Overuse of Digital Devices and Inferior Physical Fitness among Hong Kong Children

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Digital device use

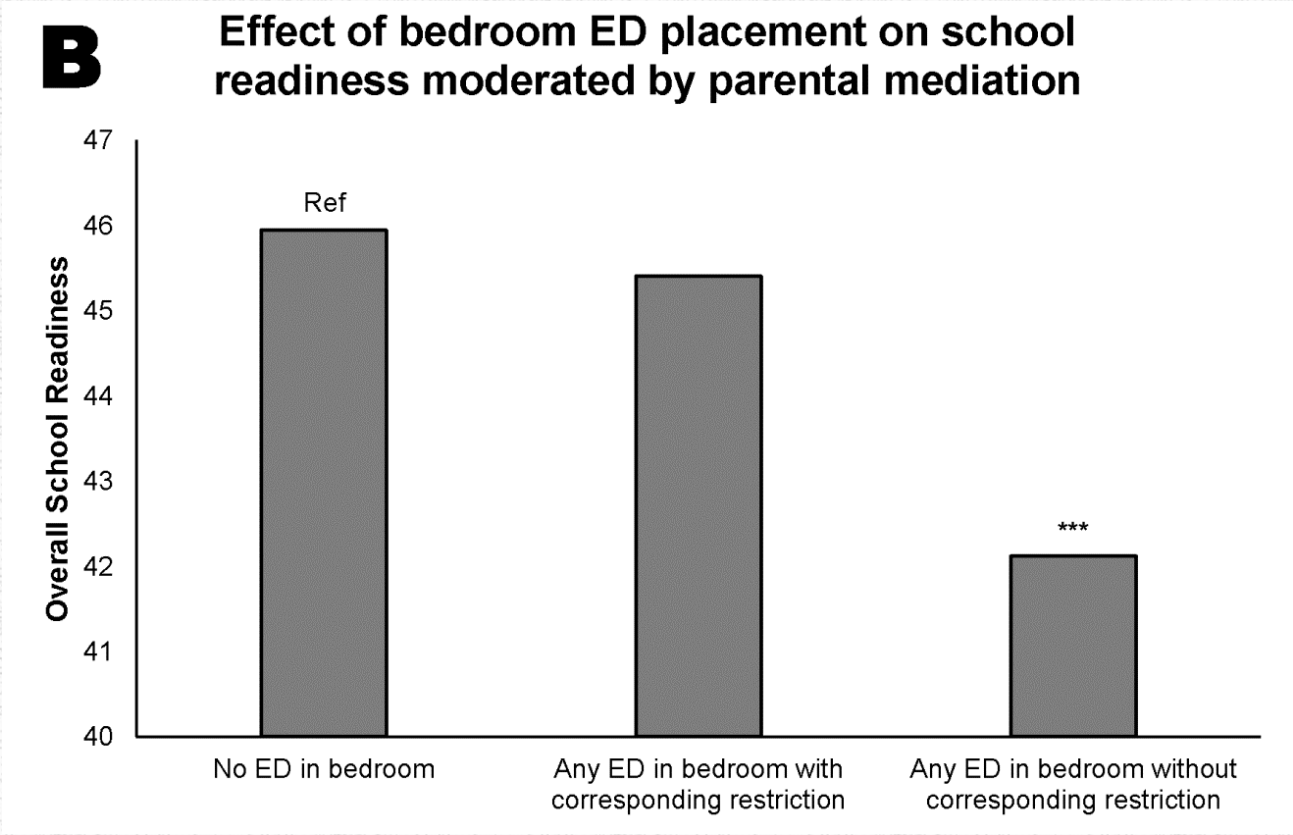
- Children and adolescents are increasingly exposed to digital device use, including televisions, computers, smartphones, and other screens

- More screen time indicates less time for exercise and in-person social interactions → **higher risk for physical and mental health problems**

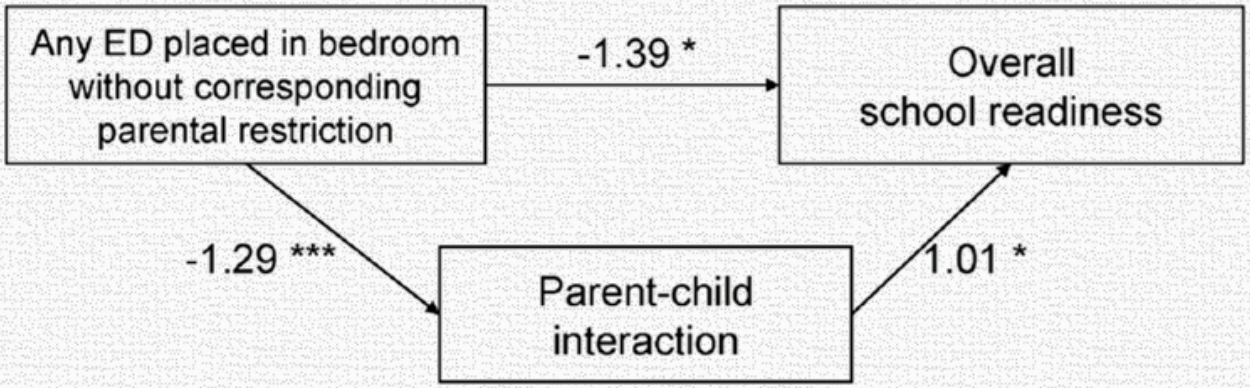
ED in bedroom and School Readiness

	Any ED in bedroom	
	β (95% CI)	P
Physical	-0.12 (-0.26, 0.01)	
Social	-0.29 (-0.50, -0.08)	**
Emotional	-0.19 (-0.35, -0.03)	*
Language / Cognitive	-0.24 (-0.39, -0.10)	**
Communication / General	-0.26 (-0.50, -0.03)	*
Total	-1.11 (-1.80, -0.42)	**

Effect of EDs in bedroom influenced by parental mediation



Parent-child interaction mediates the association between ED bedroom placement and school readiness



	β (95% CI)
Total effect	-2.70 (-3.40 to -2.01) **
Mediated effect	-1.31 (-1.92 to -0.69) *
Unmediated effect	-1.39 (-1.81 to -0.98) *
Proportion of mediation	48.5%

Figure 1 Path model to explore the mechanism between electronic device (ED) use and children's school readiness, adjusted for sex and family socioeconomic status. These two variables are not shown in the figure for clarity. Model fit indices: Comparative Fit Index=0.96; Tucker-Lewis Index=1.00; root mean square error of approximation (95% CI)=0.00 (0.00 to 0.07); standardised root mean square residual=0.003. *p<0.05, **p<0.01, ***p<0.001.

Our Research

HKU has conducted two studies on digital device use:

- To explore the pattern of digital device use among Hong Kong children and its associations with children's behavioural problems and academic performance
- To examine the effect of parental guidance of children's digital device use on child development
- To alert policymakers and service providers to develop strategies to reduce the risk of excessive digital device use among Hong Kong children

First Study (Cohort Study)

Subjects: *681 children from 21 kindergartens in 2011*

Sampling: *Stratified random sampling in Hong Kong Island and Yuen Long*

Age at Recruitment: *~5 years (K3)*

Initial Assessment: *Detailed records on digital device use*

Age at Follow-up: *~9 years (P3) in 2014-5*

Follow-up Assessment

Longitudinal association of digital device use and behaviour and academic performance in children

Longitudinal analysis of a cohort 681 children (5 years [2011] → 9 years [2015])

Outcomes in P3 於小三時之評估結果	**Each hour/day spent on television in K3** 於幼稚園高班時 看電視 （每日每小時）	**Each hour/day spent on video gaming in K3** 於幼稚園高班時 玩電子遊戲 （每日每小時）
Overweight 超重	↑ 19.4% 機會	-[#]
Risk of behavioural problems 行為問題風險	↑ 44.4% 機會	-[#]
Risk of emotional problems 情緒問題風險	↑ 38.2% 機會	↑ 23.2% 機會
Risk of hyperactivity 過度活躍問題風險	↑ 34.3% 機會	↑ 32.0% 機會
Scores in standard Mathematics test 標準數學測試	-[#]	↓ 2.8分
Scores in standard Chinese language test 標準中國語文測試	-[#]	↓ 3.5分

[#]No significant differences identified 未發現顯著相關

Analyses adjusted for family SES and child gender 於分析中控制家庭社經與兒童性別

Findings

- Pre-schoolers who spent more time on television viewing and video gaming at age 5 were more likely to be overweight, have behavioural problems including emotional problems and hyperactivity as well as poor academic performance at age 9

Second Study (Population-based Study)

Subjects: *7,585 students from 51 primary schools in 2016*

Sampling: *Stratified random sampling in Hong Kong (population representative sample)*

