

Part A Project Particulars

Project Title: Smart Practice for Healthy Vision for School Children

Project Period: 1 February 2011 to 31 January 2013

Particular of Applicant: School of Optometry, The Hong Kong Polytechnic University

Part C Project Details**Goals**

This project aims to establish a culture of 'Smart Practice for Healthy Vision from childhood through the promotion of a series of vision screenings and visual health educational activities. The campaign raises the awareness of the understanding of myopia development and prevention for parents, teachers and school children so that better visual habits and reading style will be enforced, leading to lowering of the prevalence of myopia and prevention of severe myopia among school children.

With the advent of e-technology and the introduction of e-books to both the primary and secondary school children, both parents and teachers' utmost concern are any negative effects on eye-sight especially the higher progression rate in myopia and the visual discomfort which may be caused by the e-book technology. There is an impending need to evaluate the visual performance in using e-book and best practice to minimize myopia progression and visual discomfort. Such information will be invaluable to alert parents, teachers as well as school children to develop a smart practice of healthy reading style to safeguard healthy vision.

For the schools that participate in the project, educational talks on eye care will be provided to school children, school teachers and parents. Both school teachers and parents will be involved in creating school and home environments that are conducive to good visual hygiene.

The select study aims to provide information on current status of myopia prevalence in Hong Kong, the impact of e-book on visual function and myopia development. By studying the visual behaviour in using conventional books and e-books, a programme to promote healthy reading activities will be designed and implemented for the school children such that they are aware of the importance of protecting their eyes from mis-use and visual fatigues.

Objectives:**1. Teacher/School professional development:**

- a. Encourage teaching staff and parents to be concerned and involved in the understanding of related visual problems such as myopia development and the impending impact on vision with the use of e-books via educational seminars and workshops on eye care.
- b. Both school teachers and parents will be engaged in creating school and home environments that are conducive to good visual hygiene.

2. Community Service:

- a. Establish the service needs of myopia problems among school children.

- b. Through the promotion of visual health, with the use of “Smart Practice for Healthy Vision” educational pack (leaflets, brochures, exhibition posters etc.), the project aims to establish good reading style for the children and elevate their visual health awareness in all aspects.
- c. Educational booklets on “Myopia and you” and ‘Smart use of e-book’ for school children will be produced along with the web version. The long term goal is to reduce the incidence of myopia in the community.

3. Select Study:

Through vision screening, e-book impact study and related questionnaire, the following information can be determined:

- a. Prevalence of refractive error in particular myopia among school children.
- b. The visual habits and possible risk factors in causing myopia by conducting a vision questionnaire.
- c. The effect of the use of e-book on visual functions and behaviour adaptation among school children.
- d. Children identified with high myopia will be channeled for myopia control intervention.

Needs Assessment and Applicant’s Capability

Background

The prevalence of myopia is alarmingly high in many Asian countries. In Hong Kong, Singapore, Taiwan, Japan and China, as many as 80% of young adults are myopic.¹⁻⁵ Myopia starts at a very young age in these countries. In general, once the children start school, myopia starts to appear (Figure 1).

There has also been a trend of increasing prevalence of myopia as well as the severity of myopia in the last decade. This trend has been noted in Hong Kong, Taiwan and Japanese studies. The average increase in the prevalence of myopia is in the range of 6 % (Taiwan)⁶ to as high as 25 % (Hong Kong)⁷ over the past decade. However, this has not always been the case. Data from Hong Kong show that myopia prevalence in the older age groups is surprisingly low (Figure 2)^{8, 1, 9-15}. This suggests that the increase in myopia prevalence is a recent phenomenon. If we assume that the current rate of myopia development amongst the young is maintained, then in the next few decades, about 8 to 9 out of every 10 persons in Hong Kong will be myopic.

Apart from the increasing number of people becoming myopic, another alarming feature is the rate of progression of myopia. The annual rate of change in refraction is around -0.3 D to -0.5 D. The age of onset of myopia is an important factor associated with the progression rate.¹⁷⁻¹⁹ Younger children (6 to 10 years) and children who have myopia already generally show higher myopia progression rates. Table 1 shows the mean progression rates for young children in some longitudinal studies.

