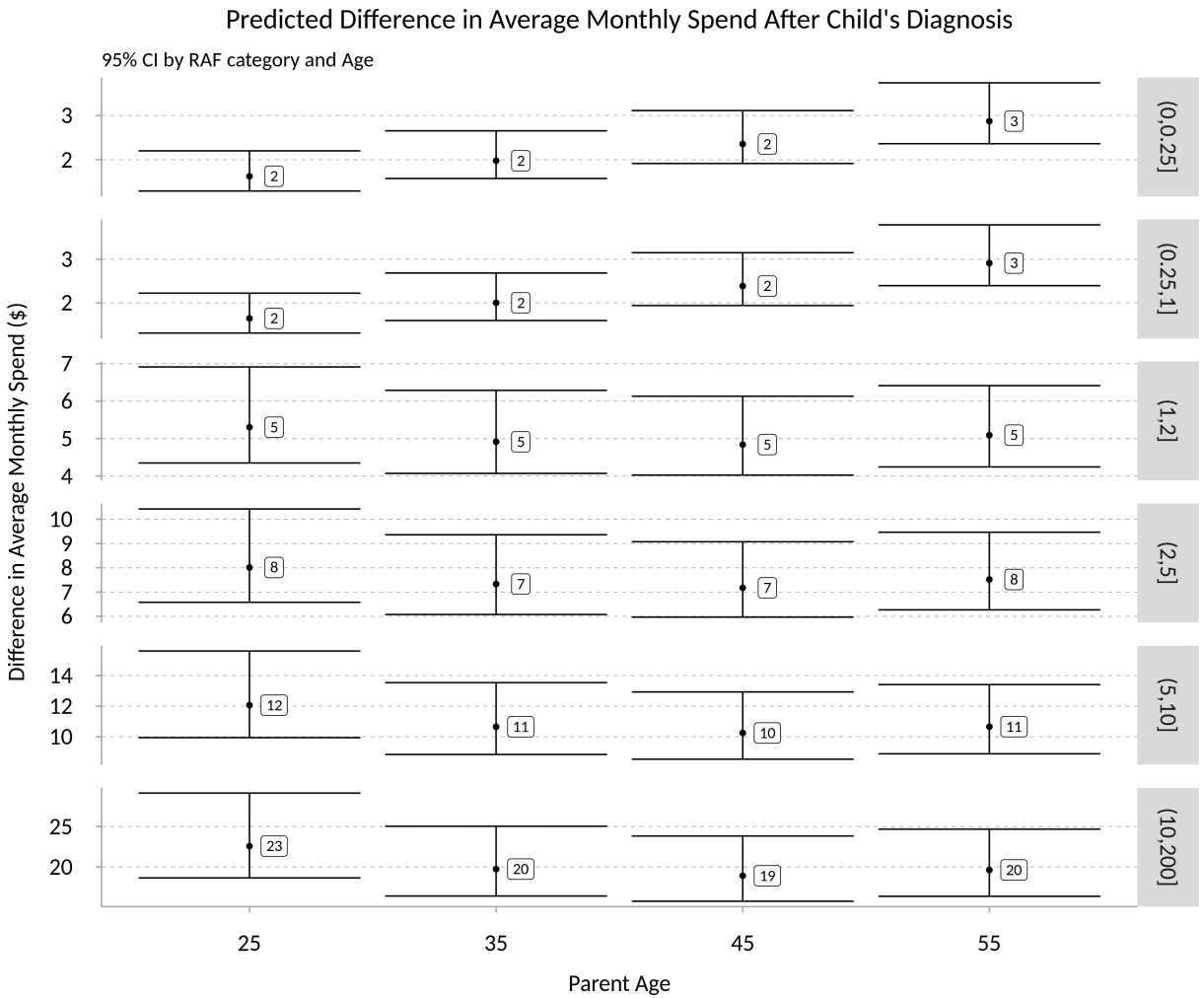


CANCER EFFECT ON MEN'S SPENDING



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