Age at Recruitment: *6–10 years (P1–3)*

Assessments: *Detailed records on digital device use, sleep pattern, and risk of Attention-Deficit Hyperactivity Disorder (ADHD)*

Daily time spent on digital device use in Hong Kong children

Population representative survey of 7585 children (P1–3; 6–10 years)

Average daily time spent on digital device use (min) **平均每日使用電子產品時間（分鐘）**	**All children** **所有兒童**	**Boys** **男孩**	**Girls** **女孩**
All purposes 所有用途[a]	250.2	252.0	248.4
Watching television 電視[a]	90.6	90.0	91.8
Video gaming 玩遊戲[b]	92.4	99.6	84.0
Game consoles 遊戲機	30.0	32.4	27.0
Computers 電腦	18.6	20.4	16.8
Smartphones 智能電話	21.0	22.2	19.2
Tablet computers 平板電腦	26.4	27.6	25.2
Studying學習及做功課[c]	51.0	48.0	54.0
Computers 電腦	30.0	29.4	31.2
Smartphones 智能電話	13.2	12.6	14.4
Tablet computers 平板電腦	10.2	9.0	11.4
Web browsing 上網[c]	16.2	14.4	18.6
Computers 電腦	6.6	6.6	6.6
Smartphones 智能電話	5.4	4.8	6.0
Tablet computers 平板電腦	5.4	4.8	6.6

[a] No significant differences between gender 男女生之間並無顯著差別
[b] Boys spent significantly more time than girls 男生比女生使用時間更長
[c] Girls spent significantly more time than boys 女生比男生使用時間更長

Comparison with other places

- Our population representative survey in 2016 found that 74.8% of children spent more than 2 hours on digital digital device use

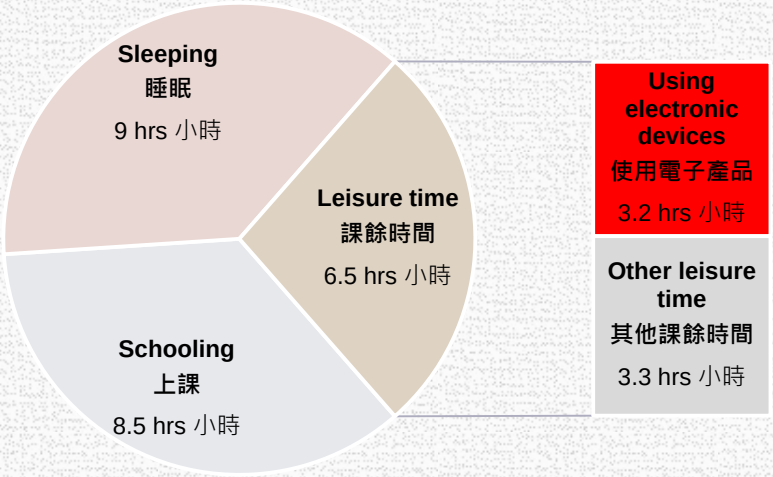
- In comparison, the figure was
  - 20.8% in United States (Wellington, et al., 2012)
  - 47.4% in Beijing, China (Shan et al., 2009)

SHAN, X. Y., Xi, B., Cheng, H., HOU, D. Q., Wang, Y., & Mi, J. (2010). Prevalence and behavioral risk factors of overweight and obesity among children aged 2–18 in Beijing, China. *Pediatric Obesity*, 5(5), 383-389.

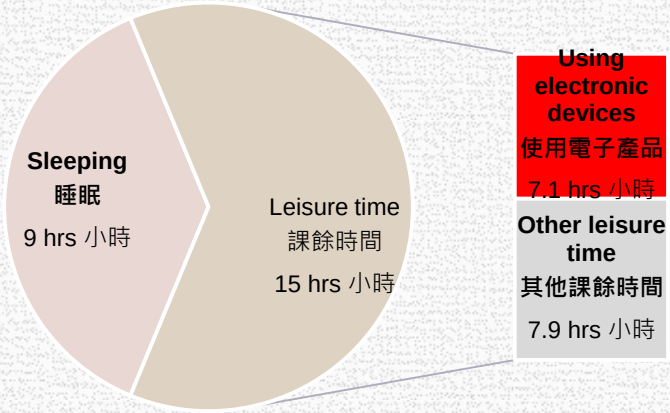
Wethington, H., Pan, L., & Sherry, B. (2013). The Association of Screen Time, Television in the Bedroom, and Obesity Among School-Aged Youth: 2007 National Survey of Children's Health. *Journal of School Health*, 83(8), 573-581.

Children spent, on average, more than 4 hours per day using electronic devices, occupying half of their leisure time.

School Days



Holidays



Association of digital device use and behaviour/academic performance in children

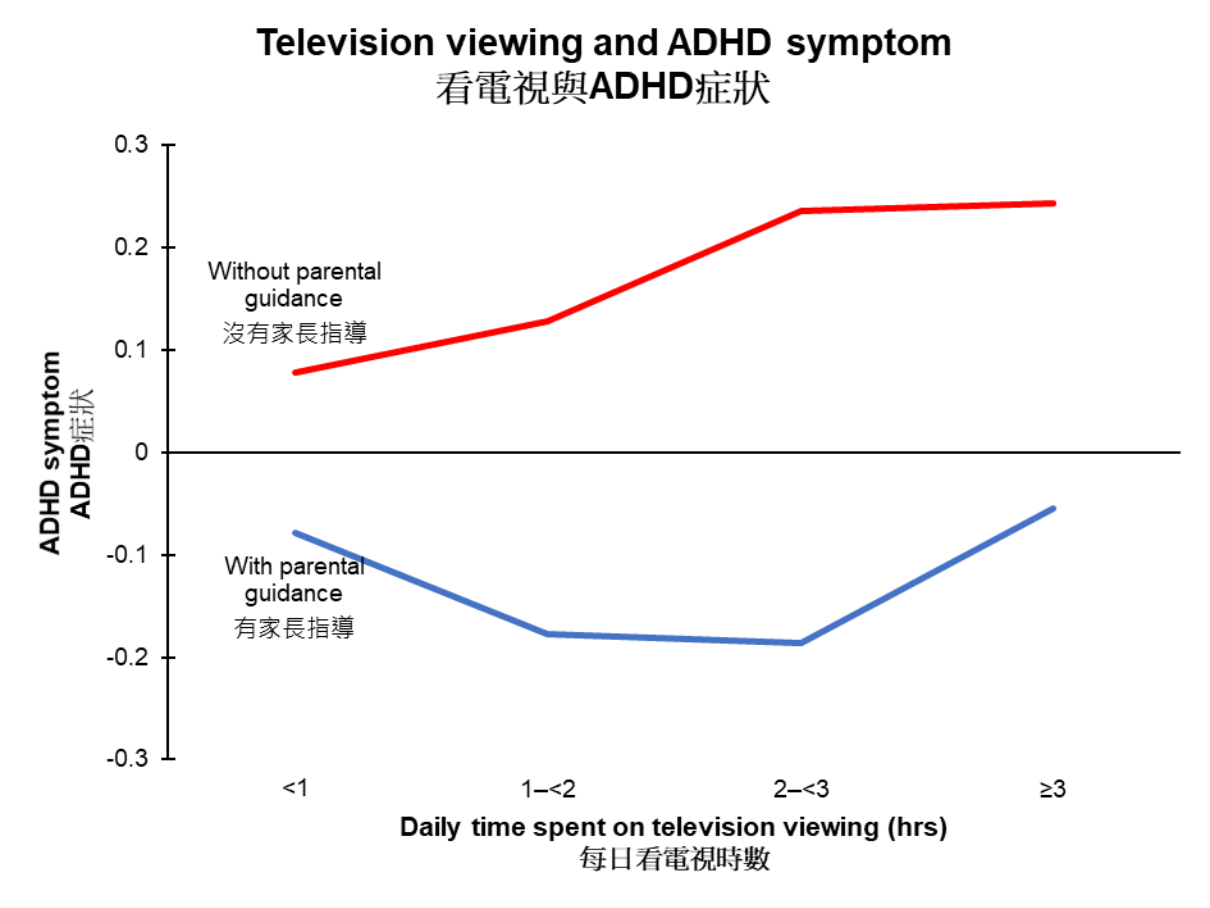
Population representative survey of 7585 children (P1–3; 6–10 years) in 2016

Use of electronic devices for each hour per day 每日每小時使用電子產品	**ADHD risk** 專注力不足/過度活躍症風險
Watching television 看電視	↑ 4.70% 機會
Video gaming 玩遊戲	↑ 4.59% 機會