There are now younger children with high myopia (greater than 6D) than in the past decade. Many studies on Asian children have reported myopia of about -2 D at age 12 which increase to about -3 D at age 18 to 20 years. The prevalence of high myopia was reported to increase from 0.2% at age 7 to about 13% at age 15 years and further increases to 24% in girls and 18% in boys at 18 years old.⁴

High myopia is a risk factor for a number of sight threatening conditions including retinal degeneration, retinal detachments and glaucoma²⁰. This should be a cause for concern for healthcare planners. As the epidemiological vision data for Hong Kong children have been reported some twenty years ago, it is necessary to review the status of visual health among school children in Hong Kong.

Recent research has identified several factors that may be related to myopia development. Children spending more time outdoor tend to develop less myopia. There are also several options available to reduce the progression rate. A study of the visual habits of school children is necessary to unveil the problems that cause such high prevalence in Hong Kong school children.

It is also timely to study the visual behaviour in using e-books such that better practice can be conveyed to young children when they embark on adopting e-learning devices.

Significance of the project

The project will help to identify the extent to which myopia is affecting the local school children population such that preventive measure and timely management of the condition can be provided.

The project will also inform on the comparative differences in using e-books to conventional books and provide advice for healthy reading in using these electronic devices. Booklets on healthy reading style will be produced to promote healthy lifestyle for using eyes at school and home.

In addition, the project will enhance health education amongst children, teachers and parents of the community. Results from the visual survey will be reported through various channels such as journal publication, the media including press release and newspaper interviews, to alert the public on the importance of primary vision care for school children. The report will also be distributed to all primary and secondary schools principals.

Centre for Myopia Research - The host organization

This project is supported by The Centre for Myopia Research, which is hosted by the School of Optometry, The Hong Kong Polytechnic University. Over the past 20 years of myopia research, the Centre has achieved a high international standing. It has been recognized by the PolyU Area of Strategic Development external assessors in 2002 as one of the top two myopia research centres in the world. The Centre's Vision is freeing the world from sight-threatening myopia and its objectives are (1) To understand myopia and its related pathology by basic laboratory and pre-clinical investigations and (2) To find methods to retard, prevent and cure myopia through clinical research.

The Centre has advised various organizations, including the education bureau on issues related to vision and myopia. The Centre has also participated in a number of vision health promotions with schools, associations and community centres. The Centre has published over 100 publications in myopia research and is currently conducting several clinical trials in myopia control.

In this project, the Centre will provide the main bulk of optometric equipment; the in-kind is equivalent to HK\$1.2M. It will provide space to house the project personnel and provide the web support for the project. For children that require a comprehensive vision assessment, they will be referred to the Optometry Clinic at the School of Optometry at the University.

Targets and Expected Number of Beneficiaries

Students, teachers and parents are invited to take part in this study. The expected number of beneficiaries is 5000 students, 600 teachers and 2000 parents; totaling to 7600 people.

Schools	Number	Students	Teachers	Parents
Primary	10	250/school	30/school	100/school
Secondary	10	250/school	30/school	100/school
Total	20	5000	600	2000

Scope of Work for the Select Study

Subject recruitment

Twenty schools will be invited to take part in the project and it is envisaged that 5000 school children will be examined.

We aim to contact the district community centres to assist in communicating with the schools in their districts. Kwai Tsing district is one of the districts that have agreed to participate in this project; the Kwai Tsing Safe Community and Healthy City will assist in communicating with the schools in their district to promote the concept of healthy vision. All schools in the district will be invited to participate in the project, it is expected that 20 primary and secondary schools will be invited.

Letter and information of the project will be provided to the schools to solicit their support to the project. Consent will be obtained from the parents prior to the study.

Procedures

(a) Identifying myopia and visual function

The measurement of refractive error, the ocular components, accommodative response, accommodative lag, phoria, response AC/A ratio will be performed.

(b) Identifying the risk factors and environmental differences among the schools and homes

A questionnaire will be used to collect this information. The project team will visit the schools to collect data on lighting, furniture and children posture during class time as well as the homes of the children.

(c) Evaluate the difference in visual function and behaviour between reading with e-book and conventional book.

One hundred school children aged from 6 to 15 years old will be recruited for this part of study. They are requested to perform reading using conventional books and e-books. At the end of 30 minutes reading, their accommodation amplitude, facilities and response will be measured for comparison. During the course of the reading, a video camera will also record their posture, eye hand co-ordination and general behaviour for comparison.

