Child and adolescent behaviour in long-term evolution (CABLE): a school-based health lifestyle study

Lee-Lan Yen

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What is This?
Session 1

Lee-Lan Yen, et al.

Child and adolescent behaviour in long-term evolution (CABLE): a school-based health lifestyle study

Children and adolescents are an important asset for our country and society. Their health is tied to individual factors and the environment that they grow and develop in. After the dramatic decline in the infant mortality rate due to improvements in medical technology and environmental sanitation, the main focus of health promotion has shifted. Although conducting research on the influence of such things as congenital and environmental factors on the quality of health of infants remains important (Golding, 1989; Farrow and Preece, 1995), investigation of the health status and behavioural development of children and adolescents from individual, family and school perspectives, has become even more essential area of research (Glendinning et al., 1997; Griffin et al., 1999; Jones et al., 1990; Karronen and Rimpela, 1996; McLellan et al., 1999; Paetsch and Bertrand, 1997; Sweeting and West, 1995). As a lifestyle based study following the development of children and their health related behaviours has never previously been conducted in Taiwan, the CABLE (Children and Adolescent Behaviour in Long-term Evolution: a school-based health lifestyle study) project, a prospective cohort based research model, was designed to collect and explore in-depth a multitude of health behavioural science related information.

According to health statistics for Taiwan, the leading causes of death in the 5-9 years age group, 10-14 years age group, and the 15-19 years age group include: accidental injury, malignant neoplasms, heart disease, and suicide (Dept. of Health, 1999). Many causes of death are intricately linked to a person’s lifestyle (McGinnis and Foege, 1993; CDC, 1996; US DH&W, 1997). For example, it has been well established that smoking, consumption of unhealthy foods, lack of exercise, alcohol abuse, drug abuse and accidental injury lead to both increased morbidity and mortality. The damage caused by a combination of harmful behaviours is much greater than that caused by a single behaviour alone (Sameroff et al., 1993). Moreover, the longer the period of exposure to such behaviours, the greater the damage incurred. Therefore it is important when assessing the relationship between lifestyle and health, to comprehensively assess the various different habits that combine to form an individual’s routine daily life.

Pre-school, primary school and junior high school are times when many behaviours and habits are developed. Therefore it is a period of time that has an important influence on a person’s health. As an individual grows and develops, and the environment around them changes, some of their behaviours may also change, perhaps resulting in even more detrimental behaviours (Eyberg, 1998). A completed survey of Taipei City junior high school students showed that 98.9% consume fast food, 92.6% stay up late, 91.8% suppress urination, 90.4% watch TV or play video games for prolonged periods of time, 73.7% run in stairwells, 62.6% tell offensive jokes, and 58.1% break things when angry (Yen, et al.). Therefore it can be seen that such behaviours are quite common in seventh graders. Moreover, these harmful behaviours have the potential to be prevented or modified at an early stage.

Primary school students aged between 6 and 12, due to their cognitive and behavioural development, gradually become less reliant on their parents and begin to develop into individuals (Piaget, 1929). Therefore, this is also a period where they are more receptive to behavioural guidance. As a result, a longitudinal study that follows a study population from primary school to junior high school should be both economically viable and effective.

Overall objectives

Although some specific study objectives will vary slightly over time and with differing analytical perspectives, the following central objectives for the CABLE project will remain consistent.

1. To understand the distribution, aggregation and changes in health related behaviours of students.

Yearly cross-sectional data will be used to delineate the distribution, factor structure, and cluster characteristics of student health behavior. In addition, data will be compared on the basis of area, school, sex, grade and other factors. Longitudinal data collected over several years will be used to observe the changes in health behaviours over time.

2. To investigate the influence of parents on student health behaviour and health status.

There are four kinds of parental-student relationships: father-son, father-daughter, mother-son, and mother-daughter. The transfer of behaviours, attitudes and habits from generation to generation, was assessed based on the distribution, aggregation, strength and mechanism of health behaviors.

