Published in final edited form as:

Optom Vis Sci. 2015 November ; 92(11): e392–e393. doi:10.1097/OPX.0000000000000753.

Who Says There's Nothing New under the Sun?

Karla Zadnik, OD, PhD, FAAO and Donald O. Mutti, OD, PhD, FAAO

The Ohio State University College of Optometry, Columbus, Ohio

Abstract

The time since our first publication in 2007 describing time spent outdoors as protective for juvenile myopia onset to clinical trials incorporating outdoor light interventions has been short. The time outdoors/myopia example highlights the incorporation of clinical or epidemiological evidence to translational research that may eventually change clinical practice and or behavior.

Keywords

myopia; translational research; children's vision

In recent years, there has been plenty of buzz around the concept of translational research. Merriam-Webster defines it as “medical research that is concerned with facilitating the practical application of scientific discoveries to the development and implementation of new ways to prevent, diagnose, and treat disease,”¹ its shorthand definition being “bench to bedside.” Those rigid definitions do not allow for the possibility that an observation might be made in an epidemiological study that could lead to both basic and patient-oriented research, yet that very thing has happened in a field near and dear to optometry's heart—myopia research.

Although we have been interested in the predictors, causes, and treatment of myopia for almost 30 years and the field is always exciting and controversial, there seems to be a resurgence in excitement over myopia as evidenced recently by a myopia mini-symposium at the 2015 Association for Research in Vision and Ophthalmology meeting and by an all-day session this spring at the British Contact Lens Association meeting. One exciting area is the role of peripheral refractive error and defocus in the etiology of myopia and whether or not contact lenses that create myopic blur in the periphery might slow the progression of myopia. The other is the suggestion that there might be a new, modifiable risk factor for myopia onset—outdoor light exposure.

Our focus is on the observation that time outdoors, and most likely the light exposure when outside, is protective for myopia onset. That observation has moved to both animal experiments and human clinical trials in a very short time, a powerful example of how translation can move from bedside to bench and back to bedside.

French et al. published a review on the topic in *Experimental Eye Research* in 2013.² They reference a 1993 report of a protective association between time spent outdoors and myopia progression rate in Finnish schoolchildren, but that observation seems to have died for lack of a second. From 2002–2006, there were several published papers reporting cross-sectional, protective associations between childhood myopia and time spent outdoors. In 2007, our group was the first to report an association between more time outdoors and a reduced risk of myopia **onset**, supported by longitudinal data from our Orinda Longitudinal Study of Myopia.³ After that, things took off with confirmatory publications from all over the world, although the effect seems to be restricted to myopia onset, as time outdoors does not appear to protect against myopia progression in most reports.^{4–5} The fact that there is a comprehensive review article on this new risk factor for myopia, only six years after the first longitudinal observation was published, is remarkable in and of itself.

Perhaps it's because time outdoors is the first new, potentially modifiable risk factor postulated for juvenile-onset myopia in over 100 years. Perhaps it's the inability of most epidemiological studies to find evidence for the age-old risk factor, near work. Whatever the underlying reason, now, in 2015, we regularly hear reports of new studies investigating the dopamine-light hypothesis in many animal models including chicks, tree shrews, and rhesus monkeys.⁶ Work that places alternate hypotheses like vitamin D and physical activity in lesser roles has been conducted. Amazingly, there are already clinical trials of children in China randomized to extra time outside during the school day and to glass cube classrooms.⁷

In spite of the absence of a breakthrough observation at the bench that points to new ways to deal with disease, we would argue that this represents translational research, too. A scientific observation was made and reported. In less than a decade, that discovery has “facilitate[ed] ... the development and implementation of new ways to prevent, diagnose, and treat disease.” In short, translation doesn't always have to be a game-changing biological thunderbolt to change research and clinical care in a “flash.”

References

1. Merriam Webster Online Dictionary. [Accessed September 21, 2015] Translational research: definition. Available at: <http://www.merriam-webster.com/dictionary/translational%20research>
2. French AN, Ashby RS, Morgan IG, Rose KA. Time outdoors and the prevention of myopia. *Exp Eye Res.* 2013; 114:58–68. [PubMed: 23644222]
3. Jones LA, Sinnott LT, Mutti DO, Mitchell GL, Moeschberger ML, Zadnik K. Parental history of myopia, sports and outdoor activities, and future myopia. *Invest Ophthalmol Vis Sci.* 2007; 48:3524–32. [PubMed: 17652719]
4. Jones-Jordan LA, Mitchell GL, Cotter SA, Kleinstein RN, Manny RE, Mutti DO, Twelker JD, Sims JR, Zadnik K. Visual activity before and after the onset of juvenile myopia. *Invest Ophthalmol Vis Sci.* 2011; 52:1841–50. [PubMed: 20926821]
5. Wu PC, Tsai CL, Wu HL, Yang YH, Kuo HK. Outdoor activity during class recess reduces myopia onset and progression in school children. *Ophthalmology.* 2013; 120:1080–5. [PubMed: 23462271]
6. Feldkaemper M, Schaeffel F. An updated view on the role of dopamine in myopia. *Exp Eye Res.* 2013; 114:106–19. [PubMed: 23434455]
7. Dolgin E. The myopia boom. *Nature.* 2015; 519:276–8. [PubMed: 25788077]
8. Wang, SS. [Accessed June 9, 2015] The puzzling rise in nearsighted children. *Wall Street Journal.* Apr 20. 2015 Available at: <http://www.wsj.com/articles/the-mysterious-spike-in-nearsighted-children-1429543997>