Role of teacher and principal

The principal of the school is to endorse the participation of the campaign. They are responsible in assigning the coordinator for the school, provide the venue for vision screening and allow access to

students and parents for educational seminars and workshops. Several principals will be invited to be chairman and members of the quality assurance committee of this project.

All the teachers are encouraged to participate in an educational seminar to enrich their understanding on common visual problems and their signs and symptoms among young children, including lazy eye, eye turn, visual perceptual dysfunction as well as refractive errors like myopia, astigmatism and hyperopia development. Teachers are also engaged in the promotion of "Smart Practice of Healthy Vision" and in creating school and home environments that are conducive to good visual hygiene.

Implementation Plan with Time-line

The total duration of the project is 24 months.

Stages	Time	Action	Measure
Stage 1 (3 months)	Feb to Apr 2011	Preparatory Stage: <ul style="list-style-type: none"> Recruit full time staff and part time clerical and student helpers Recruit volunteer optometrists and paediatricians. 	<ul style="list-style-type: none"> One full time staff and one part time staff More than 30 volunteers
	Feb to Apr 2011	Promotion of project: <ul style="list-style-type: none"> Recruit interested schools Coordinate activities schedules Visit schools and give orientation to teachers 	<ul style="list-style-type: none"> Liaise with 10 primary and 10 secondary schools, aim for 20 successful enrolment
Stage 2 (18 months)	May to July 2012	Educational seminar/workshop/pack <ul style="list-style-type: none"> Compile seminar content notes Classroom and home environment review with school teachers and parents Prepare materials on "Smart Practice for Healthy Vision" pack 	<ul style="list-style-type: none"> Conduct educational seminars for teachers and parents "Smart Practice for Healthy Vision" pack ready for distribution in Sept 2011 when new term starts Conduct games and activities with school children
	May to July 2012	"Select Study" kick off <ul style="list-style-type: none"> Vision screening at schools Design Questionnaire E-book investigation Provision of health service to relevant children 	<ul style="list-style-type: none"> Data collection and analysis for 20 schools Prepare reports
	Aug to Nov 2012	Revisit schools to deliver school reports on <ul style="list-style-type: none"> Vision screening results Questionnaire results <p>Conduct talks/activities to school children to reinforce "Smart Practice for Healthy Vision"</p>	<ul style="list-style-type: none"> School reports for principals and teachers

Stage 3 (3 months)	Nov 2012 to Jan 2013	Press Conference and Project effectiveness announcement <ul style="list-style-type: none"> • Preparation • Conference 	<ul style="list-style-type: none"> • Update on the current status of myopia in school children • Announcement of project outcomes including total number of seminars held, number of school children screened, and number of children identified to have visual problems. • Announcement of the e-book study and ways to use e-book effectively and comfortably • Effectiveness of the project review.
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Expected Deliverables and Outcomes

Deliverables

1. Results on prevalence of myopia in school children and its associated risk factors.
2. Results on the effect of the use of e-book on visual functions and behaviour adaptation among school children.
3. Sixty educational talks provided to school children, teachers and parents.
4. An education packs on "Smart Practice for Healthy Vision" which includes brochures, posters and two booklets "Myopia and you" and "Smart use of e-book".
5. Individual school report and a full project report covering all the major findings from this project.
6. One press conference to be held during the last 3 months of the project.
7. One or two manuscripts for submission to international journals.

Budget

Project staff and equipment

Two full time project associates will be recruited and based at the Centre for Myopia Research, School of Optometry, The Hong Kong Polytechnic University. They will communicate and coordinate with the participating schools, correspond with the volunteers from support organization, prepare the transportation of equipment and conduct on site data collection from the school children. They will also be responsible for providing the data analysis, writing preliminary reports and give educational talks to the school teachers and parents as well as develop the content of the booklet regarding healthy reading.

A research clerk will be recruited to perform the data entry and other administrative tasks such as sending letters and educational materials to schools and parents, order transportation, prepare and issue referral reports.

Student helpers will be recruited to assist in the data collection at the schools and conducting interview for the questionnaire with the students and parents. It is estimated that each visit will require 5 student helpers and the total hours per year will be 1000 hours.

Hong Kong Paediatric Foundation will invite its member to be volunteers for this project and will also provide medical advice for school children that are identified to have health issues during the screening. The Foundation contributes \$50,000 for promoting this project.