3. To elucidate individual, family and school factors that influence student health behaviours.

After developing an understanding of the student’s individual background, interpersonal relationships, family and school characteristics, multivariate statistical methods will be used to...
establish variables related to student health behavior. In addition, the direct and indirect relationships between these variables will be calculated.

4. To develop an understanding of the health status of students from biological, psychological and sociological perspectives and examine the relationship that this has with health behavior. The yearly cross-sectional data will be used to study student health from the three perspectives of biology, psychology and sociology, as well as further verify the relationship between these three areas and health. Data from the longitudinal study can be used to assess the changes in the students’health status over time.

Study design

The CABLE research proposal was passed by the National Health Research Institutes’examining committee in January 2000 and was commenced in March. The acronym “CABLE” was chosen as the project logo in order to create a common term of reference among those in the research group and also for ease of communication when discussing the project with others. This logo was created from the first letter of each word of the study title. Cable, meaning electrical cable or broadband cable, is an essential item in modern daily life. This project incorporates certain basic qualities akin to those of cables such as length (long-term follow-up), heterogeneity (health is considered from the different perspectives of biology, psychology, and sociology), and breadth (the scope of the project includes individual, family and school factors). If the world CABLE is read backwards as “ELBAC”, the pronunciation is similar to the Chinese “ai-bai-ke”. This phrase means “an encyclopedia for loving and cherishing children”, emphasising that knowledge about how to care for children is something worth exploring and investigating. The CABLE research team incorporates a love of children with the ideal of health without limits.

The most ideal place for recruiting study subjects for a long-term study of child development is a primary school. As a result it was decided to select first grade primary school students in 2001 as the sample population and follow them consecutively over the next few years. As the reform of the education system has just been completed prior to 2001, this group of students will be the first to experience the first to ninth grade new education system. In order to gain an understanding of the different influences on student lifestyle and health status by...
the old and new educational systems, an additional study group of fourth graders was chosen. In addition, to compare differences between metropolitan and rural areas, the two locations of Taipei City and Hsinchu County were selected. The basic research design of the project is focused on young students as shown in Figure 2. In both Taipei and Hsinchu, a first grade and a fourth grade sample population was selected, giving a total of four sample groups for the two areas combined. Students and their parents will be surveyed yearly for a planned duration of 5 years.

The study’s framework

The design of the CABLE study is based on the principles of the ecological model (Bronfenbrenner, 1979) and is shown in Figure 3. The emphasis of the ecological model is that in-depth research should be carried out at a variety of different levels including individual, interpersonal, organisational, community and public policy. This multifaceted approach is a more effective and comprehensive way of looking at problems than by simply focusing on a single level (McLeroy, et al. 1988; Stokols, 1996). The research design incorporates the two dependent variables of health lifestyle and health behaviour. The variable health lifestyle is made up of health harming behaviours, health protecting behaviours, and health promoting behaviours. The variable health status will be assessed according to biological, psychological and sociological perspectives. The three independent variables of individual factors (student and parental personal characteristics), interpersonal factors (the interpersonal relationships the student has at home and school), and organisational factors (the structure and function of the family, school and community), will also be considered.

During long-term follow up of the study group, additional information will be gathered yearly as illustrated by the long-term research framework in Figure 4. The basic study design will be as mentioned above, with only minor changes over time. Certain factors that are unlikely to change over time such as student and parental population characteristics, family structure, and school size and resources, will be referred to as independent or controlled variables.

Study subjects

There are 152 primary schools in Taipei City and 79 in Hsinchu County. As there are only a few private primary schools in these two areas (10 in Taipei City and 1 in Hsinchu County), and as the origin and family background of the students in these schools is quite dissimilar to the students in public schools, these private schools were excluded from the sample population. Based on the number of first grade students, schools were divided into small (50-199 students), medium-sized (200-399 students) and large (more than 400 students). Schools with less than 50 students were not included in the sample population. After this, schools were randomly selected to participate in the survey. To ensure that the numbers of children chosen from each type of school was about equal it was decided to select 6 small schools, 2 medium-sized schools and 1 large school from each location. An approximate estimate of student numbers was calculated as being 70 x 6 (small schools), 200 x 2 (medium-sized