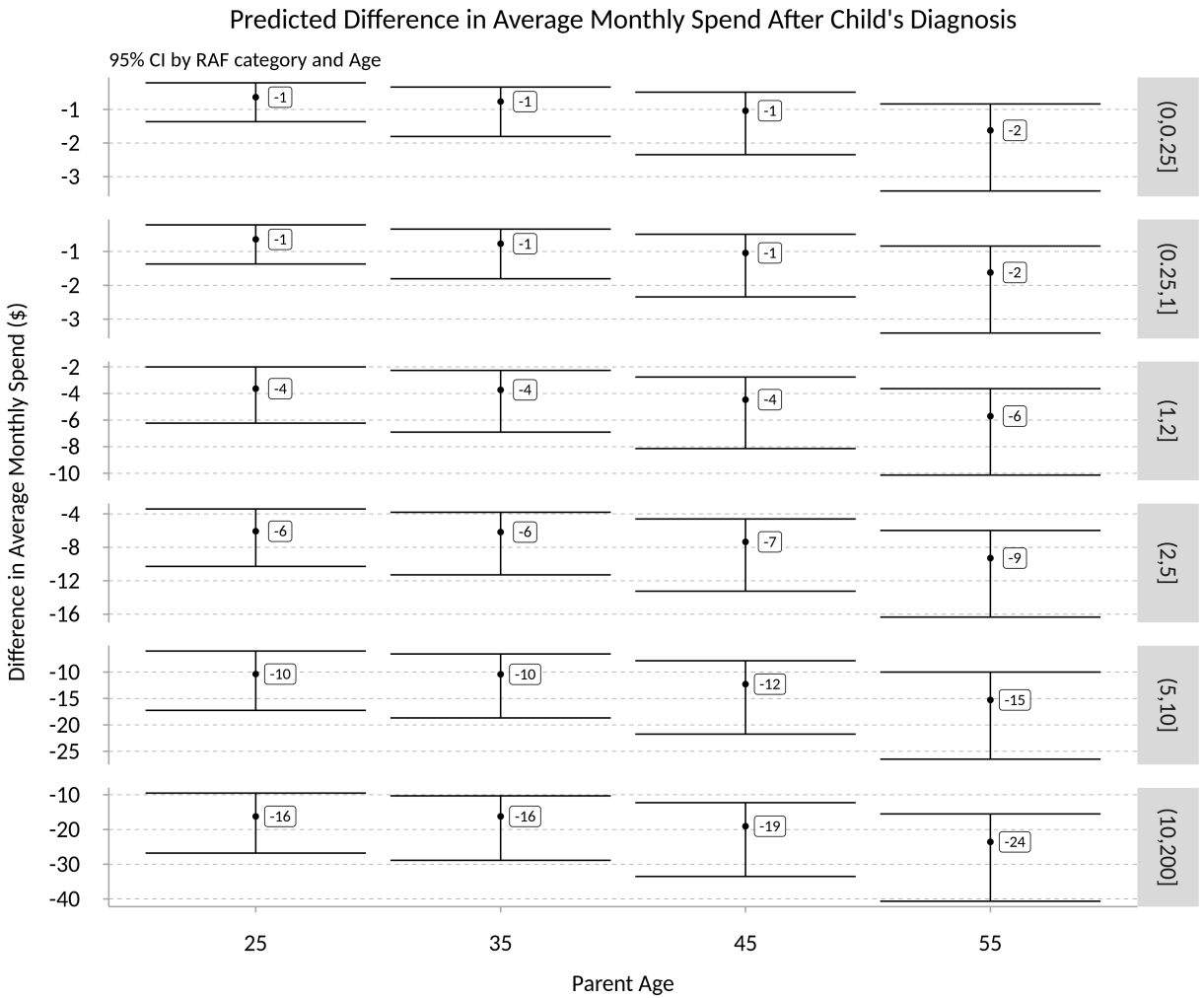
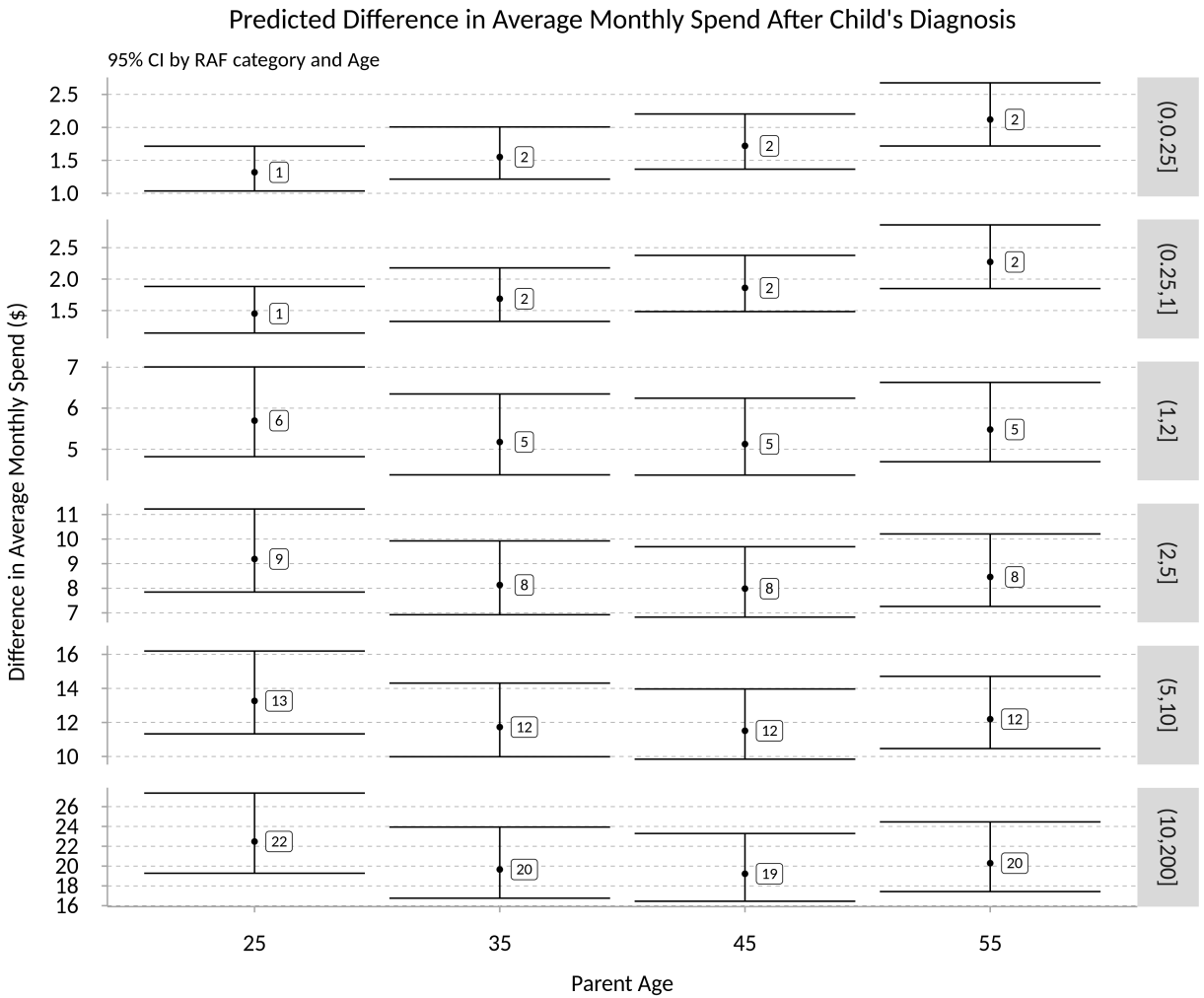


TRAUMA EFFECT ON MEN'S SPENDING



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