Two major equipments are required. An autorefractor is needed to capture the refractive error of the children. An IOL Master is needed to measure the axial length of the eye ball. Both the refractive error and eye size data are essential data in this study. They are provided by the Centre for Myopia Research. Other small items include visual acuity chart, domiciliary trial set and trial frame, retinoscope and ophthalmoscope.

In this project, the Centre will provide the main bulk of optometric equipment; the in-kind is equivalent to HK\$1.2M. The School of Optometry, The Hong Kong Polytechnic University also provides space for storage of the equipment.

Description of expenses	1 st year	2 nd year
Staffing: 2 research associates, 1 research clerk, students helpers		
Two Project Associates (optometrists): Each at \$21,000/month +\$1000 (MPF) = \$22,000/mth (\$264,000 per year)	\$528,000	\$528,000
One Research Clerk: \$8000/monthx1.05 (MPF)=\$8400/mth (\$100,800 per year)	\$100,800	\$100,800
Student helpers @\$50/hours for 1000 hours per year	\$50,000	\$50,000
	<i>Sub-total</i>	<i>1,357,600</i>
Equipment		
Small vision testing items such as visual acuity chart, domiciliary trial set and trial frame, retinoscope, ophthalmoscope	\$40,000	
6 E-book @\$3000 each	\$18,000	
1 digital video camera	\$4,500	
1 notebook computers	\$8,500	
1 desktop computer	\$6,000	
	<i>Sub-total</i>	<i>77,000</i>
Other expenses		
General expenses: including insurance cover for equipment damages, postage, stationary and travel allowance for volunteers	\$50,000	\$50,000
Equipment transportation, approx. 50 sessions at \$1000 (van)	\$50,000	\$50,000
Travel for seminars 30 sessions each year at \$300 per seminar	\$9,000	\$9,000

	<i>Sub-total</i>	<i>218,000</i>
Publicity and promotion		
Publicity activities including media and press release [additional \$50,000 from Hong Kong Paediatric Foundation]		\$50,000
Booklet production	\$50,000	
	<i>Sub-total</i>	<i>100,000</i>
Total for each year	\$914,800	\$837,800
Grand Total		\$1,752,600

Asset Usage Plan

<u>Category</u> (in alphabetical order)	<u>Item / Description</u>	<u>No. of Units</u>	<u>Total Cost</u>	<u>Proposed Plan for Deployment</u> <i>(Note)</i>
<u>audio and video equipment</u>	<u>Digital video camera</u>	<u>1x</u>	<u>\$4,500</u>	<u>To be used for future research studies at the Centre for Myopia Research</u>
<u>book & VCD</u>	<u>E-book</u>	<u>6x</u>	<u>\$18,000</u>	<u>To be used for future research studies at the Centre for Myopia Research</u>
<u>computer hardware</u>	<u>Desktop computer</u>	<u>1x</u>	<u>\$6,000</u>	<u>To be used for future research studies at the Centre for Myopia Research</u>
	<u>Notebook computer</u>	<u>1x</u>	<u>\$8,500</u>	
<u>Others</u>	<u>1. Visual acuity charts</u>	<u>4x</u>	<u>\$3,000</u>	<u>To be used for future research studies at the Centre for Myopia Research</u>
	<u>2. Domicillary trial lens set</u>	<u>3x</u>	<u>\$20,000</u>	
	<u>3. Trial frame</u>	<u>8x</u>	<u>\$8,000</u>	
	<u>4. Retinoscope</u>	<u>2x</u>	<u>\$5,000</u>	
	<u>5. Ophthalmoscope</u>	<u>2x</u>	<u>\$5,000</u>	

Note: for use by school / organization / in other projects (please provide details of the department / centre to which the asset will be deployed and the planned usage of the asset in activities upon project completion).