Analyses adjusted for family SES and child gender 於分析中控制家庭社經與兒童性別

Role of parental guidance in the relationship between TV viewing and ADHD

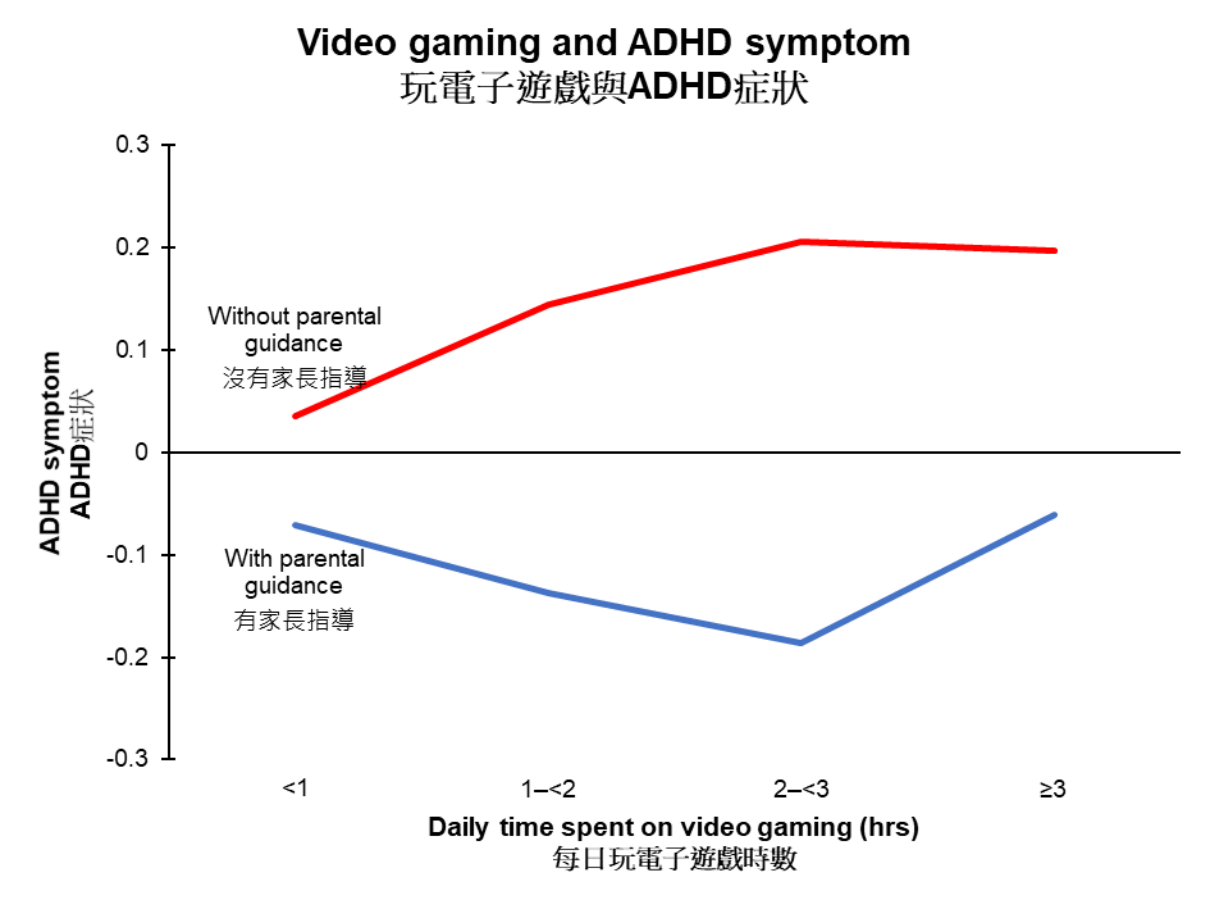
Population representative survey of 7585 children (P1–3; 6–10 years)



Adjusted for family SES, child gender and age, family history of any mental disorders

Role of parental guidance in the relationship between video gaming and ADHD

Population representative survey of 7585 children (P1–3; 6–10 years)



Adjusted for family SES, child gender and age, family history of any mental disorders

Findings

- Among primary school students, usage of digital devices is positively associated with ADHD
  - Higher ADHD risk among children who used more digital devices
- Such duration effect was insignificant when parents provided guidance on children's television viewing and video gaming

Conclusions

- Hong Kong children spent more time on using digital devices than counterparts in other places
- More digital device use in preschool predicts more behavioural problems and poorer academic performance in primary school
- Parental guidance during digital device use can protect children from the potential harm

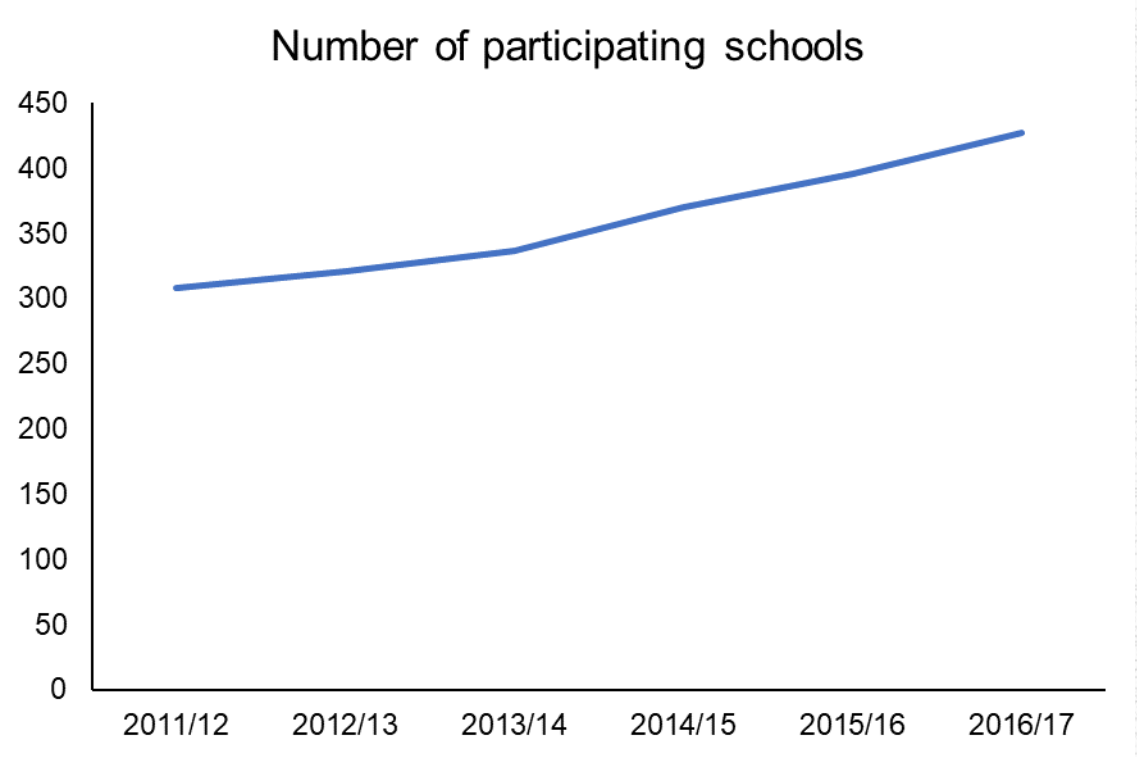
Current Situation of Physical Fitness

School Physical Fitness Award Scheme

A population-based programme to promote and monitor physical fitness among Hong Kong students