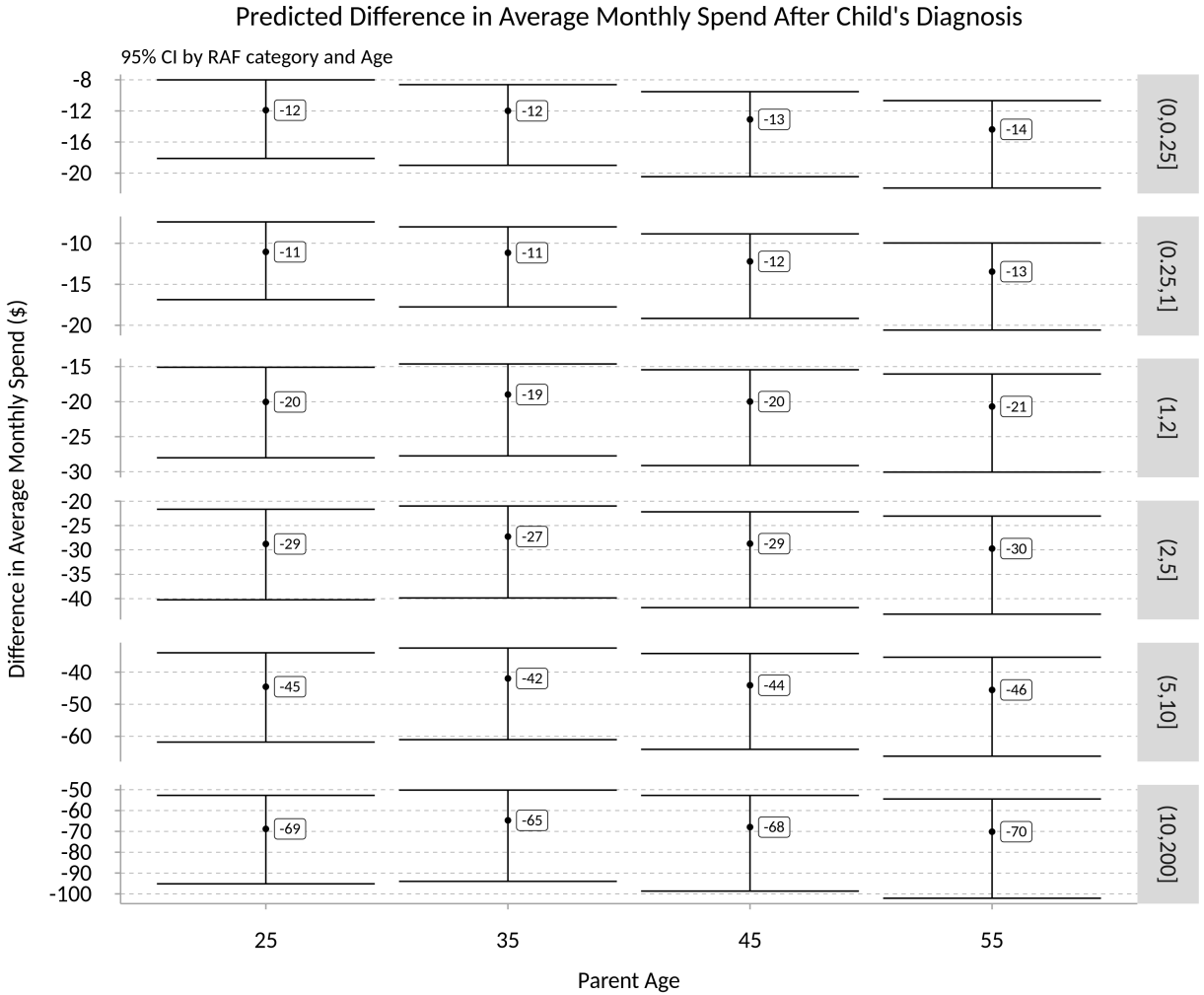
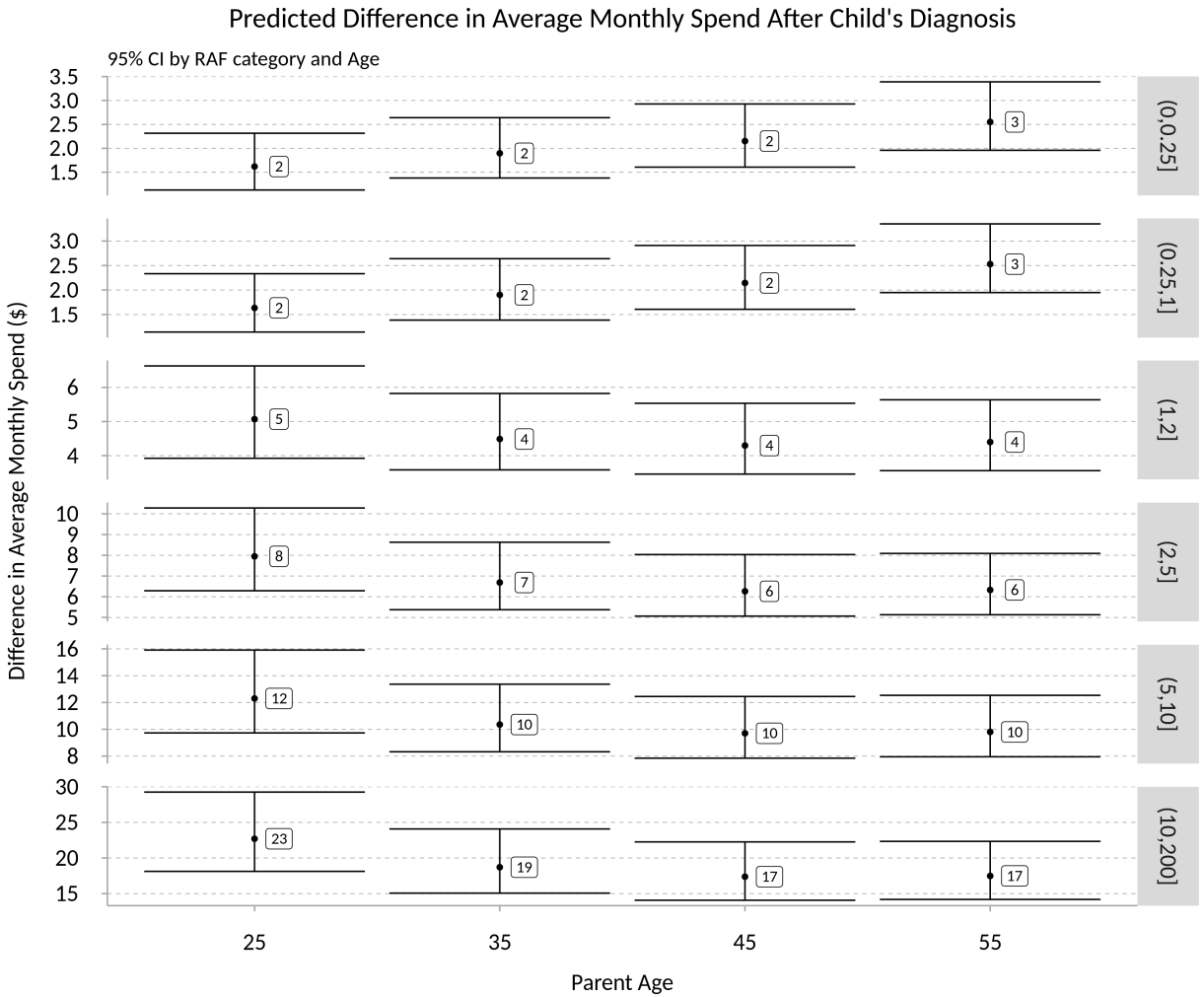


ASTHMA EFFECT ON MEN'S SPENDING