Report Submission Schedule

I / My school / My organization commit(s) to submit proper reports in strict accordance with the following schedule :

<u>Project Management</u>		<u>Financial Management</u>	
<u>Type of Report and covering period</u>	<u>Report due day</u>	<u>Type of Report and covering period</u>	<u>Report due day</u>
<u>Progress Report</u> <u>1/2/2011 - 31/7/2011</u>	<u>31/8/2011</u>	<u>Interim Financial Report</u> <u>1/2/2011 - 31/7/2011</u>	<u>31/8/2011</u>
<u>Progress Report</u> <u>1/8/2011 - 31/1/2012</u>	<u>29/2/2012</u>	<u>Interim Financial Report</u> <u>1/8/2011 - 31/1/2012</u>	<u>29/2/2012</u>
<u>Progress Report</u> <u>1/2/2012 - 31/7/2012</u>	<u>31/8/2012</u>	<u>Interim Financial Report</u> <u>1/2/2012 - 31/7/2012</u>	<u>31/8/2012</u>
<u>Progress Report</u> <u>1/8/2012 - 31/1/2013</u>	<u>28/2/2013</u>	<u>Interim Financial Report</u> <u>1/8/2012 - 31/1/2013</u>	<u>28/2/2013</u>
<u>Final Report</u> <u>1/2/2011 - 31/1/2013</u>	<u>30/4/2013</u>	<u>Final Financial Report</u> <u>1/2/2011 - 31/1/2013</u>	<u>30/4/2013</u>

Evaluation Parameters and Methods

Evaluation is based on both the number of beneficiaries and the long term influence on visual health awareness.

The expected number of beneficiaries is 5000 students, 600 teachers and 2000 parents; adding to a total of 7600.

1. A total of 600 teachers to attend 20 eye care seminars/workshop.
2. A total of 2000 parents to attend 20 eye care seminars.
3. Both teachers and parents are to be engaged in the improvement of classroom and home environment for healthy vision for school children.
4. A total of 5000 school children have had a vision screening to inform on their visual status, activities and games undertaken on "Smart Practice for Healthy Vision" educational pack.
5. For those requiring further care, they will be referred for a comprehensive eye or health examination by optometrists and pediatricians.
6. A total of 100 school children to undertake the e-book visual behavior study and raise their awareness on e-book reading style.
7. 20 schools participating in the project will be provided with educational booklets for all their students and a school report at the end of the study.

Questionnaires will be conducted to collect feedback regarding the operation and long term impact of the project.

1. Questionnaires to target groups including the school principals, teachers, parents and school children. Expect at least 75% of the participants to benefit with better understanding of vision health care.
2. Different questionnaires specifically designed for the students, teachers and parents, gathering comments and suggestions with regard to the project design, course contents, activities, in order to assess the effectiveness of the programme.
3. The project team conducts regular reviews on quarterly basis to ensure the quality of project and derive improvement if necessary. The project team will also match the outcomes with the initial planned deliverables. It is expected that most of the initial planned deliverables be completed.
4. Establish a quality assurance committee, composed of three participating school principals and one of them would be nominated as the chairperson, one paediatrician and one optometrist together with the project leader. They provide directions during the project with regard to the progress and related problems.
5. A project evaluation seminar will be held to evaluate the promotion and development of this project, and share the conclusions with the schools and professionals, and make recommendations for future developments.

Sustainability of the Outcomes of the Project

The resources from the implementation of this project can continue to benefit the promotion of the objectives in future, such as uploading the details of the activities onto the web. All the materials will be available to primary and secondary schools via a link to the homepage of The Centre for Myopia Research at School of Optometry, The Hong Kong Polytechnic University.

Through the education and training of teachers and parents, they can become promoters for future projects in their own schools. By using the materials developed, they can assist in mounting the courses, setting up workshops and activities for newly joined school children to promote smart practice for healthy vision and thereby becoming a community resource.

The project will be repeated in schools in other districts. It is expected that the trained parents and teachers will form the volunteers group together with core support from the Centre for Myopia Research; we will be able to spin off the project to other districts and benefits several folds of numbers of school children.

The Centre for Myopia Research will continue to apply for sponsorship and joint ventures with industrial partners, utilize community resources to continue to promote smart practice for healthy vision in schools.

Dissemination / Promotion

We aim to promote the project through the use of web sites, seminars and school newsletters. The project is initially based in Kwai Tsing schools and The Kwai Tsing Safe Community and Healthy City will assist in the promotion to schools by free advertising in their websites as well as their newsletters.

At the later stage of the project, through press conference and project evaluation seminar, we shall extend the message of this project into the schools and society, so that the project can be promoted and continued into the future. Other means of publicities to be considered are free advertising offers from MTR, Road Show on bus, free newspaper, TV and radio interviews.

