The Effect of Technology on Human Behavior
(A Case Study on BBC Secondary School and The British University in Egypt)

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Abstract

This research is about examining the effect of the invading technology represented in the internet using personal computers and Smartphone on the behavior of the youth. The subjects of interest about the youth are their friendships and social lives, family relations, general health and personal achievements.

To find out whether the technology has a good or bad effect on youth, we examined some students at the secondary and university levels, who were asked about their behavior using a questionnaire.

The questionnaire included questions that would describe how such students behave regarding their friends, families, health and personal achievements. Their answers were then used to reach a general conclusion about how the youth are affected by technology.

For the friendship part, we were interested in asking the students about the number of friends they have, how they prefer to contact them, and if they feel comfortable about their social life. For their family relations, we were interested in asking them about their interaction with different family members, and also whether they are satisfied with their family relations or not. The questions about the health included both physical and psychological diseases (ones that could be caused by the overuse of technology). At last, to have a complete image about their achievements, we asked them about their grades, activities and hobbies.

We used the questionnaires filled by the students to perform our analysis. We used the Gamma and Kruskal Tau measurements of association to test for correlations, T-tests and ANOVA tables for testing the equality of means, and finally we used Regression (Binary and Multinomial Logistic). At the end, we used the results of such tests and measurements to reach our conclusion.

The conclusion was very astonishing, where we found that technology does not greatly affect the youth. Youth in general use technology extensively, and they use it in almost everything (studying, playing games, search … etc.), but such use of technology neither has a bad nor a good impact on their behavior.
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Chapter One

Introduction
1.1 Background

Our world is ever changing and advancing in the realm of science and technology. Our dreams become cornerstones for the future. These days it seems hard to escape the presence of technology. Most people will praise the many technological gadgets that they use in their everyday lives. Many of us depend on it to get us through the day, to do our job, to get around, and to find certain things. Technology is evolving at a very fast rate, and what most people did not even think could be real a few years ago is now becoming a reality.

Some of the most prominent technological innovations are smart phones, laptops and using the internet. They have greatly affected many aspects of our lives. Today the Internet continues to grow day by day at an incredible speed. About 32.7% of the world’s population has access to the internet (Howe, W., 2012). The internet has become ubiquitous, faster, and increasingly accessible to non-technical communities, social networking and collaborative services, enabling people to communicate and share interests in many more ways. Sites like Facebook, Twitter, Linked-In, YouTube, Flickr, Second Life, Delicious, blogs, wikis, and many more let people of all ages rapidly share their interests of the moment with others everywhere. Smart phones, high-end mobile phones built on a mobile computing platform, with more advanced computing ability and connectivity than a contemporary feature phone, are now replacing Personal Computers (PCs). They have now taken the world by storm, and a lot of people could not imagine what life would now be like if they did not have the internet, email, and chat features on their phones at their disposal. By the last three months of 2010, 94 million PCs and 100 million smart phones were sold. Analysts believe that this trend will never reverse as it continued in the first quarter of 2011 where 82 million PCs and 100 million smart phones were sold (according to the latest surveys).

According to the Guardian newspaper in U.K. (on 4 August 2011), smart phones (such as Blackberries, iPhones and Androids) sales increased from 4% in 2005 to 48% in 2011, 50% of people claim to use the mobile internet equally at home and outside their residence, 47% of teenagers admit using their smart phones in the toilet while only 22% of adults confessed to the same habit, and mobile-addicted teens are more likely than adults to be distracted by their phones over dinner and in the cinema.

Figure 1.1 illustrates the evolution of internet usage from 1996 up till now.

In Egypt the internet usage is growing intensively. The number of internet users in Egypt increased by 28 percent during the year 2010. Egypt’s internet and mobile phone usage rates
are among the highest in the developing world. More than 23 million Egyptians used the internet by the end of the year 2010, up from 16.6 million in 2009.

A report released by the Ministry of Communications and Information Technology compared usage rates from the end of 2009 to the end of 2010. Users that access the internet through mobile phones increased from 4.8 million to 7.9 million. The great role of the internet was seen clearly in the 25 January revolution. The protestors called for the protests on twitter and Facebook.

As a result, on January 25 and 26, the government blocked Twitter in Egypt and later Facebook was blocked as well which proves how the internet played a crucial role in the Egyptian revolution. On January 28, the internet and mobile phone communications were also blocked.

While technology has brought us such a long way, could it in fact be hindering us in other ways? Could most forms of technology just be interruptions, ways of moving us further away from each other? Could Technology cause a form of isolation? We are faced with these questions every day, whether we realize it or not. Technology has its benefits, but when we take a look at how it has affected society in general and how people interact with one another,
we will quickly see that it has a negative impact. Modern technology has allowed people to communicate with just about anyone they want to at any given time and although this may sound like a good thing, the fact remains that people do not interact personally with one another as often as they used to. This has created a barrier in personable, face-to-face communication amongst people because they no longer have to call up a friend or family member to wish them a happy birthday or congratulate them on their recent success. As a result, people are becoming lazier, and they do not feel the dire need to step outside of their home to find entertainment and fun in things that used to be fun, such as participating in sports with friends, meeting a friend, etc.... Technology is a privilege to have but interaction with other people is crucial, and being responsible for one's actions and not letting technology rule his or her life is better than becoming desensitized to society. The fact that technology is at our finger tips and at the click of a button we can uncover our entire world, presents itself as a blessing and a curse.