<table>
<thead>
<tr>
<th>Subjects</th>
<th>First grade</th>
<th>Fourth grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population (n)</td>
<td>33,652</td>
<td>7,072</td>
</tr>
<tr>
<td>Sample selected (n)</td>
<td>1,950</td>
<td>1,634</td>
</tr>
<tr>
<td>Sample completed (n)</td>
<td>1,297</td>
<td>921</td>
</tr>
<tr>
<td>Response rate (%)</td>
<td>66.5</td>
<td>56.4</td>
</tr>
<tr>
<td>Children’s fathers (n)</td>
<td>991</td>
<td>736</td>
</tr>
<tr>
<td>Children’s mothers (n)</td>
<td>1,107</td>
<td>796</td>
</tr>
</tbody>
</table>

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by the CABLE research team to establish
Initially, numerous discussions were held
were randomly selected. The grade one
4880. In the event that some schools
locations, the overall number of students
for the study was estimated as being
1,220 students. In addition, as two sets of students were
addition, as two sets of students were
giving a total of 1,220 students. In
A small-scale pilot study was carried out
July 2001, using the revised questionnaires.
questionnaires, as were several primary
expertise in psychology, sociology,
questionnaires were compiled for the
fourth graders, mothers and fathers.
different target groups of first graders,
questionnaire was drawn up. Both the
rating scales for health behaviour,
be formed with
So that a long-term co-operative
survey of first graders after November,
as first graders need a period of time to
adjust to school life and learning. The
questionnaire forms and other related
items used in the survey are all sent to
the schools prior to commencing. When
the survey team arrives at the school, a
team of two people prepares the
questionnaire forms, stationery, stickers,
demonstration posters (used when explaining the questionnaires) needed
for all the classes. Before commencing,
the assistance of the class teacher is
sought to ensure that the students are
prepared and have gone to the toilet. Then, the students whose parents have
given consent are instructed to congregate on one side of the room. The
students whose parents did not give consent are either instructed to group on
the other side of the room or are taken out of the classroom by the class teacher.
When the survey is being conducted, one interviewer explains the
questionnaire and instructs the students how to complete it. The other interviewer
is responsible for keeping order in the classroom. For first graders, an
interviewer reads out the questions and responses slowly, helping the students to
answer the questions one by one. Fourth graders are left to fill in the
questionnaires by themselves, and are to raise their hands to ask questions if
necessary. The students in the classroom that are not participating in the survey
will be given paper by the interviewer for drawing or paper folding. Those students who are sitting quietly at their desk will
be rewarded with a sticker. Interviewers are also responsible for calming down
students who are being disruptive. The
group supervisor will visit all classes

Instruments
Initially, numerous discussions were held
by the CABLE research team to establish
the underlying principles of the project.
The team then divided into three groups
for literature review after which a draft
d questionnaire was drawn up. Both the
student and parental questionnaires
included parts about basic personal and
family information, inter-family
relationships, and school life, as well as
rating scales for health behaviour,
psychological health, and social health.
In addition, four different versions of the
questionnaires were compiled for the
different target groups of first graders,
fourth graders, mothers and fathers.
These draft questionnaires were
reviewed and discussed at the routine
weekly meetings and necessary
alterations made. In addition,
punctuation symbols (to help children
read complicated Chinese characters)
were added to the student
questionnaires. Ten persons with
expertise in psychology, sociology,
behavioural science, health education,
and policy management, were requested
to review and comment on the
questionnaires, as were several primary
school teachers.
A pilot test was conducted from June to
July 2001, using the revised questionnaires.
A small-scale pilot study was carried out
on 5 first graders
and 5 fourth graders and their parents.
A larger pilot study was also carried out
on the students in an after school child
care class from two institutes, with a total
of 37 first graders and 79 fourth graders
participating. In line with certain
practical considerations and after
analysis of the results from these pilot
studies, the questionnaire forms were
again modified and the final copy
developed. As first graders have a limited
attention span, their questionnaires were
divided into a “vegetable” section and an
“animal” section to be completed on
two separate occasions. After the
questionnaires were collected, tests of
validity and reliability were performed
on the results to confirm the usability of
the research instruments.
As the study is being carried out on
children, it is necessary to gain the
consent of the child’s parent or guardian
before including the child in the study.
Therefore, an informed consent form was
designed that included information about
the CABLE project, the methods of
participation for students and their
parents, data processing methods and
privacy. The CABLE proposal,
questionnaires and consent form were all
reviewed and passed by the Human
Research Medical Ethics Committee of
the National Health Research Institutes.