Part D Details of Collaboration / Participating Organizations

Collaborating organizations

There are two collaborating organizations to support the Centre for Myopia Research, School of Optometry, PolyU. They are:

- Hong Kong Paediatric Foundation
- The Kwai Tsing Safe Community and Healthy City

Hong Kong Paediatric Foundation

The Foundation is a non-profit making organization established on 24 March 1994 by the resolution of the members of the Hong Kong Paediatric Society. The Foundation is dedicated to the advancement of child health and child care in Hong Kong, and strengthening the public's knowledge about child diseases.

The foundation will invite its members to be volunteers for this project and will also provide medical advice for school children that are identified to have health issues during the vision screening. The foundation will also nominate one of its members to join the quality assurance committee. It will contribute \$50,000 towards promotion and publicity of the project. They will also help to disseminate the educational booklets.

The Kwai Tsing Safe Community and Healthy City

Kwai Tsing District has driven to be a safety community with international standard. With the joint efforts of the Kwai Tsing District Council, Princess Margaret Hospital, Occupational Safety and Health Council, government departments, NGOs and private enterprises, Kwai Tsing District was accredited to be the 73rd Safe Community by the World Health Organization (WHO) in 2003. Both the Safe Community and Healthy City Schemes aim to promote Safe Community and Healthy City were steered by the World Health Organization (WHO), now become a movement across the globe. Objectives of these schemes are to encourage intersectoral collaboration, community partnership and best utilization of resources to achieve safety and health of the community.

They will provide the network for primary and secondary schools for this project and help to advertise the project in their website and newsletters.

Participating schools

Ten schools agreed to participate in the project. More schools will be invited when the project is successfully funded.

1. 香港道教聯合會圓玄學院第一中學
HKTA THE YUEN YUEN INSTITUTE NO.1 SECONDARY SCHOOL
2. 荔景天主教中學
LAI KING CATHOLIC SECONDARY SCHOOL

3. 獅子會中學
LIONS COLLEGE
4. 樂善堂梁植偉紀念中學
LOK SIN TONG LEUNG CHIK WAI MEMORIAL SCHOOL
5. 香港四邑商工總會陳南昌紀念中學
HKSYC & IA CHAN NAM CHONG MEMORIAL COLLEGE
6. 李惠利中學
METHODIST LEE WAI LEE COLLEGE
7. 荃灣官立中學
TSUEN WAN GOVERNMENT SECONDARY SCHOOL
8. 佛教林金殿紀念小學
BUDDHIST LIM KIM TIAN MEMORIAL PRIMARY SCHOOL
9. 柏立基教育學院校友會李一諤紀念學校
SRBCEPSA LEE YAT NGOK MEMORIAL SCHOOL
10. 聖公會主愛小學 (梨木樹)
S.K.H CHU OI PRIMARY SCHOOL (LEI MUK SHUE)

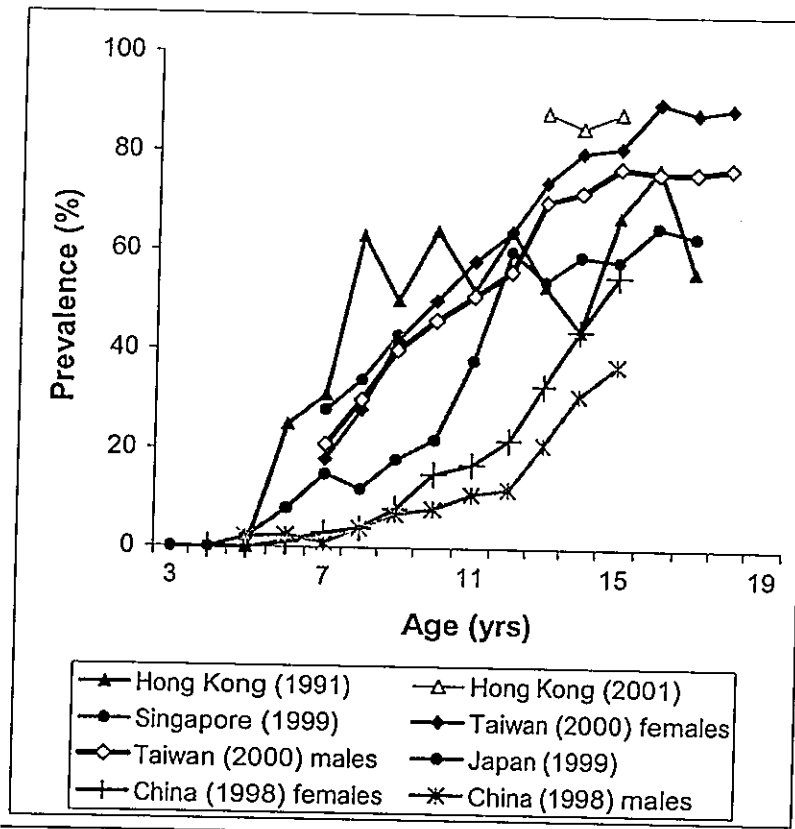
Supporting literatures, figures and tables