The internet has also become a major concern for parents, because some online activities may seriously distract adolescents from their homework. Families are less likely to spend time together, as youth go off to their rooms to spent time with their devices. Also technology can cause serious health problems. The overuse of laptops can cause several diseases.

Another great danger of the internet is internet addiction in its many forms. Each person’s Internet use is different. One might need to use the Internet extensively for his work, for example, or he might rely heavily on social networking sites to keep in touch with faraway family and friends. Spending a lot of time online only becomes a problem when it absorbs too much of his time, causing him to neglecting relations, work, school, or other important things in his life. When the person feels more comfortable with his online friends than his real ones, or he cannot stop himself from playing games, gambling, or compulsively surfing, even when it has negative consequences in his life, then he may be using the Internet too much.

Many people turn to the Internet in order to manage unpleasant feelings such as stress, loneliness, depression, and anxiety. When you have a bad day and are looking for a way to escape your problems or to quickly relieve stress or self-soothe, the Internet can be an easily accessible outlet.

It is apparent that technology has the potential to harm or enhance our social skills and social life. We can all notice that our brains are not working the way they used to be anymore. For more than a decade now, we have been spending a lot of time online, searching
and surfing the Internet. Research that once required days in the stacks or periodical rooms of libraries can now be done in minutes.

The key is to analyze how technology affects us socially. Do technologies help us build positive, meaningful relations, or do technologies hinder this process? Are we better able to communicate, listen, and share because of the technologies in our lives? Do we use technologies to improve our relations and build new ones? Are we letting people know who we are and what we contribute to this world, or are we merely distracting ourselves with shallow pursuits? Does technology increase or decrease our concern for others, our compassion for others, and our desire to serve them? such are the critical questions regarding technology.

1.2 The Objective of the Research

The main objective of this research is to determine the effect of technology on the students’ behavior represented by social and family interactions, general health, and personal achievements. The analysis will include both secondary and university levels.

1.3 Questions of the Research

1- Whether parents complain about using smart phones and PCs.
2- Reasons for parents’ complains about using smart phones and PCs.
3- Whether secondary students have different attitude towards technology from university students.
4- Whether smart phones replaced PCs.
5- How frequent the students use the PC.
6- What are the common activities when using a PC.
7- What is the effect of technology on social behavior.
8- What is the effect of technology on family relations.
9- What is the effect of technology on general health.
10- What is the effect of technology on personal achievements.

1.4 Literature Review

Henderson and Zimbardo (2000) in a concern to examine differences between students at the high school and college level conducted a research on a sample of students from 2 schools, private and public versus another sample of university students. The students were
also categorized into shy and non-shy students. Time spent using various types of technology in particular activities was defined in terms of categories denoting an average range of the hours of use.

Contrary to the initial hypotheses, shy students did not use technology more than the non-shy, but they responded to significantly less of their email than the non-shy, suggesting that they were not using technology to practice socializing as much as the non-shy, which means that shyness may extend to less socializing online as well as offline. Overall the data suggest that the public high school students spend more time socializing and less time engaging in PC activities alone than private school students, and that college students spend more time corresponding, surfing and socializing.

Banjo, et al. (2008) considered the relation between cell phone usage and social interaction with others focusing on helping behavior in particular. The sample consisted of 28 students of various communications courses. The result was that cell phone users are less likely to help strangers or to smile to them than non cell phone users.

Lanigan, et al. (2009) in her research presented that from a sample of 97 internet user the majority of participants (89%) perceived that the PC impacted their family relations. Of those participants, 45% cited a mostly positive impact; 24% a mixed impact and 20% a mostly negative impact.

Smith (2011) presented that 87% of smart phone owners access the internet or email on their handheld, including two-thirds (68%) who do so on a typical day. Also, 25% of smart phone owners say that they mostly go online using their phone, rather than with a PC. This supports our assumption that smart phones replaced PCs as a mean of access to the internet.

Hampton, et al. (2011) on his research presented the following results concerning social networks users, such as
- Facebook users are more trusting than others.
- Facebook users have more close relations.
- Facebook users get more social support than other people.
- Facebook users are much more politically engaged than most people.
- Facebook revives “dormant” relations.
- Social networking sites are increasingly used to keep up with close social ties.
- MySpace users are more likely to be open to opposing points of view.

Rosen (2011) conducted 1,000 teen surveys and observation of 300 teens actively studying for 15 minutes. Some positive and negative impacts were obtained.
The negative impacts

- Teens who use Facebook frequently may become narcissistic, which means inordinate fascination with oneself and excessive self-love.
- Teens who have a strong Facebook presence may display psychological disorders, such as anti-social behaviors, mania and aggressive tendencies.
- Teens who overdose on technology daily, and this includes video games too, have higher absenteeism from school and are more likely to get stomach aches, have sleep issues, and feel more anxious and depressed.
- Middle and high school students, as well as college students, who checked their Facebook once during the 15-minute study time, had lower test grades.