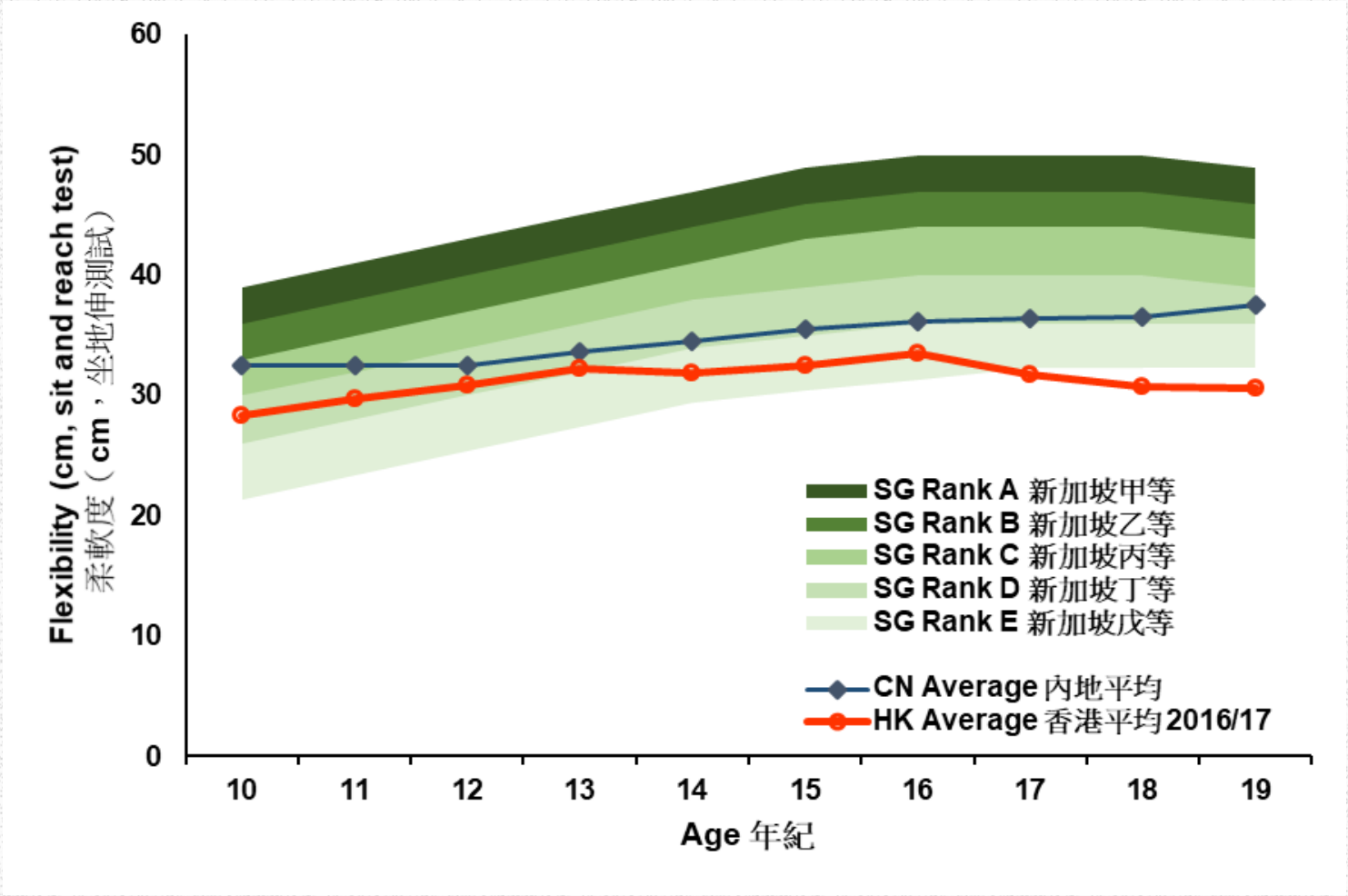
- Organised by the Hong Kong Childhealth Foundation, Education Bureau, and Physical Fitness Association of Hong Kong, China **since 1990**
- Serving 427 schools (190,064 students) in 2016/17