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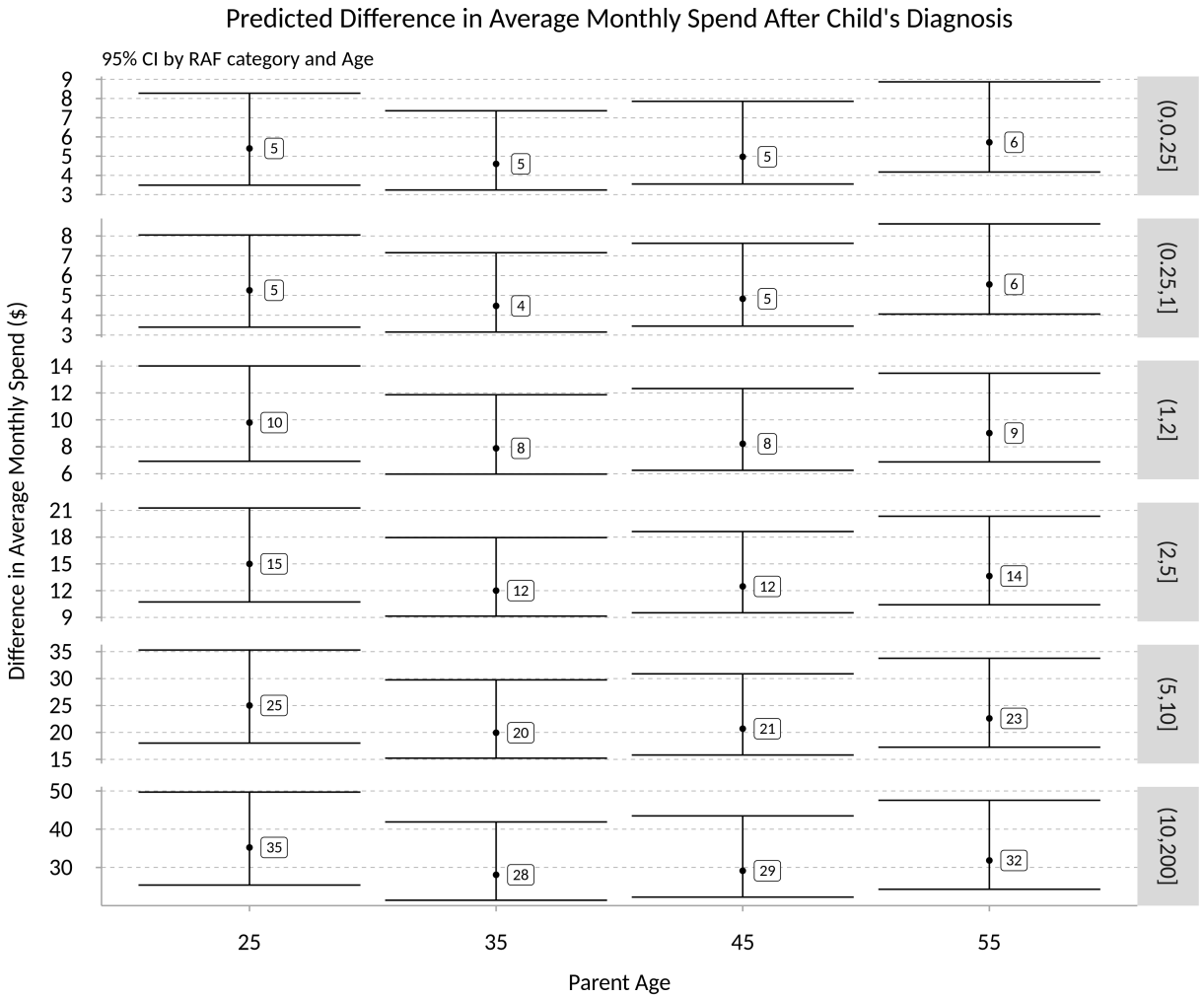
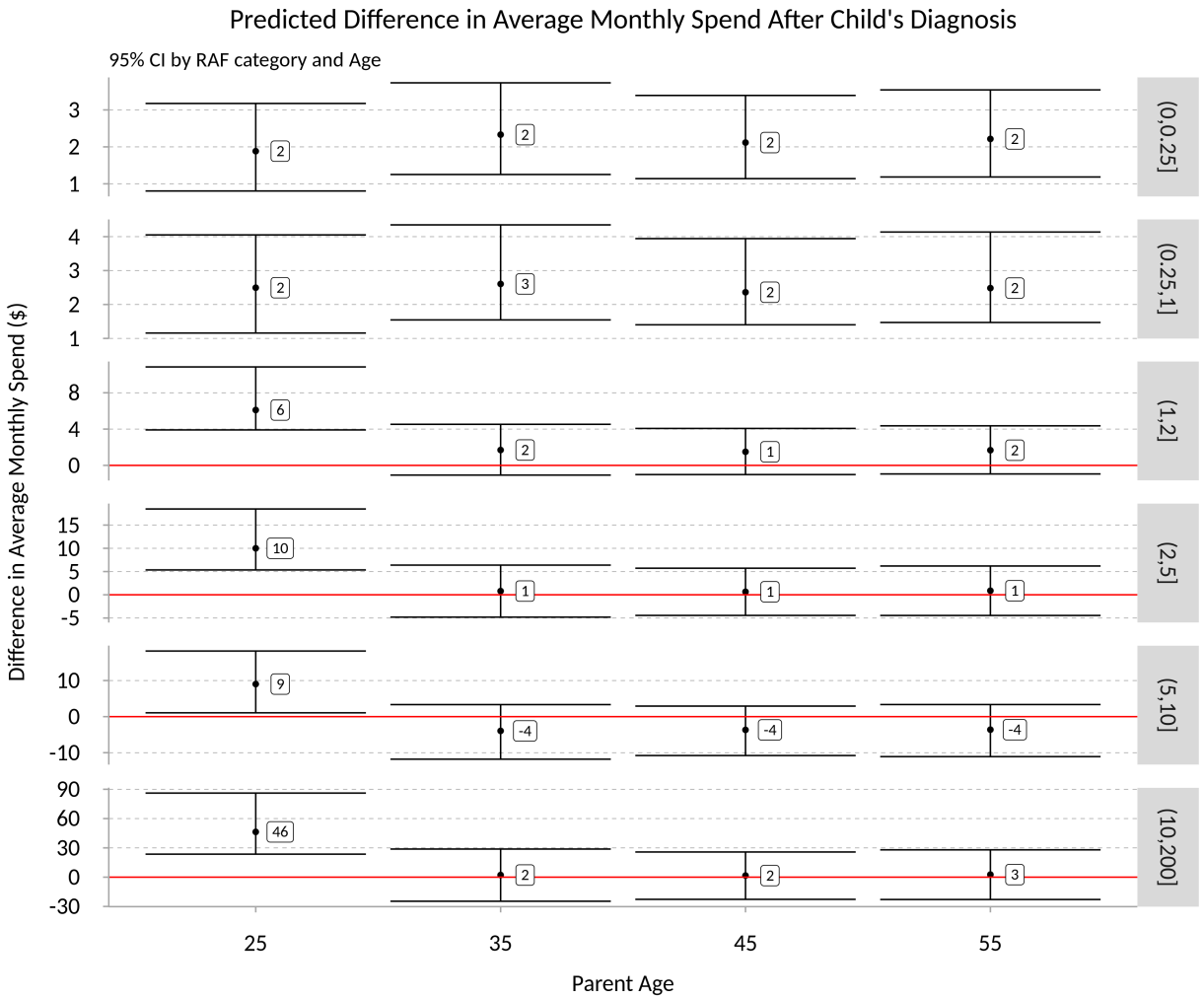