The positive impacts

- Use of Facebook allows children to develop their self-identity. Choosing a profile photo, listing likes and dislikes, all force the youth to become more self-aware.
- Facebook and other social networking sites give shy children a way to socialize
- Encouraging comments online can put a smile on someone's face and improve moods.

National Sleep Foundation (2011) published a poll which found that 43% of Americans between the ages of 13 and 64 say they rarely or never get a good night's sleep on weeknights. Almost everyone surveyed, 95%, uses some type of electronics like a television, PC, video game or cell phone within the hour before bed. The study discussed that the invasion of such alerting technologies into the bedroom may contribute to the high proportion of respondents who reported that they routinely get less sleep than they need.

1.5 Some Basic Definitions

Our research title is “The effect of technology on human behavior” so in this Section we will define the factors of technology as well as the elements of human behavior and their determinants that we will consider in this research.

First: Factors of technology

We define technology in this research with respect to 10 main factors which are
1- Owning a personal laptop
2- Owning a smart phone (like iphone, blackberry and all mobile phones running Android or Windows)
3- Number of hours spent on PC per day and/or per week
4- Playing games as most common activity on PC
5- Surfing the internet as the most common activity on PC
6- Word processing as the most common activity on PC
7- Doing research as the most common activity on PC
8- Using e-mail as the most common activity on PC
9- Chat rooms as the most common activity on PC
10- Using social channel as the common activity when using PC (like facebook, twitter, chat rooms, etc...)

Second: Elements of human behavior
We define human behavior with respect to 4 main elements each consisting of many determinants as follows

1- Social behavior
The first element of human behavior which is social behavior consists of the following determinants
a- Number of friends
b- How often a student hangs out with his friends
c- Pretending things to seek attention
d- Most preferable thing to do when a student is bored
e- Becoming angry over unimportant things
f- Mood changes
g- Most preferable way of communication when talking to a friend or defending a cause
h- Working on a research as a group vs. individual
i- Communications skills
j- Listening skills
k- Self confidence

2- Family relations
The second element of human behavior which is family relations consists of the following determinants
a- Number of hours spent per week watching television with family.
b- How often a student eats with his family.
c- Number of hours spent per week interacting with siblings.
d- Whether a student discuss his problems with his family or not.
e- Whether a student share his feelings with his family or not.
f- Whether a student feels supported by his family or not.

3- General health
The third element of human behavior which is general health consists of the following determinants
a- Fitness (defined by exercising, practicing sports and activeness in daily life)
b- Suffering from physical disease that is related to usage of technology (specifically headache, eyestrain, Upper Limb Disorder (ULD) and back pain)
c- Number of sleeping hours each night

4- Achievements
The fourth element of human behavior is achievements. It consists of the following determinants
a- Favorite hobby(s).
b- Whether a student has received any medals before.
c- Average grade.
d- Participating in extra-curricular activities.

1.6 Assumptions
1- As we discussed before, Rosen (2011) presented in his study two main arguments
   - The positive impact of technology, that it has the capability to bring people together with more frequent contact.
   - The negative impact of technology, that it can affect students significantly by reducing sociability and causing psychological disorders.

   In this research, we assumed that technology has a negative impact on the students in this sample. We wish to find out which of those two arguments is supported by this sample’s data.

2- Family relations are supposed to be affected negatively by technology such that the number of hours spent on PC per week, using games, social networks, chat rooms and surfing the net as common activities will affect hours spent watching TV with family, hours spent interacting with siblings and eating with family negatively.
3- Parents’ complain about using PC will increase by increasing number of hours spent using the PC per week, also by using games, social networks and chat rooms as common activities when using the PC (as they are considered time wasting activities that might have a negative impact on personal behavior).

4- Parents’ complain is supposed to differ between the gender and educational levels.

5- Reasons for parents complain differ among gender.

6- Over use of technology has negative impact on suffering from physical disease. Long hours spent on PCs may cause eyestrain, back pain and Upper Limb Disorder (ULD). Also overuse of smart phones may cause severe headache.

7- Over use of technology decreases the period of sleep a student gets each night. He/she may spend many hours on PC at night and get less hours of sleep.

8- Technology could reduce a student’s fitness. For example, a PC game could replace a football match for boys.

9- Overuse of technology has a negative impact on achievements. Those with high achievements would do research and word processing as common activities on PC and those with low achievements would rather play games and use social networks and chat rooms.

10- The factors that affect the university students’ achievements are different from the factors that affect secondary students’ achievements.

1.7 Statistical Tools of the Analysis
In this research we will use the statistical package SPSS to perform the following analysis

- Computing variables
- T-tests
- ANOVA table
- Two way categorical measurements (gamma and Kruskal tau)
- Principle Components
- Factor Analysis
- Binary Logistic Regression
- Multinomial Logistic Regression

We should mention here that all the analysis will be conducted at 95% level of significance.
Chapter Two

The Methodology of the Research
2.1 Study Design

Our aim is to study the effect of the intervention of technology on the students in the secondary and university levels, regarding their characters, achievements, general health and their relations with others. We specifically included the students of the secondary level in our research, to compare between their heavy usages of technology with those of the university level. This research is considered a cross-sectional one because it handled the effect of technology on students’ behavior in the academic year 2011/2012.

We aimed to select students of high socioeconomic level, who would have an easy access to such level of technology. To meet our expectations, we decided to select an international school and a private university which are

- The BBC International Language School.