Participation statistics

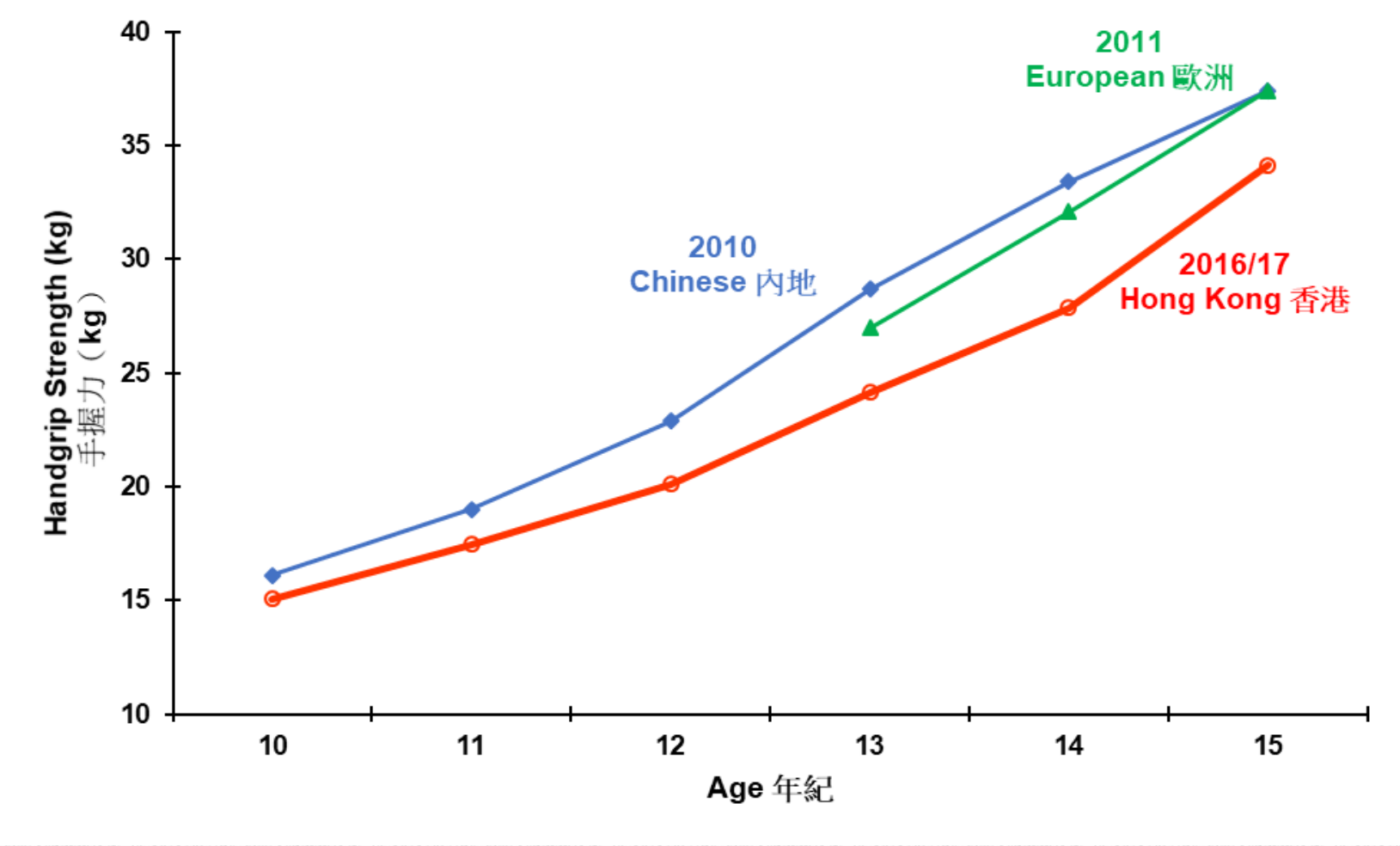


	2013/14	2016/17
Schools	337	**427**
Students	138,260	**190,064**

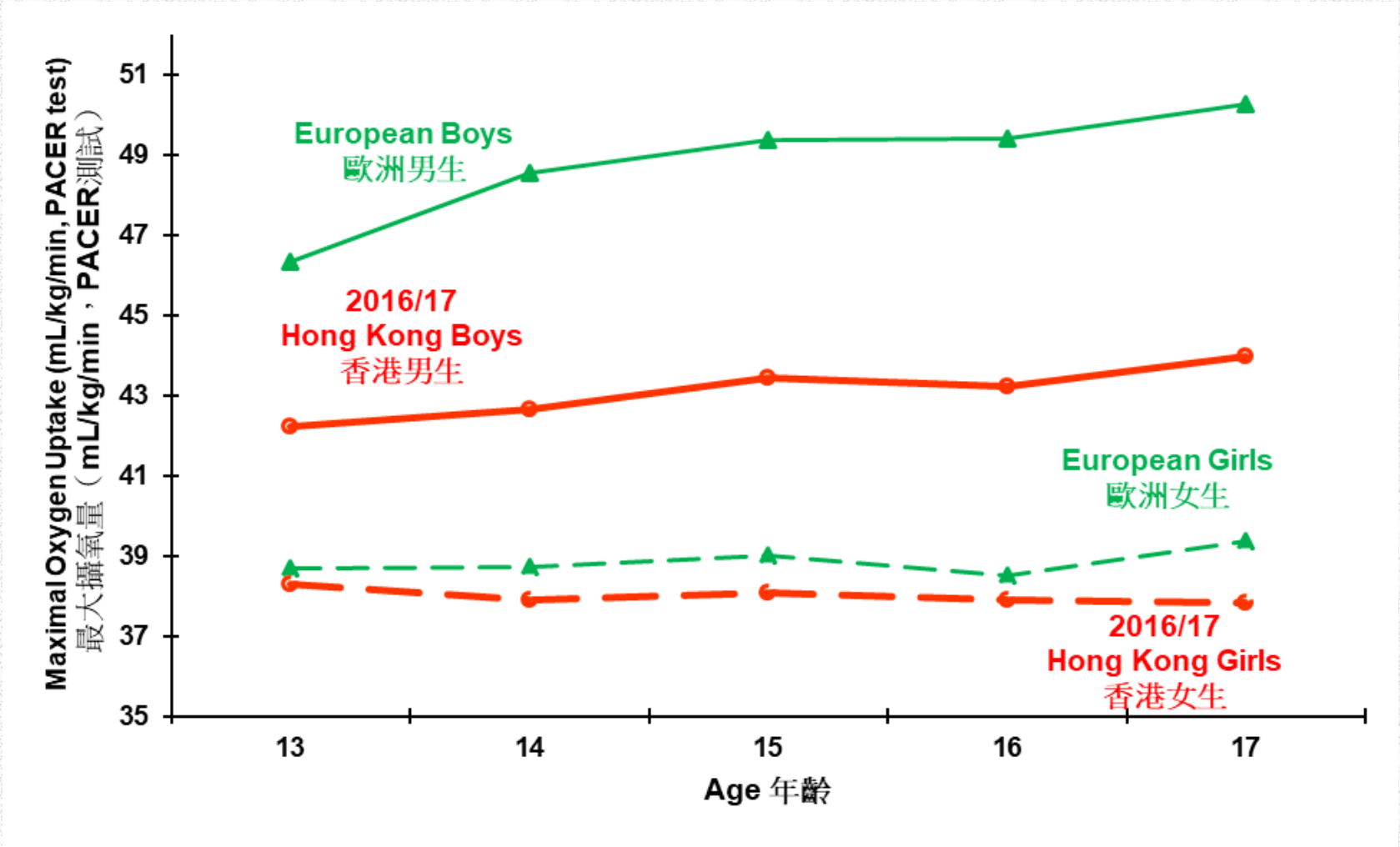
Flexibility



Muscle strength

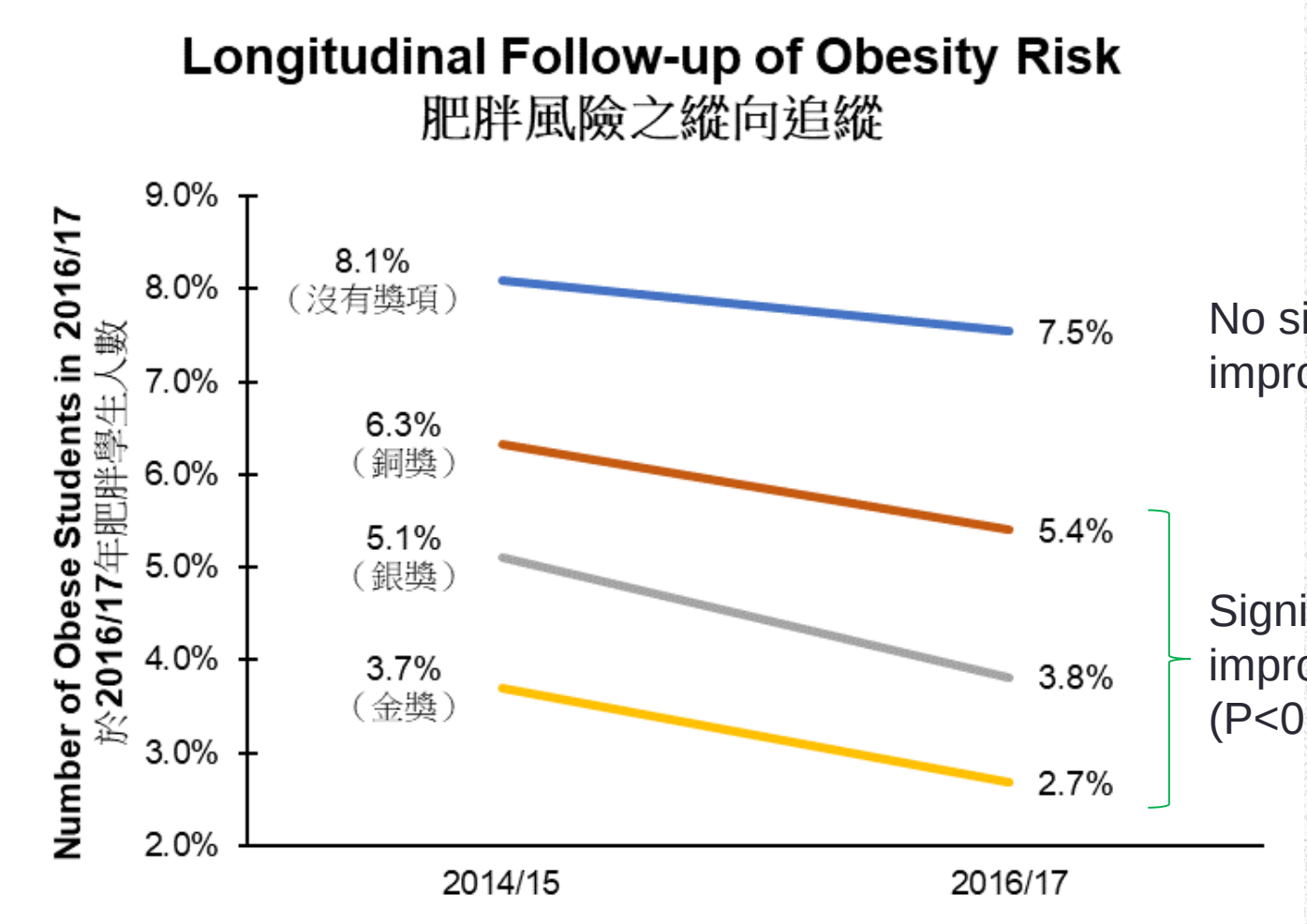


Cardiorespiratory fitness



Effect of the School Physical Fitness Award Scheme on student obesity risk

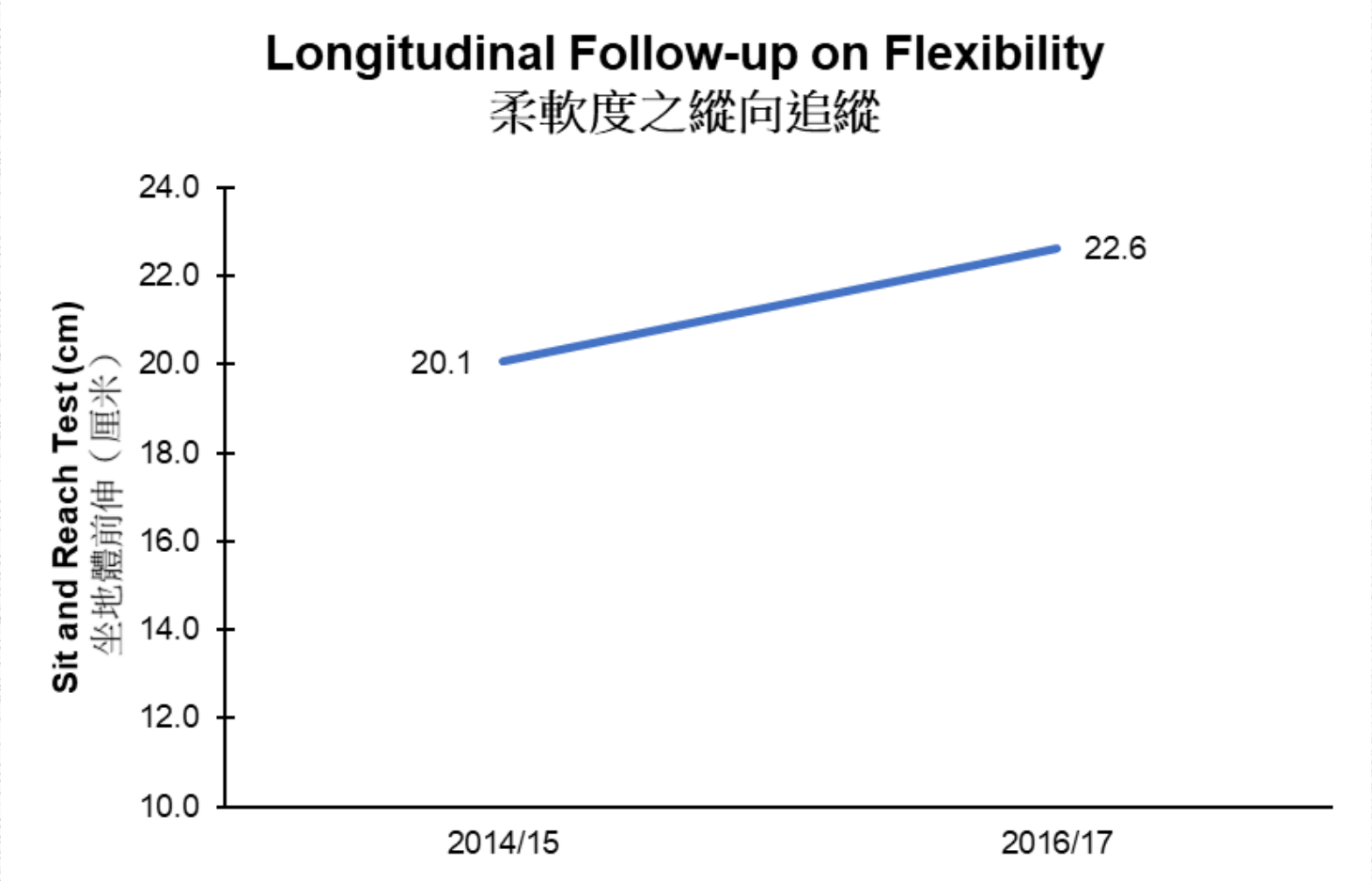
Longitudinal follow-up of 34,706 students from the School Physical Fitness Award Scheme