Data collection
So that a long-term co-operative
relationship could be formed with
the schools involved in the study,
the 18 schools were divided into
groups, with one CABLE research team
member assigned to each group as a
supervisor. In each school, a contact
person was chosen (either the school
administrator, guidance officer or nurse)
to create a reliable communication
channel between the CABLE team
and the school. In addition, there were
60 university students recruited for
the project who were given interview
training. The main elements of this
training included: introduction to the
ideals of the CABLE project; explanation
of the contents of the questionnaires;
explanation of the survey procedure; and
any important points to keep in mind
when conducting the survey. In addition,
as the CABLE research team uses the
acting out of a play to present the survey;
possible problems that may be
encountered during such a performance
were discussed and any questions
answered, so that ability and self-
confidence could be strengthened. These
interviewers were divided into six teams
along with a supervisor, each team being
responsible for three schools each. In
the initial stage, through the assistance
of the school’s contact person, first grade
and fourth grade student teachers
distributed the informed consent forms
for parents to complete. Only those
students whose parents agreed to their
participation in the study were included
in the student sample group. From
October to December 2001, each survey
team conducted surveys of their
respective schools according to a
schedule. It was decided to conduct the
survey of first graders after November,
as first graders need a period of time to
adjust to school life and learning. The
questionnaire forms and other related
items used in the survey are all sent to
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be rewarded with a sticker. Interviewers are also responsible for calming down
students who are being disruptive. The
group supervisor will visit all classes
being interviewed and will provide any assistance needed. The first graders complete the questionnaire in two class periods. The fourth graders use one class period for questionnaire completion. The interviewers give the parent questionnaire form to the students to take home as the completed student forms are being collected. The students are requested to give the questionnaire to their parents and hand in the completed and signed form to their class teacher the following day. Students health information will be gathered from the school health records. Schools conduct their health examinations during the second semester, which in 2002 will be from February to May. As it takes some time for the student data files to be completed after the examinations, this information will be gathered from the school health database in September 2002, after the first semester of the new school year has begun.

Data management
After the questionnaires from the first year of the survey have been collected, the data will be coded, keyed in, examined for errors and corrected where necessary. Six computer files will then be created as follows: one for the first grade students, one for the parents of the first grade students, one for the fourth grade students, one for fourth grade parent file, one for the fourth grade students, a combined first grade student-parent file, and a combined fourth grade student-parent file. Statistical analysis will be performed on this cross-sectional data on the basis of the research questions of the study and the characteristics of the variables. Apart from descriptive statistics, inferential statistical methods such as the chi-square test, ANOVA test, multiple regression analysis, logistic regression analysis, hierarchical regression analysis, cluster analysis, and path analysis will also be used. As the study will be continued over consecutive years, as well as the six cross-sectional database files mentioned above, yearly chronological files will also be produced. After the second year of the study, hypotheses will be developed and verified through repeated measurements and observing changes in trends. As the data from this study will become more and more complicated over time, the data management systems will be constructed continually.

Preliminary results on the distribution of health behaviours
The analysis of the data collected from the CABLE project during 2001 will be able to answer many research questions posed by our study objectives. In view of the length limitations of this report, it will only include the results of the statistical analysis of health behaviours and will describe the distribution of health behaviours amongst first and fourth graders. Further reports will be compiled and released in the future. As shown in Table 2, many behaviours beneficial to health such as eating breakfast, paying attention to safety whilst walking, drinking water, wearing a seatbelt, brushing teeth before sleeping, eating fruit and vegetables, wearing a helmet when on a motorcycle and washing hands before eating, were reported by about 70% of both first and fourth graders as being performed either frequently or always. However, the proportion of students participating in exercise (apart from school physical education classes) was lower, at about 50 to 60%.