  In general, it was not easy to access secondary students in their schools, but the BBC school offered us a permission to distribute the questionnaires themselves among the students (without us entering the school).

- The British University in Egypt (BUE), which was the only private university that granted us a permission to access ourselves during March 2012.

2.2 The Pre-Sample

We selected a pre-sample to examine the simplicity of the questionnaire which was amended later and to estimate the non response rate of our populations.

- For BBC school we sent 40 questionnaires and they were all filled which means there is no non response. This is because the questionnaires were distributed by the school teachers so there was a kind of obligation on the students to answer the questionnaire.

- For the BUE, also 40 questionnaires were distributed, 37 of them were answered. The following formula was used to calculate the non response rate

\[
\text{Non response rate} = \frac{\text{number of non response}}{\text{total sample size}} \times 100
\]

When applied on our sample we get the non response rate as follows

\[
\text{Non response rate} = \frac{3}{40} \times 100 = 7.5\%
\]

2.3 The Sampling Design

In this research, we have two target populations which are the students in the BBC secondary school and in the BUE. The primary unit of analysis in this research is the student.
An intended sample size we wished to obtain was 400 divided into 200 of university students and 200 of secondary ones. The frames and sampling techniques are discussed as follows:

- As for the BBC secondary school, the frame was the attendance sheet of Sunday 25\textsuperscript{th} of March 2012. All students who attended school that day answered the questionnaire but they were 174 students only which did not meet our expectations of gathering 200 questionnaires.

- As for the BUE, the frame was students who attended college on Wednesday 21\textsuperscript{st} of March 2012. A simple random sample was taken from students who had a break between 11 am and 2 pm that day.

According to the non-response rate calculated from the pre-sample (7.5%), we should distribute 215 (0.075x200) questionnaires. Out of the 215 questionnaire distributed 201 were solved. The sample included students from faculties of Engineering, Business & Economics and PC Science. The percentages of students selected from each faculty are given figure 2.1
2.4 The Study Instrument

This research depends on the questionnaire as an instrument for data collection; this questionnaire is divided into five main parts as follows

The First part
Consists of 8 questions to determine the sample characteristics and factors of technology, which are
- Gender, question 1.
- Owning laptop and Smartphone, questions 2 & 3.
- Replacement of Smartphone to laptops, question 4.
- Parents’ complain about Smartphone.
- The days per week and the hours per day spent on PC, questions 6 & 7.
- The most common activities on PC, question 8.

The Second part
Consists of 12 questions about the students’ relation with their friends, to measure the determinants of friendship which are
- The number of friends and how often the student hangs out with them, question 9 & 10.
- The students’ rating to themselves as a communicator, question 11.
- Whether or not the student pretend things to seek attention, question 12.
- Students’ satisfaction with their life, question 13.
- Preferable things to do when the student is bored, question 14.
- Becoming angry over unimportant stuff and mood changes, questions 15 & 16.
- Preferable method of communication and defending a cause, questions 17 & 18.
- Whether students like to work individually or in groups, question 19.
- Rating the students to themselves in nine statements indicating their social skills, question 20.

The Third part
Consists of 6 questions measuring the determinants of the students’ family relations.
- Whether the student lives with his/her parents or not, question 21.
- The hours per week the student spends watching TV with family, question 22.
- How often the student eats with family, question 23.
- How many hours the student spends interacting with siblings, question 24.
- Parents’ complain about using PCs, question 25.
- Whether the students discuss their problems, share their feelings, or feel supported by their families, question 26.

The Fourth part
Consists of five questions to measure the determinants of general health.
- The hours of sleep the students get each night, question 27.
- How often the student exercise and practice sports, questions 28 & 29.
- Whether the students suffer from a physical disease, question 30.
- How active the students are, question 31.

The Fifth part
This is the only part that differs from the secondary questionnaire to that of the university. For the secondary is consists of 6 questions, and that of university consists of 8 questions to measure the determinants of achievements, which are
- The students’ favorite hobbies and how often they practice them, questions 32 & 33.
- Whether the student has ever received medals, question 34.
- The student’s level and average grade, questions 36 & 37 in the university questionnaire and questions 37 & 38 in the secondary questionnaire.
- Whether the students participate in extracurricular activities, question 38 in the university questionnaire and 37 in the secondary questionnaire.

The two extra questions in the university questionnaire were
- The faculty, question 35.
- Whether students have ever attended courses, question 39.

2.5 Sample Characteristics

a) The Gender
In our sample the number of males was higher than number of females by only 8% and Figure 2.2 shows this.
b) The Educational Level

The difference between percentages of the university and the secondary students was 8% as shown in figure 2.3

c) Owning Laptops

Since we were already targeting students with high socio economic level, most of them owned their personal laptops. That is why most of the coming analysis did not
depend on owning laptop since the percent of those who do not own laptops is very small

**Figure 2.4 Owning Laptops in the Sample**

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owns a laptop</td>
<td>96%</td>
</tr>
<tr>
<td>Does not own a laptop</td>
<td>4%</td>
</tr>
</tbody>
</table>

**d) Owning Smart phones**

Like the case with personal laptop so is the smart phones. Only 9% of the sampled students did not own smart phone. Also most of the coming analysis do not depend on owning smart phones.

