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Introduction

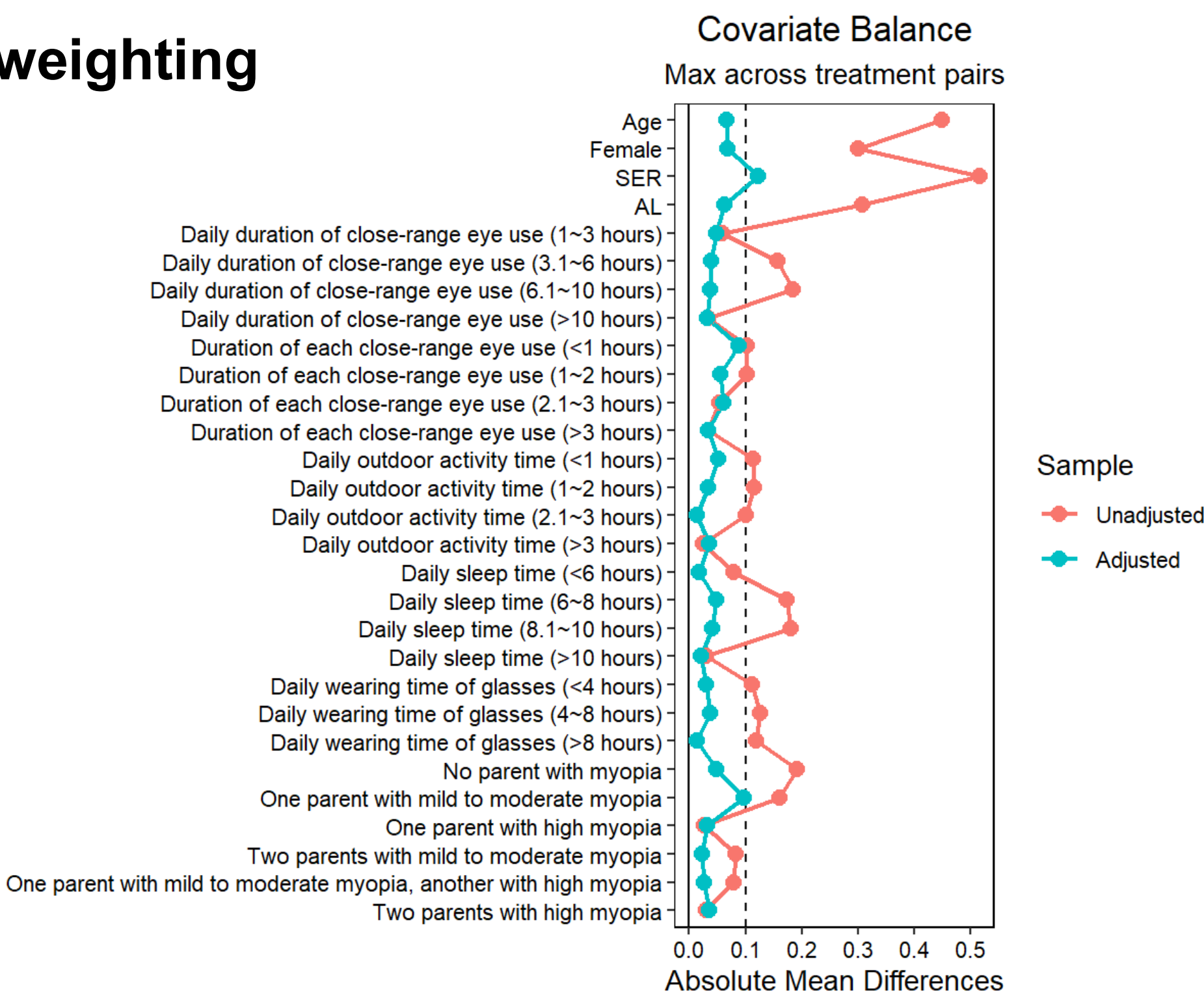
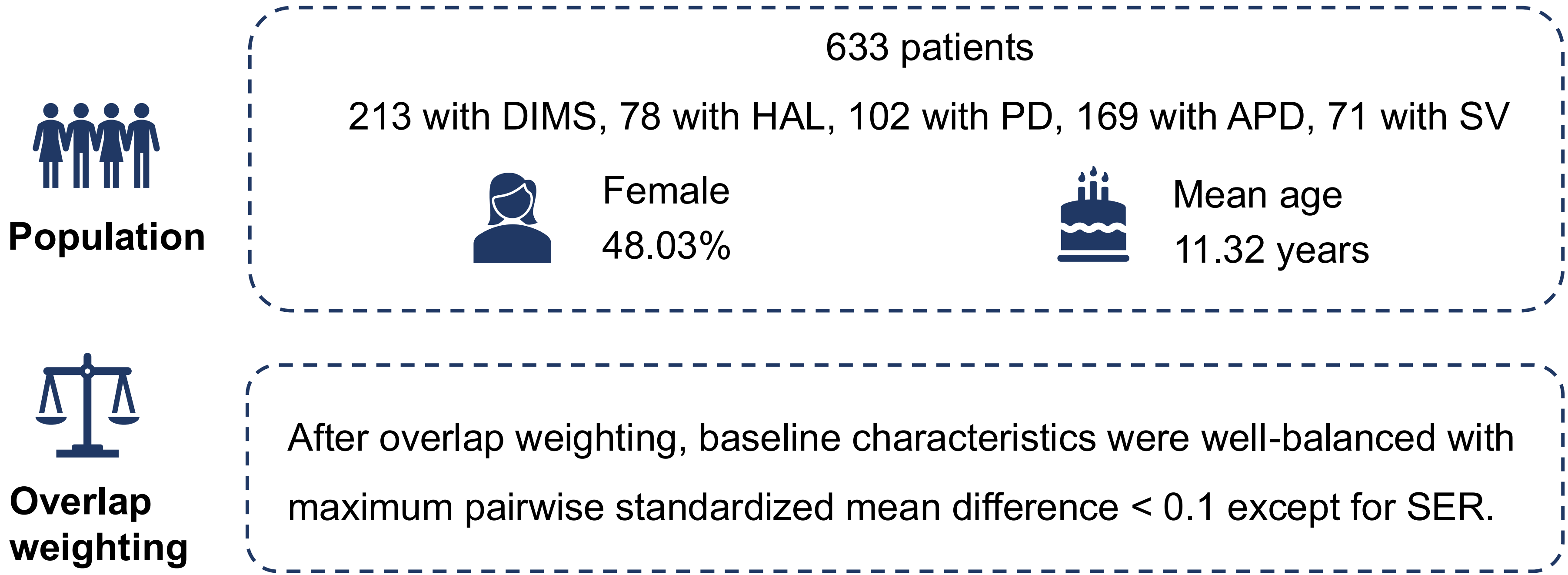
- Background**
The defocus spectacle lenses most commonly used for myopia control: Defocus Incorporated Multiple Segments (DIMS) Highly Aspherical Lenslets (HAL)
 - Objective**
To determine whether the impact of defocus spectacle lenses varies according to myopia severity.
- Research gap**
While previous research has established a connection between defocus spectacle lenses and myopia progression, the moderating role of myopia severity remains largely unexplored.

