

## **Project Summary - A Multidisciplinary Approach Designed to Provide New Insights Into the Development of Myopia in Children**

**Objectives:** Vision problems are intimately connected with children's ability to learn, and they impact social development and interactions. Recent U.S. government figures indicate that 60% of young people in the U.S. are myopic (nearsighted), but no clear etiology has been identified. Using the approach of developmental psychology, this project will examine multiple factors that have been identified in the literature that are possibly linked to myopia development, including psychological factors, diet, posture, near-work, and time spent outdoors. In addition, this project will examine whether there is an interplay among various factors in this complex area of development and potentially suggest a unified explanation of the origin of myopia.

The PI's recent preliminary study indicates that psychological factors; diets low in fruits, vegetables, and whole grains; and less time outdoors may be related to development of myopia. In the proposed project, we hypothesize that, compared with emmetropic (normal vision) children, newly diagnosed myopic children will demonstrate (1) differences in types and intensities of stressors, (2) lower stress awareness, (3) less fresh fruits and vegetables and whole grains in their diets, (4) being behind in their development of postural control, and (5) less time spent outdoors.

**Methods:** The proposed three-year project is multidisciplinary and multi-method and employs a matched-pairs design. Children ages 6 to 13 will undergo refractive assessment. Each child who has just been diagnosed with myopia will be paired with another child of the same sex, age, and school grade who is emmetropic, and a minimum of 65 matched pairs (130 children) will participate. Children and mothers will participate in interviews and complete surveys related to childhood history, including psychological issues and stressors; the child's diet; time spent outdoors; reading, computer use, TV viewing. Each child will be evaluated by a physical therapist with regard to postural issues. Surveys and testing will be conducted by trained faculty and students from appropriate departments who are blinded to the child's vision status. Statistical analysis will include (a) comparison of the data of all myopic children as a group and all emmetropic children as a group, and (b) analysis of the quantitative and qualitative matched pair comparisons.

**Intellectual Merit:** The project will (a) investigate myopia development using a multidisciplinary model, (b) investigate psychological factors related to myopia development, and (c) study myopic children at the time of first diagnosis. The project opens new doors of investigation through exploration of unique and potentially transformative concepts. Moreover, its exciting new approach and its focus on previously unexplored areas may lead to exciting new findings linking myopia development to potentially modifiable lifestyle factors. The project will provide new insights into an issue with potential effects on learning and development for the majority of children and adolescents in the U.S. today. The project explores myopia development in terms of multiple influences, including prenatal influences and the relationship between biological and emotional aspects of human development, and may lead to development of new models for studying vision development. In the PI's preliminary study, emmetropic students reported experiencing more childhood stress than did myopic students. The project will explore the possibility of differential processing of stressful events by myopes and emmetropes.

**Broader Impacts:** The project may lead to identification of potentially modifiable lifestyle factors that could reduce myopia incidence among children from all groups in our society. Results of the project will be disseminated through publications, presentations, and internet websites. Possible societal benefits include widespread positive educational and childhood developmental effects, reduction of the personal and societal economic burden related to vision correction, reduction in the incidence of serious eye disorders that may affect myopic adults later in life, and enhancement of visual ability for public safety and military personnel.