**Figure 2.5 Owning Smart phones in the Sample**

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owns a smart phone</td>
<td>91%</td>
</tr>
<tr>
<td>Does not own a smart phone</td>
<td>9%</td>
</tr>
</tbody>
</table>
Table 2.1 shows the cross tabulation for those who own laptops, smart phones and both devices. This indicates that most of the sample students own both personal laptops and smart phones.

Table 2.1 Owning either a Laptop or a Smart phone in the Sample

<table>
<thead>
<tr>
<th>owns a laptop</th>
<th>owns a smart phone</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>no</td>
<td>yes</td>
<td>Count</td>
</tr>
<tr>
<td>no</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>% of Total</td>
<td>1.3%</td>
<td>2.9%</td>
</tr>
<tr>
<td>yes</td>
<td>29</td>
<td>328</td>
</tr>
<tr>
<td>% of Total</td>
<td>7.8%</td>
<td>87.9%</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>339</td>
</tr>
<tr>
<td>% of Total</td>
<td>9.1%</td>
<td>90.9%</td>
</tr>
</tbody>
</table>

e) Time Spent on PC

- Hours per day

In our sample most of the students used PC for 3-5 hours daily as shown in figure 2.6

![Figure 2.6 The Number of Hours Spent by the Students Daily on PC](image.png)

- Hours per Week

This variable is computed by multiplying the number of hours per day and the number of days per week spent by the students on PC. Figure 2.7 shows the distribution of such variable.
f) Common Activities on PC

It is obvious from Figure 2.8 that the most common activity students use PC for is using social networks like Facebook, Twitter, ... etc.
Chapter Three

Data Description
3.1 Basic relations

3.1.1 The Relation Between the Gender and Technology

The following results are obtained:

- There is no significant relation between the gender and owning laptop or smart phone (t-test was conducted)
- There is also no significant relation between the gender and hours per day spent on PC (t-test was conducted)
- As for the activities done on PC, all activities were insignificantly different among males and females except for using social networks and playing games. Females are more likely to use social networks (odds ratio=2.603) while males are more likely to play games (odds ratio=2.646). Figure 3.1 shows the distribution of gender among social networks and playing games as common activities on PC.

![Figure 3.1 The Relation Between the Gender and Some Activities on PC](image)

These observations are also confirmed by t-tests. The significant difference among the gender regarding the use of social networks as a common activity on PC is obtained at (t=3.776, p-value=.000). Also, the significant difference among gender regarding playing games on PC is shown at (t=4.277, p-value=.000).

3.1.2 The Relation Between Educational Level and Technology

- It is seen that there is no significant relation between the educational level and owning laptop or smart phone (t-test was conducted).
For the hours per day spent on PC, the gamma measurement shows that university students are heavy users of PC when compared to secondary students (gamma=.334, p-value=.000). Figure 3.2 shows the percentages of hours spent per day by secondary and university students on PC. It is obvious that university students spend more time on PC than secondary ones and among both levels; students are more likely to spend from 3 to 5 hours per day on PC.

![Figure 3.2 The Relation Between Educational Level and Hours Spent per Day on PC](image)

This observation is confirmed by ANOVA table as there is a significant difference between secondary and university students regarding the number of hours they spend per day on PC (F=5.710, p-value=.001).

As for the activities done on PC, five activities differed significantly among secondary and university levels. Figure 3.3 shows that university students are more likely to do word processing, surf the internet, do research and use e-mail at odds ratio of 4.070, 1.609, 4.418 and 2.351 respectively. On the other hand secondary students are more likely to use chat rooms at (odds ratio=1.946)

These results are confirmed by t-tests which shows the significant difference between university and secondary students regarding the five activities on PC at the following values
- Word processing (t=-4.168, p-value=.000).
- Surfing the internet (t=-2.262, p-value=.024).
Figure 3.3 The Relation Between Educational Level and Some Activities on PC

- Doing research ($t=-7.045$, p-value=.000).
- Using email ($t=-3.772$, p-value=.000).
- Using chat rooms ($t=2.397$, p-value=.017).

### 3.1.3 Whether Smart phones Replaced Laptops
Table 3.1 shows the percentages of preferences of the students to smart phones versus laptops. A 64.2 valid percent for PCs means that smart phones did not replace PCs yet.

**Table 3.1 Preferences of Smart phones and laptops**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid PC</td>
<td>204</td>
<td>64.2</td>
</tr>
<tr>
<td>smart phone</td>
<td>114</td>
<td>30.4</td>
</tr>
<tr>
<td>Total</td>
<td>318</td>
<td>100.0</td>
</tr>
<tr>
<td>Missing</td>
<td>88</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>375</td>
<td></td>
</tr>
</tbody>
</table>

### 3.2 Relations with Friends and Psychological Health
This section we will be divided into two sub-sections which are
1- Relations with friends considering the following determinants
    - The number of friends a student has.
- How often a student hangs out with his/her friends.

2- Psychological health considering the following determinants
- Suffering from mood changes.
- Becoming angry over unimportant stuff.

We will study the relation between the four determinants mentioned above and the following three factors of technology as they are the significant relations
- Using social networks
- Using chat rooms
- Days spent on the PC per week

We should mention here that no significant relations are found between determinants of relations with friends and sample characteristics (gender and educational levels). Thus we will only handle here the relations between the determinants and factors of technology.