Methods

- We conducted a retrospective cohort analysis of electronic health records from the Tianjin Eye Hospital between March 2023 to September 2024.
- Myopia patients with treatment records for defocus and single-vision (SV) spectacle lenses were included.
- Changes in spherical equivalent refraction (SER) and axial length (AL) from baseline to 12-month follow-up were adopted to assess the myopia progression.
- Overlap weighting was applied to adjust for potential confounders. Moderation analyses tested whether the effect of defocus spectacle lenses differed according to baseline SER.

Results

- Baseline demographics and characteristics of patients with myopia before and after overlap weighting**



Defocus incorporated multiple segments (DIMS) and highly aspherical lenslets (HAL) were more effective in slowing myopia progression compared with SV.

- The effect of defocus spectacle lenses on SER and AL**

	Unweighted			Weighted		
	Estimate difference	Standard Error	Adjusted P value	Estimate difference	Standard Error	Adjusted P value
			SER			
DIMS vs SV	0.33	0.06	< 0.001	0.28	0.05	< 0.001
HAL vs SV	0.44	0.07	< 0.001	0.41	0.06	< 0.001
			AL			
DIMS vs SV	-0.13	0.03	< 0.001	-0.14	0.03	< 0.001
HAL vs SV	-0.19	0.04	< 0.001	-0.22	0.03	< 0.001

The effect was significant for patients with low myopia. However, for patients with high myopia, the relationship between defocus spectacle lenses and myopia progression was not significant. Among patients with moderate myopia, only HAL remained significantly effective in slowing AL progression compared with SV.

- The effect of defocus spectacle lenses on SER with baseline myopia severity as a moderator**

	Low myopia (-3.00D < SER ≤ 0D)			Moderate myopia (-6.00D < SER ≤ -3.00D)			High myopia (SER ≤ -6.00D)		
	Estimate difference	Standard Error	Adjusted P value	Estimate difference	Standard Error	Adjusted P value	Estimate difference	Standard Error	Adjusted P value
DIMS vs SV	0.35	0.09	0.001	0.18	0.09	0.42	0.20	0.19	1
HAL vs SV	0.50	0.11	< 0.001	0.30	0.11	0.05	-0.01	0.19	1

- The effect of defocus spectacle lenses on AL with baseline myopia severity as a moderator**

	Low myopia (-3.00D < SER ≤ 0D)			Moderate myopia (-6.00D < SER ≤ -3.00D)			High myopia (SER ≤ -6.00D)		
	Estimate difference	Standard Error	Adjusted P value	Estimate difference	Standard Error	Adjusted P value	Estimate difference	Standard Error	Adjusted P value
DIMS vs SV	-0.16	0.05	0.004	-0.12	0.05	0.13	0.00	0.05	1
HAL vs SV	-0.24	0.05	< 0.001	-0.20	0.04	< 0.001	-0.06	0.04	1

Conclusions

The study identified baseline myopia severity as a significant moderator in the relationship between defocus spectacle lenses and myopia progression. These findings support prioritizing defocus lenses for low-to-moderate myopia, as baseline refraction guides optimal outcomes.