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Figure 1. Prevalence of myopia in school children in different Asian countries



** The year in bracket denotes the year that the study was carried out.

Figure 2: Prevalence of myopia in Hong Kong. Adapted from Chau (2003)¹⁶

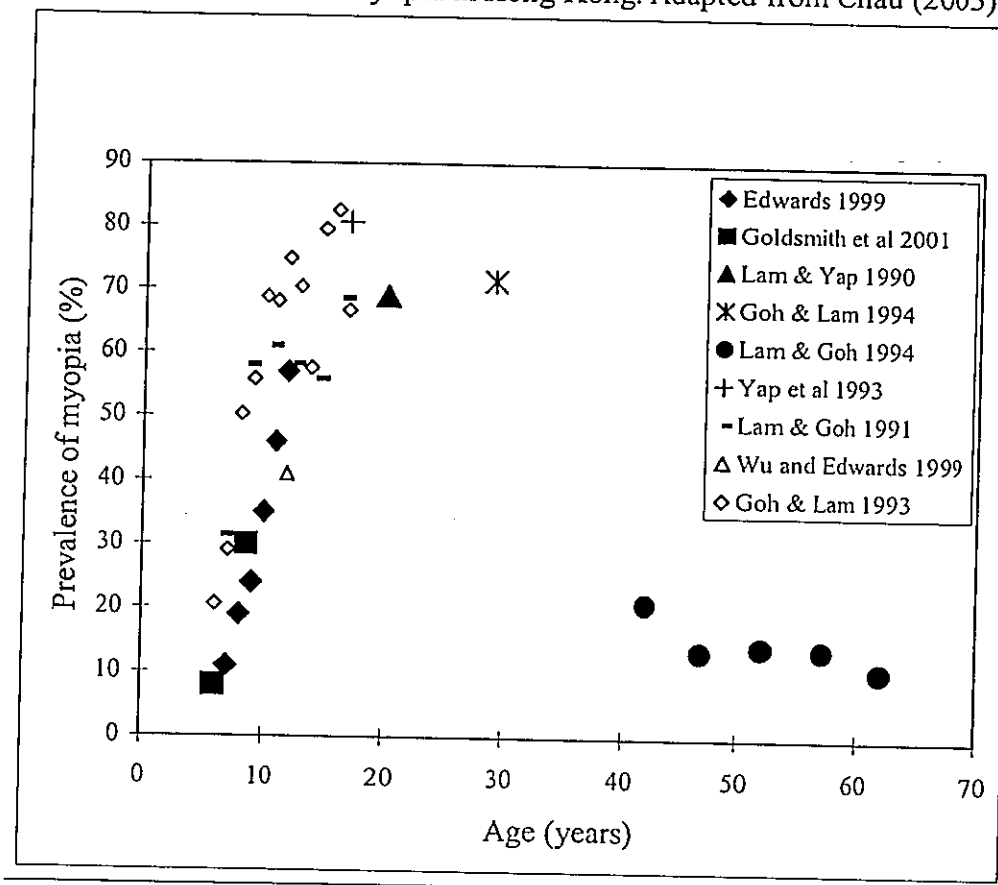


Table 1. The mean progression rate for young children in some longitudinal studies.

	Study duration	Sample	Annual myopia progression rate (D)	Standard deviation (D)
Hong Kong ¹⁷	1991-1993	Children aged 6 – 17 years (Subset of children with ≤ -0.5 D)	-0.32	0.74
			-0.46	0.40
Singapore ¹⁸	1996-1999	Children aged 6 to 12 years (subset of children with ≤ -2 D)	-0.59	0.44
			-0.65	0.44
China ¹⁹	1998-2000	Children aged 5 to 13 years (subset of children with ≤ -0.5 D)	-0.42	0.68
			-0.84	