The proportion of students reporting certain health behaviours was compared according to sex, area and year group (see Table 3). The variation in behaviours amongst first graders was relatively small, however that amongst fourth graders was larger. When comparing behavioural differences between boys and girls, apart from a few behaviours (the proportion of fourth graders who wear seatbelts and do exercise in Hsinchu County) that were more prevalent in boys, the proportion of girls practising positive health behaviours was higher than that of boys. When the two study locations were compared, where differences were present, the rates of healthy behaviours were higher in Taipei City than in Hsinchu County. Comparison of the two different grades revealed that first graders were more likely than fourth graders to brush their teeth before sleep and eat breakfast. Fourth graders

| Table 2 | Distribution of the percentages of children who always or frequently performed health promoting behaviours positive to health by sex, area and grade, 2001 |
|---------|---------------------------------------------------------------------------------|---------|----------------|---------|----------------|---------|----------------|---------|----------------|---------|----------------|
|         | **Taipei** | **Hsinchu** | **Taipei** | **Hsinchu** | **Taipei** | **Hsinchu** | **Taipei** | **Hsinchu** | **Taipei** | **Hsinchu** | **Taipei** | **Hsinchu** |
| **Behaviour** | **Boy** | **Girl** | **Sub-total** | **Boy** | **Girl** | **Sub-total** | **Boy** | **Girl** | **Sub-total** | **Boy** | **Girl** | **Sub-total** | **Boy** | **Girl** | **Sub-total** | **Boy** | **Girl** | **Sub-total** | **Boy** | **Girl** | **Sub-total** | **Boy** | **Girl** | **Sub-total** |
| Walking carefully | 81.5 | 81.8 | 81.7 | 80.6 | 82.1 | 81.4 | 81.6 | 80.5 | 80.9 | 84.6 | 72.3 | 80.3 | 76.0 | 80.5 |
| Using seatbelts | 77.9 | 80.4 | 79.1 | 73.4 | 77.3 | 75.3 | 75.5 | 81.5 | 85.4 | 84.5 | 75.7 | 69.7 | 72.9 | 70.9 |
| Wearing motorcycle helmet | 82.5 | 81.8 | 82.2 | 72.8 | 71.3 | 72.1 | 78.0 | 87.3 | 88.9 | 88.1 | 63.6 | 63.3 | 63.5 | 76.4 |
| Washing hands before eating | 71.2 | 77.8 | 74.4 | 72.6 | 78.5 | 75.5 | 74.9 | 74.4 | 79.4 | 76.8 | 66.3 | 77.6 | 71.4 | 71.3 |
| Brushing teeth before sleeping | 79.9 | 87.2 | 83.4 | 80.1 | 78.1 | 79.1 | 81.6 | 79.9 | 85.8 | 82.8 | 65.3 | 76.2 | 70.4 | 76.9 |
| Eating breakfast | 89.8 | 90.6 | 90.2 | 84.7 | 86.1 | 85.7 | 88.3 | 86.3 | 89.8 | 88.3 | 80.5 | 87.6 | 84.9 | 86.3 |
| Eating fruit and vegetables | 73.3 | 77.9 | 77.6 | 86.9 | 72.4 | 79.2 | 74.5 | 84.2 | 86.9 | 86.5 | 71.6 | 76.1 | 74.7 | 80.9 |
| Drinking water | 84.5 | 83.7 | 84.1 | 77.7 | 78.1 | 77.9 | 81.5 | 88.9 | 88.9 | 88.9 | 81.7 | 80.5 | 81.1 | 86.2 |
| Doing exercise | 65.6 | 63.4 | 65.2 | 59.4 | 63.9 | 61.6 | 61.4 | 65.9 | 63.6 | 64.8 | 63.3 | 54.2 | 59.0 | 62.0 |
### Table 3

**Results of chi-square tests of the percentages of children who always or frequently performed behaviours positive to health by sex, area and grade, 2001**