### 3.2.1 Relations with Friends

1) **Number of Friends**

- The Relation Between the Number of Friends and Using Social Networks

Using Spearman correlation coefficient we found that there is a significant relation between the number of friends and using social network as a common activity. This relation is positive (spearman correlation value=0.11, p-value =0.035) which indicates that students who use social networks as a common activity when using PC are more likely to have large number of friends.

From figure 3.4, we can conclude the following
- The first argument of Rosen (2011), positive impact of technology is supported where, from the students who have large number of friends (3 or more), it is seen that the percentage of those who use social network is approximately 5 times as the percentage of those who do not use it.
- The alternative argument, negative impact of technology is supported where, from those students who have smaller number of friends (2 or less), it is also seen that the percentage of those who use social network is higher than the percentage of those who do not use it.
- The two arguments together prove that technology is a double-edged sword. The first edge which is the positive side that modern technology has the capability to foster
openness, self-confidence, and a greater sense of ease, comfort in dealing with others, widening the circle of friendship. The other edge which is

- The negative side is preventing sociability, avoids face to face interaction with new people and being less comfort in dealing with others.

![Figure 3.4 The Relation Between Number of Friends and Using Social Networks](image)

- The Relation Between The Number of Friends and Using Chat Rooms
Using the gamma measurement we found that there is a significant relation between the number of friends and chat rooms as a common activity when using PCs. This relation is positive and moderate (Gamma value =0.482, p-value=0.007) which indicates that those who use chat rooms as a common activity are more likely to have larger number of friends.

2) Hanging out with Friends

- The Relation Between Hanging out with Friends and Using Social Networks
The only factor that has a significant relation with hanging out with friends was using social networks. Gamma measurement indicates that students who hang out with their friends more frequent are more likely to use social network as a common activity when using PC (gamma=-.344, p-value=.024)

From figure 3.5, we conclude the following
- The first argument (positive impact of technology) is supported, where from the students who hang out with their friends once or more per week, it is seen that about 82.5% of
them use social network as a common activity when using their PCs. This percentage is 5 times the percent of those who do not use social network.

- A situation arises that could indicate that the students might prefer the social networks as a substitute for hanging out with their friends. This situation is represented in the following

Among the students who hang out with their friends occasionally or once or more per month, it is seen that the percentage of those who use social network is always greater than the percentage of those who do not use it.

![Figure 3.5 The Relation Between Hanging out with Friends and Using Social Networks](image)

- The Relation Between Hanging out with Friends and Days per Week Spent on the PC

Using the gamma measurement we found that there is a significant relation between hanging out with friends and days spent per week on PC (Gamma value =-0.305, p-value=0.025). This relation is a moderate negative relation which indicates that students who hang out with their friends more frequent are more likely to use their personal PCs daily.

### 3.2.2 Psychological Health

1) Mood Changes

- The effect of using social networks on mood changes
Gamma measurement indicates that those who use social network as a common activity when using PC are more likely to suffer from frequent mood changes (Gamma =0.200 and p-value=0.034)

From figure 3.6, we conclude that from the students who always suffer from mood changes, about 90% of them use social network as a common activity. This indicates that higher tendency for mood changes appears among those who use social network as a common activity when using PC.

![Figure 3.6 The Relation Between Mood Changes and Using Social Networks](image)

2) Becoming Angry Over Unimportant Stuff

- The effect of using social network on becoming angry over unimportant stuff

Gamma measurement indicates that those use social network as a common activity when using PC are more likely to become angry over unimportant stuff (gamma =0.271 and p-value=0.007)

From figure 3.7, we conclude that there is a negative impact of technology on psychological health where the percentage of students who use social network from those who often and usually become angry over unimportant stuff is about 4 times the percentage of those who do not use it. Therefore higher tendency for becoming angry over unimportant stuff appears among those who use social network as a common activity when using PC.
It’s important to highlight the similarities in the percentages between figure 3.9 and figure 3.10. This could imply that the impact of using social network as a common activity when using PCs on the students is the same with respect to suffering from mood fluctuations and becoming angry over unimportant stuff.

Moreover the reasons behind these similarities could be due to the moderate positive relation between suffering from mood changes and becoming angry over unimportant stuff (gamma =0.4 and p-value=0.000). This significant relation implies the higher tendency for becoming angry among those who frequently suffer from mood changes which means that the influence of using social networks on mood fluctuations will directly affect the rate by which the students become angry over unimportant stuff.

### 3.3 Family Relations

Many people think that technology is beginning to have negative impact on relations specially relation with family. Many parents complain to their children about using PCs and smart phones due to less interaction with them.

In this section we will study whether technology affects relation with family or not which can be determined by:

- Whether parents complain about using the PC and reasons for complaining.
- Whether parents complain about using the smart phone.
- Number of hours spent with his/her siblings.
- The number of hours spent watching television with the family.
- How often the student eats with their parents.
- Whether he/she discusses problems with his/her family.
- Whether he/she feels supported by his/her family.
- Whether he/she shares feelings with his/her family.

