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# Risk factors for longitudinal biometric and refractive change in Australian schoolchildren

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## Abstract

**Purpose :** To investigate longitudinal change in biometry and refraction and examine the impact of risk factors in Australian schoolchildren.

**Methods :** The Sydney Adolescent Vascular and Eye Study (SAVES) followed up participants from the Sydney Myopia Study (SMS), a population-based random cluster sample of 55 schools in Sydney. Children at baseline were in two age cohorts; 6 years (n=1765) and 12 years (n=2353) and were followed up 5-6 years after the initial examination (follow up 51%). Children underwent a comprehensive ocular examination which included; cycloplegic autorefractometry (cyclopentolate 1%, Canon RK-F1) and ocular biometry (IOLMaster). Change in spherical equivalent refraction (SER) and biometry for the right eye were analysed and the impact of risk factors obtained by questionnaire (ethnicity, parental myopia, near work and time outdoors) examined.

**Results :** There was a significant negative shift in mean refraction between baseline and follow-up for both cohorts (both  $p < .0001$ ). This was associated with an increase in axial length (AL), anterior chamber depth (ACD) and axial length/ corneal radius ratio (AL/CR) and a marginal but statistically significant flattening of the cornea (all  $p < .0001$ ). For both cohorts, children of East Asian ethnicity had significantly greater changes in refraction compared to children of European Caucasian ethnicity (both  $p < .0001$ ) and larger increases in AL and AL/CR (all  $p < .0001$ ). Similarly, children in both cohorts with one or two parents myopic had greater refractive, AL and AL/CR change compared with children with no myopic parents (all  $p < .0001$ ). Children who spent more time in near work also had larger increases in AL and AL/CR although, this was significant only in the older cohort (AL,  $p = 0.02$  and AL/CR,  $p = 0.03$ ). Conversely, spending greater time

outdoors reduced AL growth in the younger (high=0.71 mm, moderate= 0.77 mm and low=0.86 mm,  $p<.0001$ ) and older cohort (high=0.22 mm, moderate=0.26 mm and low=0.28 mm,  $p=0.008$ ), as well as AL/CR (both  $p<.0001$ ).

**Conclusions** : Refractive change and increases in AL and AL/CR were associated with East Asian ethnicity and parental myopia. Greater time spent in near work increased refractive and biometric change but, this was significant for the older cohort only. More time spent outdoors slowed AL/CR change and AL elongation in both the younger and older cohort, although, the impact appeared greater at a younger age.

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