Students with better awards have lower risk for obesity in 3 years

Effect of the School Physical Fitness Award Scheme on student flexibility

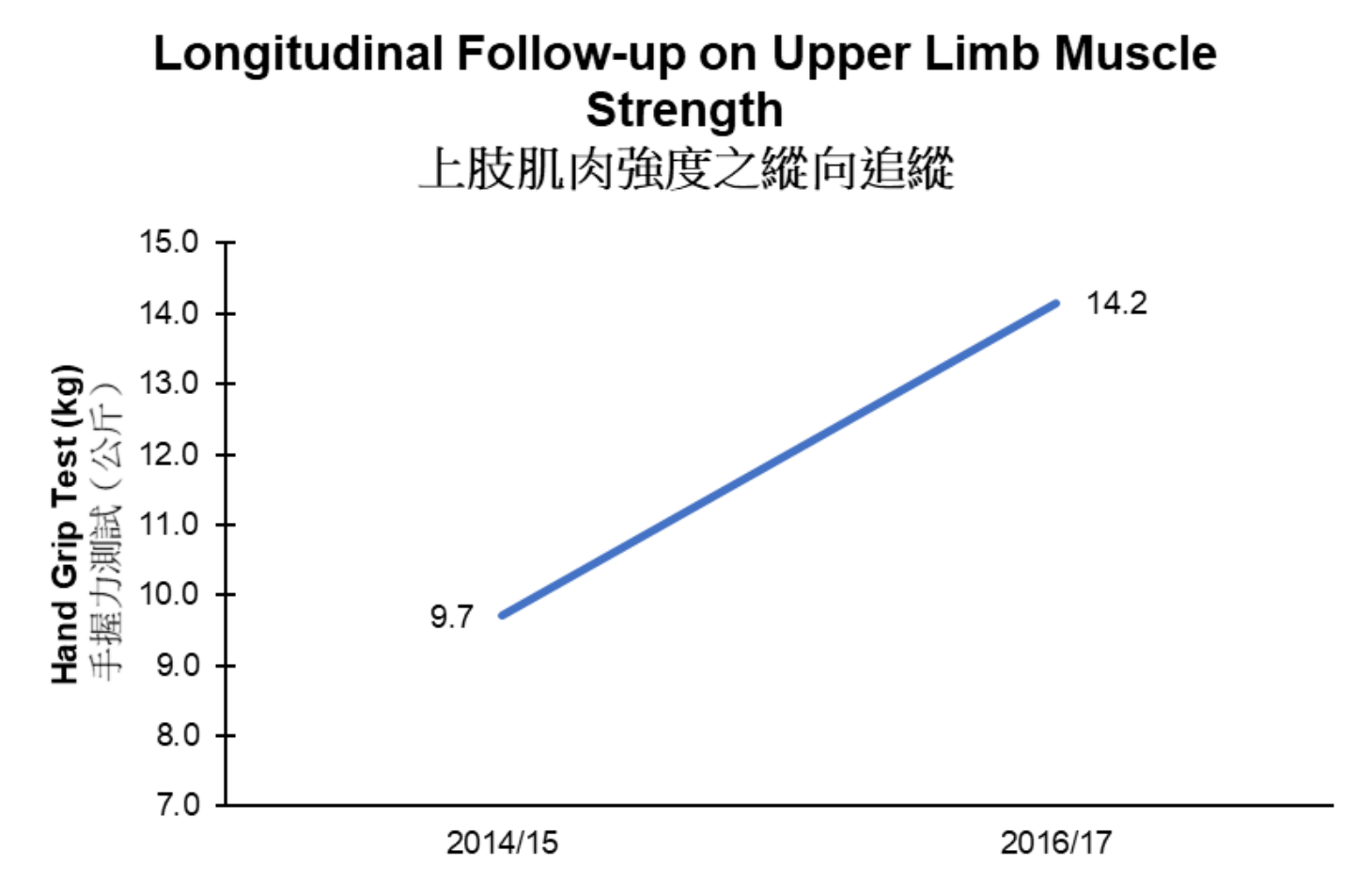
Longitudinal follow-up of 8,047 students who did not receive any awards in 2014/15



SPFAS helps weaker students to improve in flexibility

Effect of the School Physical Fitness Award Scheme on student upper limb muscle strength

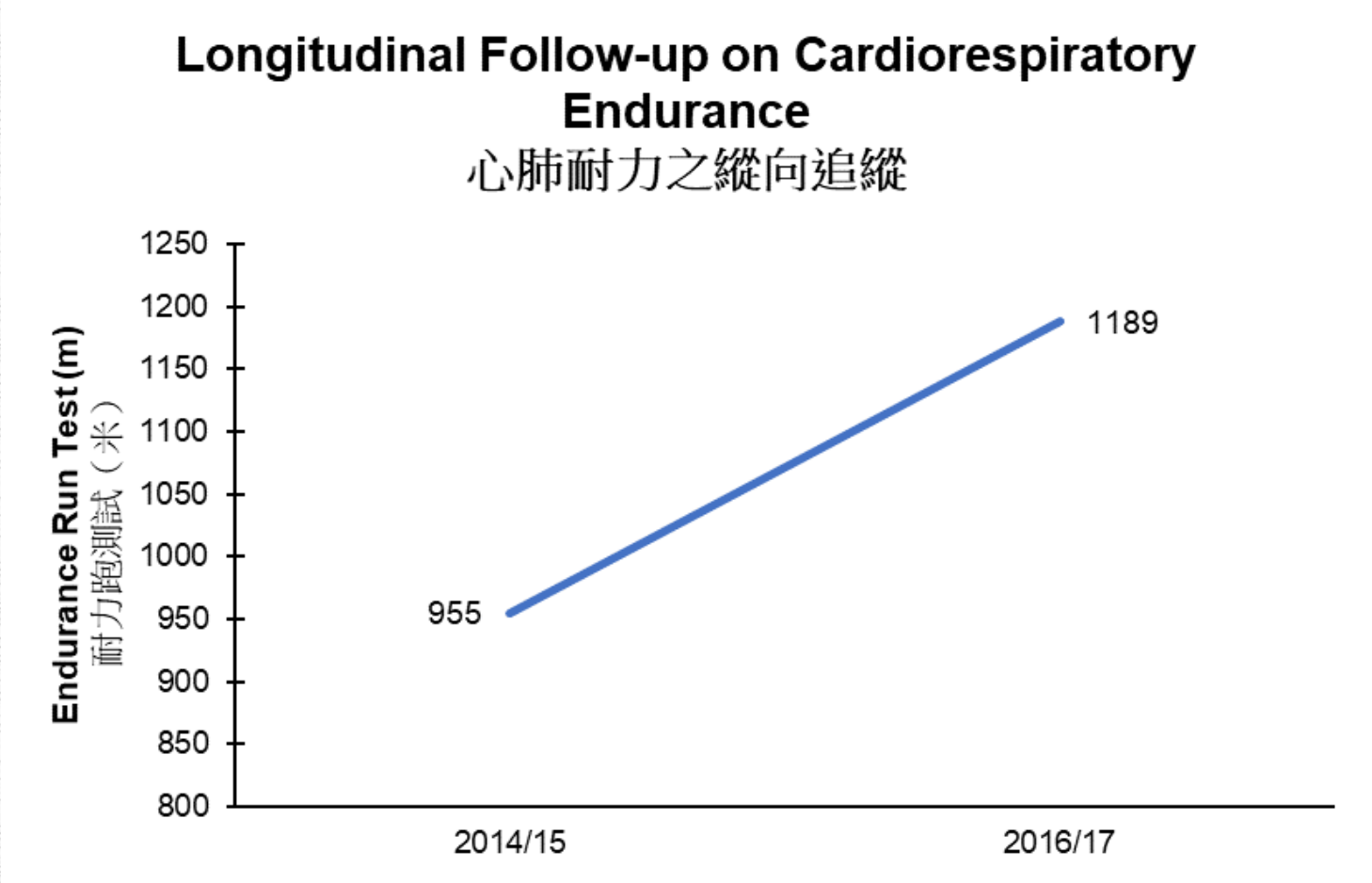
Longitudinal follow-up of 8,047 students who did not receive any awards in 2014/15