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>First graders</th>
<th></th>
<th>Fourth graders</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Taipei by sex</td>
<td>Hsinchu</td>
<td>Taipei by sex</td>
<td>Hsinchu</td>
</tr>
<tr>
<td></td>
<td>sex</td>
<td>area</td>
<td>sex</td>
<td>area</td>
</tr>
<tr>
<td>Walking carefully</td>
<td>—</td>
<td>—</td>
<td>P&lt;.001 (M &lt; F)</td>
<td>P&gt;.05 (T &gt; H)</td>
</tr>
<tr>
<td></td>
<td>—</td>
<td>—</td>
<td>P&gt;.05 (M &gt; F)</td>
<td>P&gt;.001 (T &gt; H)</td>
</tr>
<tr>
<td>Using seat-belts</td>
<td>—</td>
<td>—</td>
<td>P&gt;.05 (M &gt; F)</td>
<td>P&gt;.001 (T &gt; H)</td>
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<tr>
<td></td>
<td>—</td>
<td>—</td>
<td>P&gt;.05 (M &gt; F)</td>
<td>P&gt;.001 (T &gt; H)</td>
</tr>
<tr>
<td>Wearing motorcycle helmet</td>
<td>P&gt;.007 (M &gt; F)</td>
<td>—</td>
<td>P&gt;.001 (M &gt; F)</td>
<td>—</td>
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<td>—</td>
<td>P&gt;.001 (M &gt; F)</td>
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<tr>
<td>Washing hands before eating</td>
<td>P&gt;.001 (M &gt; F)</td>
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<td>P&gt;.001 (M &gt; F)</td>
<td>—</td>
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<td>—</td>
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<td>P&gt;.001 (M &gt; F)</td>
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<tr>
<td>Brushing teeth before sleeping</td>
<td>—</td>
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<td>P&gt;.001 (M &gt; F)</td>
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<td>P&gt;.001 (M &gt; F)</td>
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<tr>
<td>Eating breakfast</td>
<td>—</td>
<td>—</td>
<td>P&gt;.001 (M &gt; F)</td>
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<td>P&gt;.001 (M &gt; F)</td>
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<tr>
<td>Eating fruit and vegetables</td>
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<td>P&gt;.001 (M &gt; F)</td>
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<tr>
<td>Drinking water</td>
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<td>P&gt;.001 (M &gt; F)</td>
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<tr>
<td></td>
<td>—</td>
<td>—</td>
<td>P&gt;.001 (M &gt; F)</td>
<td>—</td>
</tr>
<tr>
<td>Doing exercise</td>
<td>—</td>
<td>—</td>
<td>P&gt;.001 (M &gt; F)</td>
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</tr>
<tr>
<td></td>
<td>—</td>
<td>—</td>
<td>P&gt;.001 (M &gt; F)</td>
<td>—</td>
</tr>
</tbody>
</table>

—: Non-significant
M: Male  F: Female  T: Taipei City  H: Hsinchu county  1: 1st grade  4: 4th grade

### Table 4

**Distribution of the percentages of children who had on one or more occasions performed behaviours negative to health by sex, area and grade, 2001**