It is worth to mention here that the proportion of students whose parents complain about smart phones and PCs is significantly different from zero (Two t-tests were conducted with $t=15.670$, $15.947$ respectively and both with $p$-value=$.000$). Figure 3.8 shows that parents complaints about PCs is slightly higher than their complaints about smart phones.

![Figure 3.8 Parents complain about using smart phones and PC](image)

Figure 3.9 shows the reasons of parents complain about smart phones and PCs. It is seen that

- The strongest reason that parents complain about smart phone for is less interaction with parents.
- The strongest reason that parents complain about PC for is studying reason.

In the following sub-sections we will examine the relation between the determinants of family relations and sample characteristics (gender and educational level) as well as factors of technology.
3.3.1 The Relation Between Sample Characteristics and Family Relations

In this subsection we will examine the relations between the 8 determinants of family relations and sample characteristics (the gender and educational level).

1) Parents Complain about PC and Its Reasons

- The gender

Using (kruskal tau=0.012, p-value=0.038) we found that there is a significant relation between the gender and whether parents complain about using the PC. Using the odds ratio we found that females are more likely to get complains from their parents about using the PC more than males at (odds ratio = 1.572)

From figure 3.10, we can observe that percentage of females who get complains from their parents about using PC is higher than that of males.

As for the reasons of parents complain about PCs, we found that there is a significant relation between gender and parents’ reasons for complaining about using the PC but this relation is very weak at (kruskal tau =0.057, p-value=0.000)

From figure 3.11 we observe that males are more likely to get complains from their parents due to studying, behavior and ethical reasons more than females. While females are more likely to get complains due to health related reasons and less interaction with their parents.
As for the educational level, no significant relation was found between the level and Parents complain about PC.

2) **Parents Complain about Smart phones and its Reasons**

Neither the gender nor the educational level affect parents’ complain about smart phones and its reasons.
3) **Hours Students Spend Interacting with their Sibling**

Also, neither the gender nor the educational level affect number of hours the students spend interacting with their siblings.

4) **Watching TV with Family**

Neither the gender nor the educational level affect number of hours the students spend watching TV with their families.

5) **Number of Times Students Eat with their Parents**

- There is no significant relation between gender and how often students eat with their families.
- Educational level

Using the gamma measurement we found that there is a significant relation between educational level and how often students eat with their families. Since (gamma = 0.186, p-value = 0.029), we observe that this relation is negative moderate which means that university students tend to spend more times eating with their families than secondary students.

6) **Discussing Problems with Family**

- The Gender
Using the gamma measurement we found that there is a significant relation between gender of students and whether they discuss their problems with their families. Since (gamma = 0.189, p-value = 0.013), we get that this relation is positive moderate which means that females are more likely to discuss their problems with their families than males.

![Figure 3.13 The Relation Between Discussing Problems with Family and the Gender](image)

- As for the educational level, it has no significant impact on discussing problems with family

7) **Feeling Supported with Family**
- No significant relation is found between feeling supported by family and the students’ gender
- Educational Level

Using the gamma measurement we found that there is a significant relation between educational level and whether the students feel supported by their families. Since (gamma = -0.170, p-value = 0.043) we observe that this relation is moderate negative which means that secondary students are more likely to feel supported by their families than university students.
8) Sharing Feelings with Family

Neither the gender nor the educational level significantly affect whether the students share their feeling with their families or not.

![Figure 3.14 The Relation Between Feeling Supported by Family and Educational Level](image)

### 3.3.2 The Relation Between Determinants of Family Relations and Factors of Technology

In this sub-section we will examine the relation between the 8 determinants of family relations and the factors of technology.

1) Parents’ Complaints about PCs

- Number of hours a week students spend using PC

Using (kruskal tau=0.067, p-value=0.000) we found that there is a significant relation between number of hours a week students spend using the PC and whether their parents complain about using PCs.

From Figure 3.15 we observe that parents are more likely to complain about using the PC when students spend more hours a week using them.

- Using chat rooms as one of the most common activities on PC

Using (kruskal tau=0.017, p-value=0.015) we found that there is significant relation between using chat rooms as one of the most common activities when using the PC and whether parents complain about using the PC. Moreover, using odds ratio we found that parents are
more likely to complain about using the PC when students use chat rooms as one of the most common activities (odds ratio=2.015).

From figure 3.15 we observe that the percentage of students who use chat rooms as one of the most common activities get complaints from their parents about using the PC is higher than the percentage of those who don’t use chat rooms and get complaints from their parents which means that parents are more likely to complain about using the PC when students use chat rooms as one of the most common activities.

From figure 3.16 we observe that the percentage of students who use chat rooms as one of the most common activities get complains from their parents about using the PC is higher than the percentage of those who don’t use chat rooms and get complaints from their parents which means that parents are more likely to complain about using the PC when students use chat rooms as one of the most common activities.
• Playing games as one of the most common activities when using the PC
There is significant relation between playing games as one of the most common activities on PC and whether parents complain about using it (kruskal tau=0.013, p-value=0.015). From figure 3.17 we observe that lower percentage of students who play games as one of the most common activity get complains from their parents about using the PC than those who do not play games as one of the most common activities which means that parents are less likely to complain about using PCs when students play games as one of the most common activities when using the PCs.