T1D EFFECT ON MEN'S SPENDING



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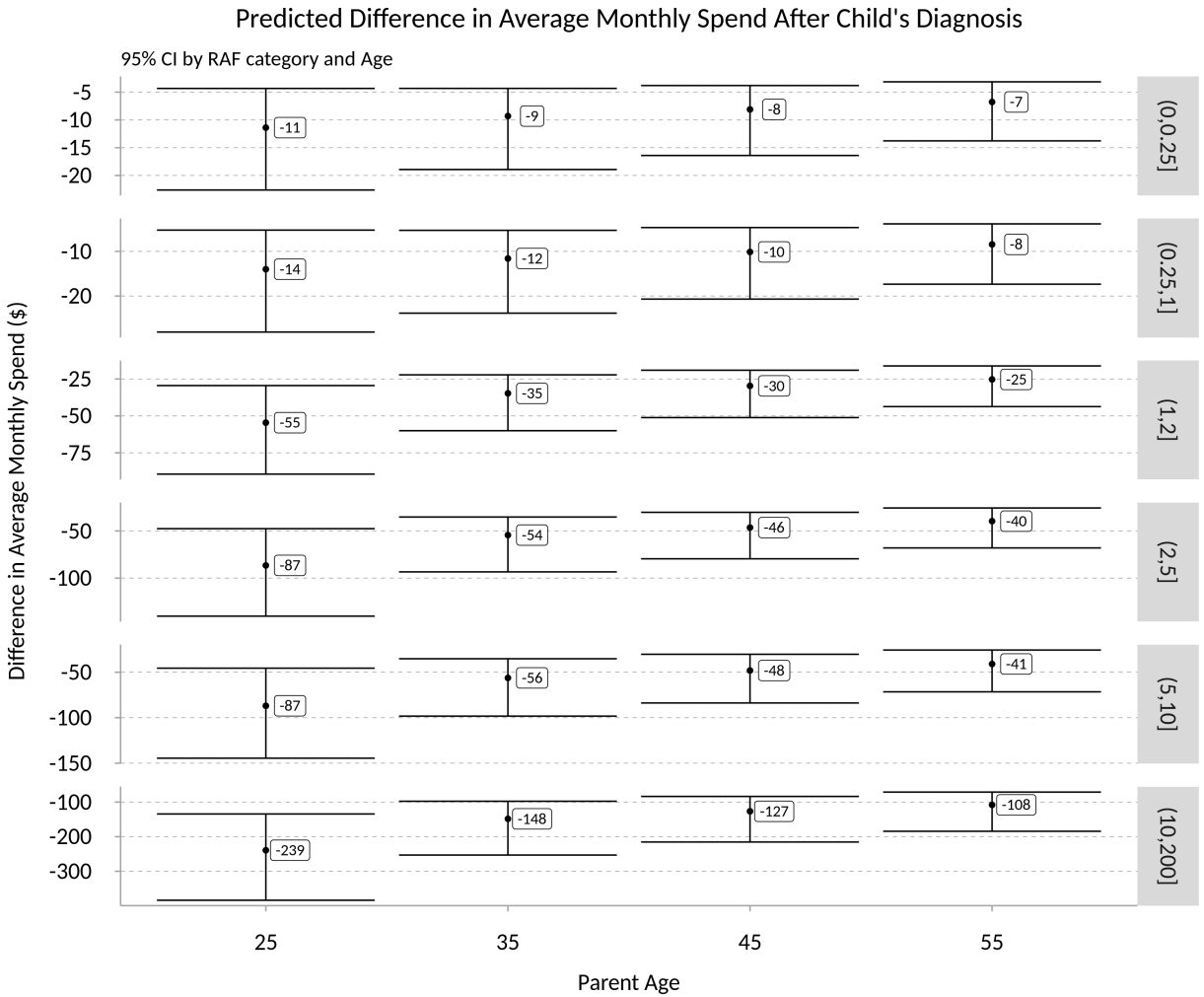