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>First graders</th>
<th></th>
<th>Fourth graders</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Taipei by sex</td>
<td>Hsinchu</td>
<td>Taipei by sex</td>
<td>Hsinchu</td>
</tr>
<tr>
<td></td>
<td>sex</td>
<td>area</td>
<td>sex</td>
<td>area</td>
</tr>
<tr>
<td>Staying up late</td>
<td>68.0 65.0</td>
<td>64.7 66.0</td>
<td>65.7 86.9</td>
<td>79.2 77.9</td>
</tr>
<tr>
<td>Eating food before sleep</td>
<td>60.8 57.7</td>
<td>59.3 54.8</td>
<td>57.8 65.8</td>
<td>39.2 51.6</td>
</tr>
<tr>
<td>Eating fast-food</td>
<td>67.0 59.9</td>
<td>63.5 60.9</td>
<td>61.1 67.6</td>
<td>52.0 67.6</td>
</tr>
<tr>
<td>Suppressing urination</td>
<td>49.5 43.2</td>
<td>56.4 59.8</td>
<td>57.4 51.6</td>
<td>58.2 68.0</td>
</tr>
<tr>
<td>Playing video games &gt; 2hrs</td>
<td>49.8 43.0</td>
<td>57.6 57.4</td>
<td>52.8 40.0</td>
<td>28.7 57.3</td>
</tr>
<tr>
<td>Watching TV &gt; 2hrs</td>
<td>61.4 54.6</td>
<td>64.2 64.0</td>
<td>59.7 74.7</td>
<td>72.5 73.6</td>
</tr>
<tr>
<td>Using vulgar language</td>
<td>36.9 22.9</td>
<td>30.1 31.2</td>
<td>21.5 40.0</td>
<td>49.7 57.4</td>
</tr>
<tr>
<td>Destroying things when angry</td>
<td>25.8 13.4</td>
<td>20.2 14.2</td>
<td>17.2 25.1</td>
<td>33.8 29.7</td>
</tr>
<tr>
<td>Fighting with others</td>
<td>40.8 25.2</td>
<td>33.2 23.3</td>
<td>23.7 27.9</td>
<td>38.7 28.6</td>
</tr>
<tr>
<td>Destroying public property</td>
<td>8.4 5.6</td>
<td>6.9 7.8</td>
<td>6.9 6.8</td>
<td>6.1 5.7</td>
</tr>
<tr>
<td>Smoking</td>
<td>7.3 4.9</td>
<td>6.0 6.4</td>
<td>5.7 8.0</td>
<td>4.7 4.7</td>
</tr>
<tr>
<td>Drinking alcohol</td>
<td>31.2 20.5</td>
<td>26.0 23.4</td>
<td>31.8 28.1</td>
<td>40.4 27.0</td>
</tr>
<tr>
<td>Suicidal ideas</td>
<td>14.6 7.3</td>
<td>11.1 13.7</td>
<td>9.9 11.4</td>
<td>16.6 13.0</td>
</tr>
</tbody>
</table>

—: Non-significant
M: Male  F: Female  T: Taipei City  H: Hsinchu county  1: 1st grade  4: 4th grade
were more likely than first graders to eat fruit and vegetables and drink water.

Table 4 lists the behaviours harmful to health measured in the study. There were four unhealthy behaviours reported by more than 50% of first grade students, which were in order of incidence: staying up late, eating fast food, watching TV for more than two consecutive hours, and eating late at night. There were seven unhealthy behaviours present in more than 50% of fourth grade students, which were in order of incidence: staying up late, eating food late at night, watching TV for more than two consecutive hours, eating fast food, using vulgar language, getting involved in fights, and suppressing urination. Although the other unhealthy habits such as playing computer games for more than two consecutive hours, smoking and drinking alcohol, breaking things when angry, and suicidal thoughts were reported by less than 50% of students, as 20 to 40% of students have experienced these behaviours, early attention to these areas is required to prevent future problems arising.

When the results of negative behaviours were compared according to sex, area, and grade (see Table 5), many differences were statistically significant. In general, the rates of negative behaviours were higher in boys than in girls. The proportion of first graders eating fast foods and getting into fights was higher in Taipei City than in Hsinchu County. However, the proportion of first grade students engaging in other unhealthy behaviours, including playing computer games for more than two consecutive hours, watching TV for more than 2 consecutive hours, smoking and drinking alcohol, was higher in Hsinchu County than in Taipei City. The proportion of fourth graders staying up late, eating fast food, and experiencing suicidal thoughts was higher in Taipei City. However the proportion of fourth grade students eating late at night, playing computer games for more than 2 consecutive hours, watching TV for more than 2 consecutive hours and causing damage to private property, was higher in Hsinchu County. The proportion of students playing computer games for more than 2 consecutive hours, causing damage to public property, and smoking showed no difference between first and fourth graders. Other negative behaviours were more prevalent in fourth graders than in first graders.