SPFAS helps weaker students to improve in muscle strength

Effect of the School Physical Fitness Award Scheme on student cardiorespiratory fitness

Longitudinal follow-up of 8,047 students who did not receive any awards in 2014/15



SPFAS helps weaker students to improve in cardiorespiratory fitness

Sports Mentorship Programme
(Randomised Controlled Trial)

Subjects: *664 students from 12 secondary schools in 2014/15*

Age at Recruitment: *12–14 years (S1–2)*

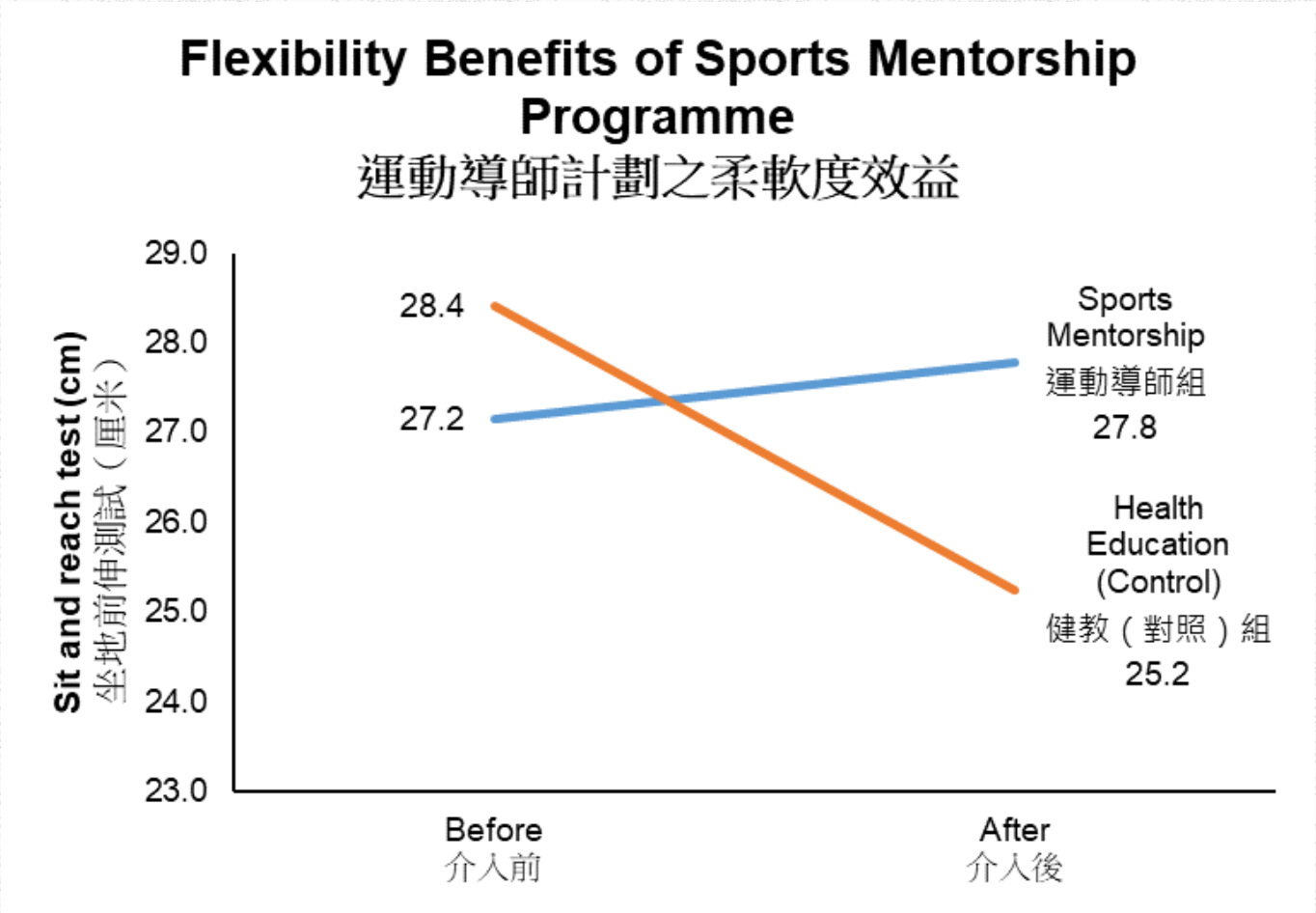
Intervention: *18 sessions of 90-minute Sports Mentorship*

Control: *Health education website*

Assessments: *Physical and mental health, physical fitness (before and after intervention)*

Effect of sports mentorship programme on flexibility in adolescents

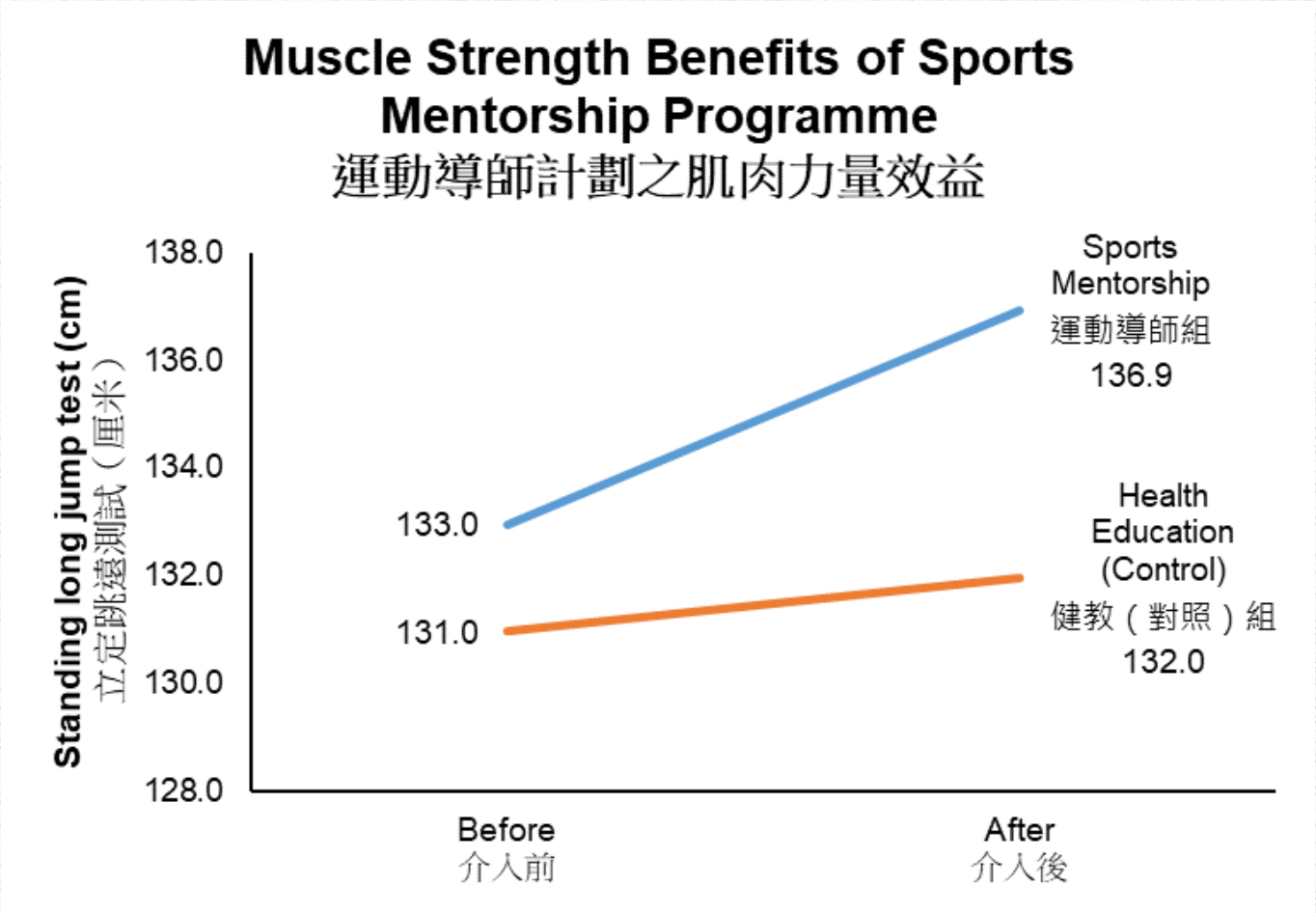
School-based sports mentorship programme on 664 adolescents (12–14 years)