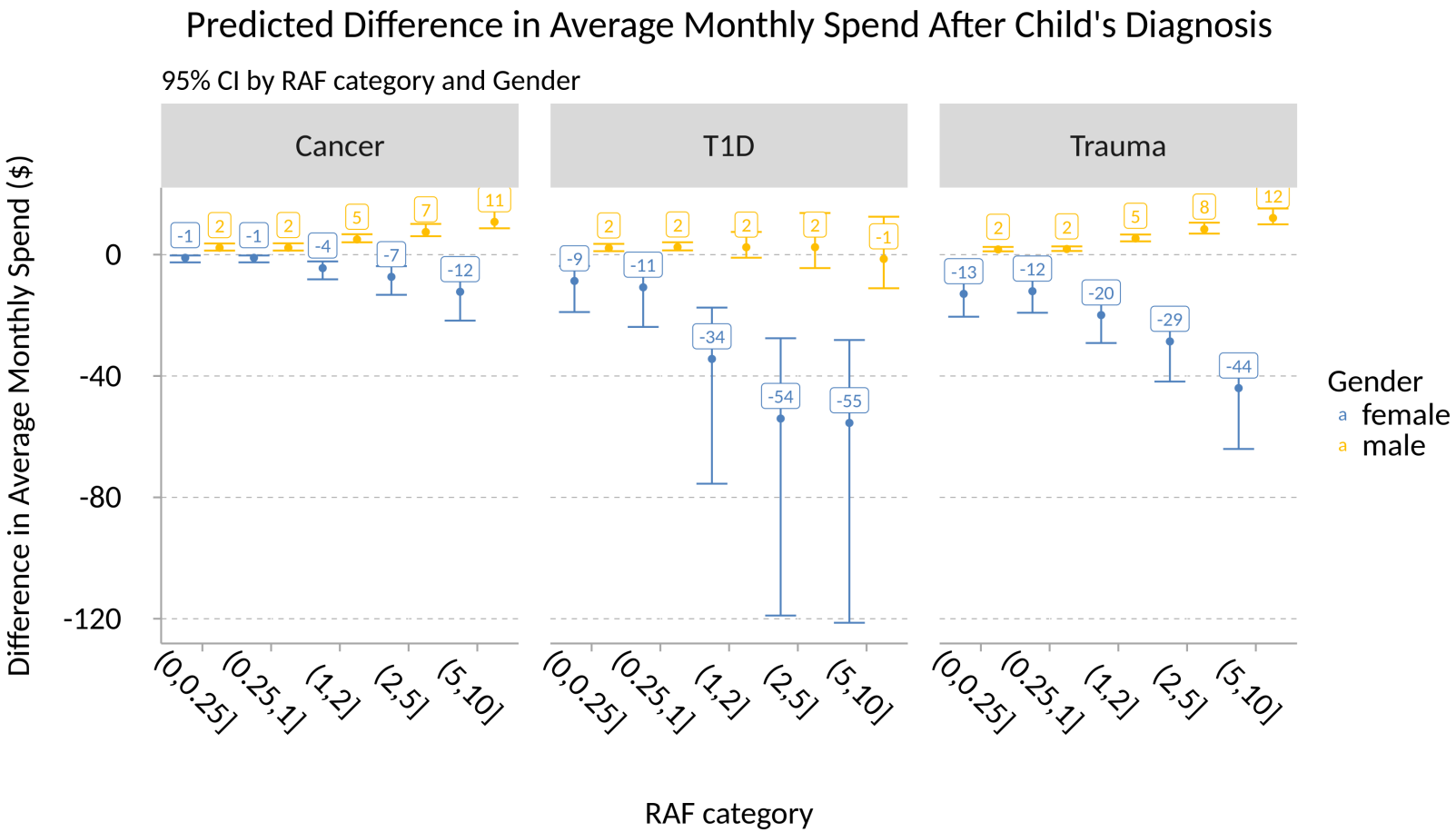
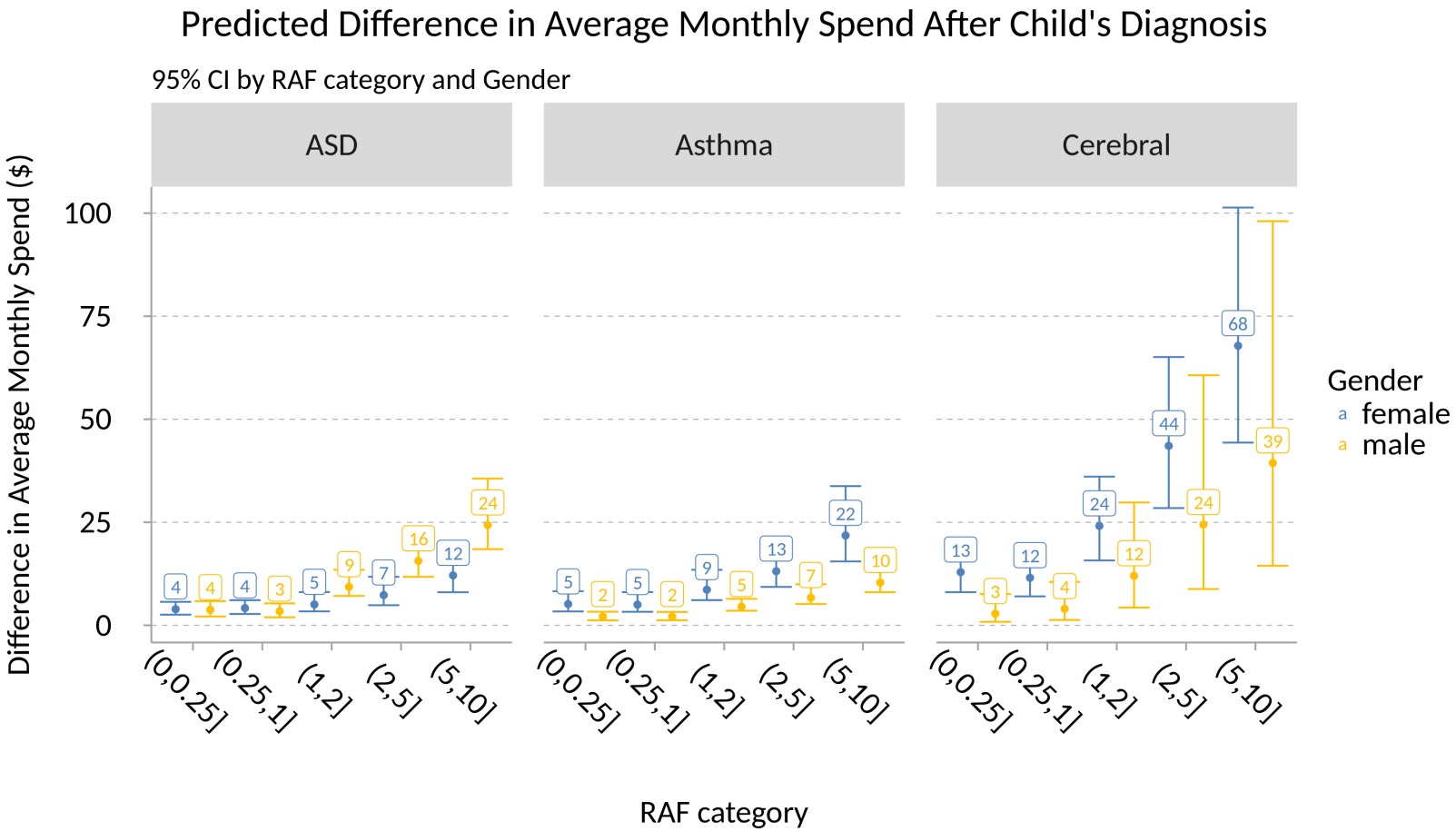


T1D EFFECT ON WOMEN'S SPENDING




Predicted Difference in Average Monthly Spend After Child's Diagnosis
95% CI by RAF category and Gender
ASD
Asthma
Cerebral
Difference in Average Monthly Spend ($)
100
75
50
25
0
4 4 4 3 5 9 7 16 12 24
5 2 5 2 9 5 13 7 22 10
13 3 12 4 24 12 44 24 68 39
(0,0.25]
(0.25,1]
(1,2]
(2,5]
(5,10]
RAF category
Gender
female
male