**Conclusions**

More than 60% of students were already engaging in positive behaviours. However, as such behaviours both

<table>
<thead>
<tr>
<th>Table 5</th>
<th>Results of chi-square tests of the percentages of children who had on one or more occasions performed behaviours negative to health by sex, area and grade, 2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behaviour</td>
<td>First graders</td>
</tr>
<tr>
<td></td>
<td>Taipei</td>
</tr>
<tr>
<td>Staying up late</td>
<td>—</td>
</tr>
<tr>
<td>Eating food before sleeping</td>
<td>—</td>
</tr>
<tr>
<td>Eating fast food</td>
<td>P &lt; .008 (M &gt; F)</td>
</tr>
<tr>
<td>Suppressing urination</td>
<td>P &lt; .025 (M &gt; F)</td>
</tr>
<tr>
<td>Playing video games &gt; 2h</td>
<td>—</td>
</tr>
<tr>
<td>Watching TV &gt; 2 hrs</td>
<td>P &lt; .001 (M &gt; F)</td>
</tr>
<tr>
<td>Using vulgar language</td>
<td>P &lt; .002 (M &gt; F)</td>
</tr>
<tr>
<td>Destroying things when angry</td>
<td>P &lt; .001 (M &gt; F)</td>
</tr>
<tr>
<td>Destroying public property</td>
<td>P &lt; .001 (M &gt; F)</td>
</tr>
<tr>
<td>Smoking</td>
<td>—</td>
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<tr>
<td>Drinking alcohol</td>
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<td>Suicidal ideas</td>
<td>P &lt; .001 (M &gt; F)</td>
</tr>
</tbody>
</table>

Note: Non-significant: M: Male F: Female T: Taipei City H: Hsinchu county 1: 1st grade 4: 4th grade
prohibit and promote health the higher the number of students engaging in them the better. More concerning was that even for such behaviours as wearing a seatbelt in the car and wearing a helmet when on a motorcycle that already are compulsory by law, there were still 10% to 20% of students in Taipei and 20% to 30% of students in Hsinchu who did not abide by these regulations. In addition, 10% to 40% of students did not carry out such behaviours as washing hands before eating, brushing teeth before sleeping, eating breakfast, eating fruit and vegetables, drinking water, and doing exercise. These activities are some of an individual’s most basic behaviours and are beneficial to health. It would be worthwhile to further investigate the reasons why these students do not perform such behaviours.

As for behaviours harmful to health such as staying up late; eating late at night; eating fast food; suppressing urination, watching TV for more than 2 consecutive hours, using vulgar language; breaking the routine; getting involved in fights with others, drinking alcohol and suicidal ideation, these were all more common in fourth grade students than in first graders. Boys were also much more likely to engage in such negative behaviours than girls. There were also some differences noticed in the prevalence of such behaviours between Taipei City and Hsinchu County. It is therefore evident that their exist certain hidden risk factors that have the potential to threaten child health. An individual’s personal habits are not created in an instant, but rather are accumulated slowly over a period of time as the same activity is repeated over and over. Once a behaviour has become a habit and has been incorporated into a person’s daily routine, it is extremely difficult to alter such a behaviour within a short period of time. The effort required and cost involved in encouraging children to develop good habits while they are young or in modifying unhealthy behaviours before they have become well established, is much less than that required to assist adults whose behaviours are already entrenched. It is an important responsibility of the family, schools and society to provide young people, including pre-school, primary school and junior high school students, with opportunities to establish healthy lifestyles during their youth, particularly because the earlier such healthy lifestyles are developed the better it is for a person’s health.

Continued analysis of the cross-sectional and longitudinal data from the CABLE study will bring forth even more in-depth empirical data. As the CABLE project is the first such study in Taiwan to conduct lifestyle based research by following the health behaviours and health status of children over a prolonged period, we predict that the study will be of benefit to both those working and conducting research in the fields of public health policy, behavioural science, health education, psychology and sociology. Many aspects of the study will be of use to the above groups including research design, implementation methods, data filing, statistical analysis, and theory development. The results and recommendations of this research project can be used for the design of child and adolescent health public policy, as well as for preventive educational activities and intervention programmes.