SMP helps students to improve in flexibility

Effect of sports mentorship programme on muscle strength in adolescents

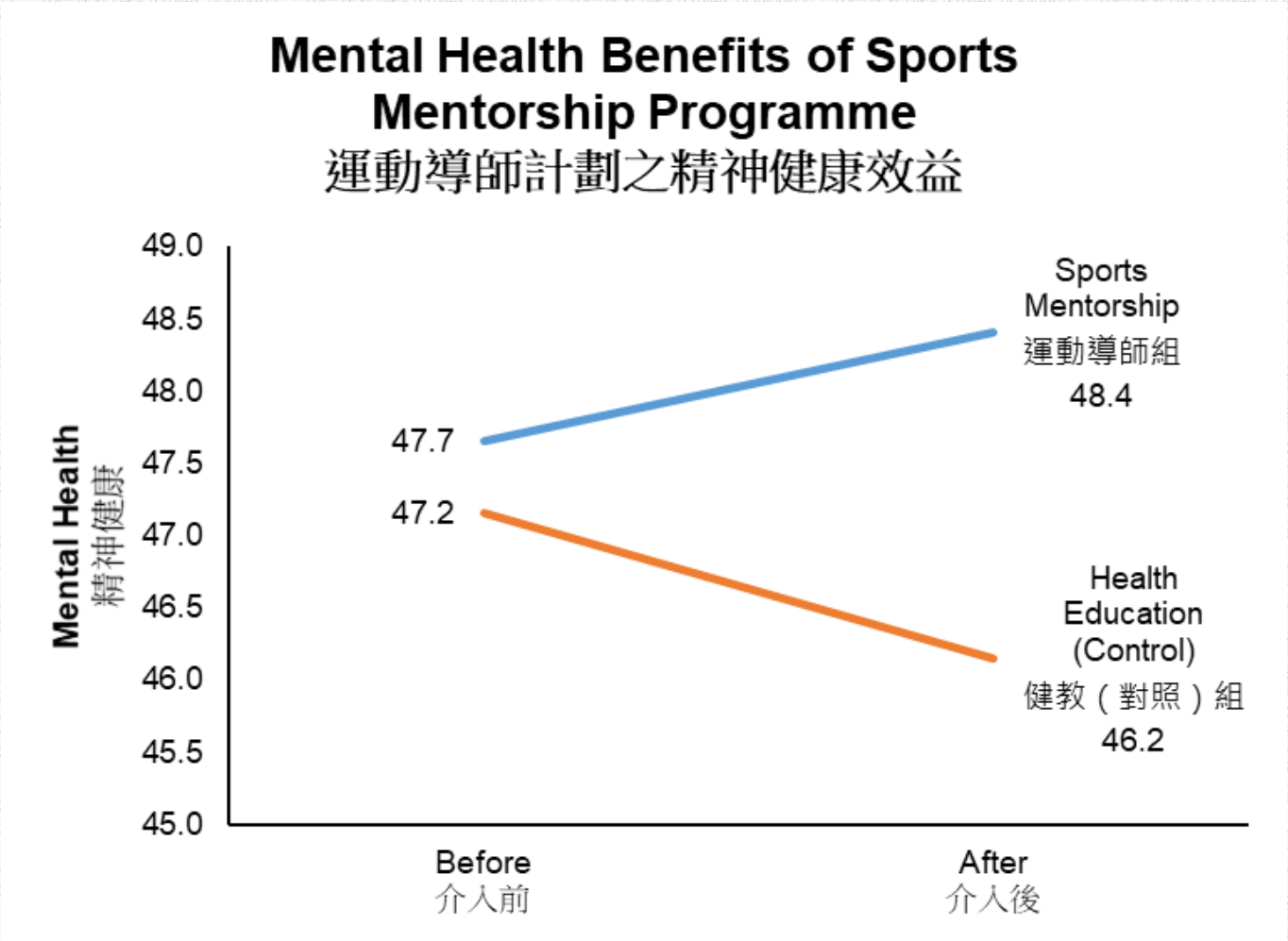
School-based sports mentorship programme on 664 adolescents (12–14 years)



SMP helps students to improve in muscle strength

Effect of sports mentorship programme on mental wellbeing in adolescents

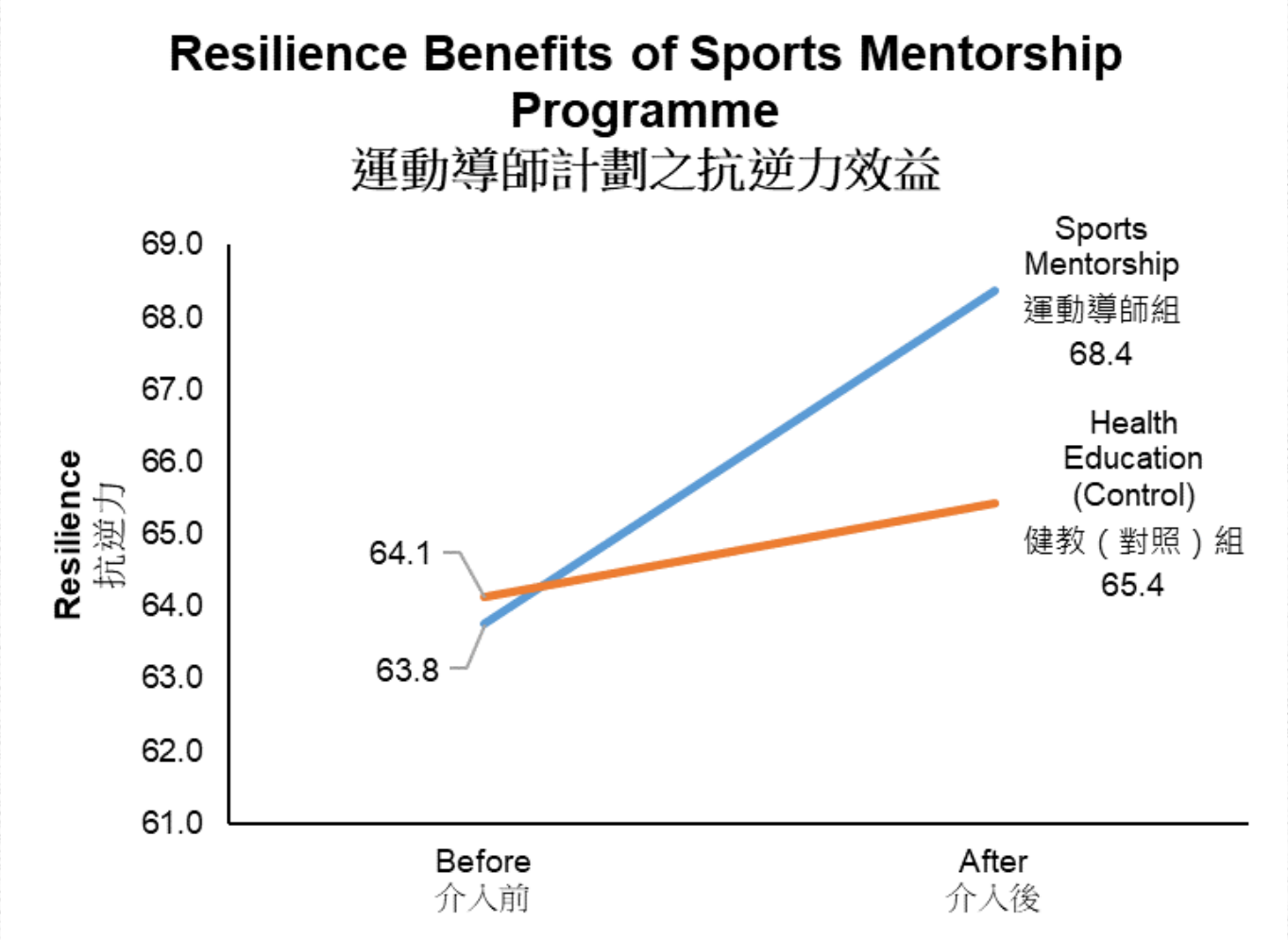
School-based sports mentorship programme on 664 adolescents (12–14 years)



SMP helps students to improve mental wellbeing

Effect of sports mentorship programme on resilience in adolescents

School-based sports mentorship programme on 664 adolescents (12–14 years)



SMP helps students to improve in resilience

Conclusions

- Despite best efforts, physical fitness of Hong Kong children and adolescents are still not as good as overseas peers
- School Physical Fitness Award Scheme is a school-level intervention which successfully promote physical fitness and physical activity
- Sports Mentorship Programme is a individual-level intervention improving physical fitness and mental health of adolescents
- In view of the benefits of physical activity on child health and development, we recommend:
  - Students to follow the World Health Organization guideline and accumulate at least 60 minutes of moderate-to-vigorous intensity physical activity every day
  - Schools and families to enrich students' opportunity to exercise