![Figure 3.17 The Relation Between Playing Games as a Common Activity and Whether Parents Complain about Using the PC](image)

2) Parents’ Complaints about Smart phones
We found that all relations are insignificant. This means that no factors affect complaining about using the smart phone.

3) Hours Students Spend Interacting with Their Siblings
• Playing games as one of the most common activities when using the PC
There is a significant relation between playing games as one of the most common activities when students use the PCs and number of hours spent with their siblings. Since (gamma = 0.192, p-value = 0.034), we observe that this relation is moderate positive which means that students playing games as one of the most common activities are more likely to spend more number of hours with their siblings.
• Surfing the internet as one of the most common activities when using the PC
Using gamma measurement we found that there is a significant relation between surfing the internet as one of the most common activities when using the PC and hours a week spent interacting with siblings. Since (gamma = 0.192, p-value = 0.013) and as shown in figure 3.18, we observe that this relation is moderate positive which means that students surfing the internet as one of the most common activities are more likely to spend more number of hours with their siblings.

![Figure 3.18 The Relation between Number of Hours a Week Spent Interacting with Siblings and Surfing the Internet as a Common Activity](image)

• Doing research as one of the most common activities when using the PC
Using gamma measurement we found that there is a significant relation between doing research as one of the most common activities when using the PC and hours a week spent interacting with siblings. Since (gamma = 0.191, p-value = 0.023), we observe that this relation is moderate positive which means that students doing research as one of the most common activities are more likely to spend more number of hours with their siblings.

4) Number of Hours Students Spend Watching TV with their Families
• Chat rooms as one of the most common activities on PC
There is a significant relation between using chat rooms as one of the most common activities when using the PC and hours a week spent watching television with family. Since (gamma = 0.339, p-value = 0.002), we observe that this relation is positive moderate which means that students using chat rooms as one of the most common activities are more likely to spend more hours watching television with their families.
It is seen that there were no further relations found between factors of technology and determinants of family relations.

**Note:**

Using social networks is the most common activity for students when using the PC. Despite this fact, we found no significant relations between social networks as one of the most common activities and relation with family. This means that using social network as one of the most common activities does not affect the family relations.

### 3.4 Describing the General Health of Students

In this section we will examine the relation between determinants of general health and sample characteristics (gender and educational level) as well as factors of technology.

The determinants of general health are:

a- Suffering from physical disease that is related to usage of technology (specifically headache, eyestrain, Upper Limb Disorder (ULD) and back pain)

b- Number of sleeping hours each night

c- Fitness (defined by exercising, practicing sports and activeness in daily life)

We need to generate an index to represent the fitness of students in our sample. To generate this index, factor analysis method of data reduction was used. The variables that were used are:

1. Exercising, walking, jogging or going to gym
2. Practicing sports
3. Activeness in daily life

One factor was generated with eigen value greater than 1. This factor explains 56.65% of total sample variation.

This index is then used to analyze the data and examine the relation between fitness as a determinant of general health and factors of technology.

### 3.4.1 The Relation Between General Health and Sample Characteristics

In this sub-section we will examine each of the three determinants of general health along with the sample characteristics (gender and educational level).

1) **Physical Diseases**

- The Gender
There is a weak but significant relation between the gender and suffering from physical disease at (Kruskal tau=.05, p-value=.000). According to the odds ratio females are more likely to suffer from physical disease more than males. (odds ratio=2.502)

Particularly, two diseases differ significantly among females rather than males which are
- Headache at (Kruskal tau=.056, p-value=.000) and (odds ratio=2.786).
- Back pain at (Kruskal tau=.015, p-value=.019) and (odds ratio=1.813).

Figure 3.19 shows these results

![Figure 3.19 The Relation Between Gender and Suffering from Headache and Back Pain](image)

- **Educational Level**
  There is a weak but significant relation between educational level and suffering from physical disease at (Kruskal tau=.014, p-value=.025). The odds ratio indicates that university students are more likely to suffer from physical disease than secondary students (odds ratio=1.607).

Particularly, three diseases differ significantly among university students rather than secondary students which are
- Eyestrain at (Kruskal tau=.015, p-value=.022) and (odds ratio=2.322)
- Headache at (Kruskal tau=.019, p-value=.008) and (odds ratio=1.830).
- Back pain at (Kruskal tau=.028, p-value=.001) and (odds ratio=2.337).

Figure 3.20 shows the distribution of these three diseases among both educational levels.

2) **Hours of Sleep Each Night**

- There is no significant relation between the gender and hours of sleep each night.
As for the educational level, we found that there is a significant relation between the level and hours of sleep each night at (\(\gamma=.288\), \(p\)-value=.001) which means that university students tend to have less hours of sleep each night.

3) Fitness

- The Gender

T-test showed that there is a significant difference between males and females regarding their fitness at (\(t=-7.022\), \(p\)-value=.000).

An evidence of the direction of the relation between the gender and fitness is that there is a significant relation between gender and exercising as well as practicing sports at (\(\gamma=.419\), \(p\)-value=.000) and (\(\gamma=.472\), \(p\)-value=.000) respectively. This means that females are less likely to exercise or practice sports.

- Educational level

T-test showed that there is a significant difference between secondary students and university students regarding their fitness (\(t=-3.737\), \(p\)-value=.000).

An evidence for the direction of the relation between educational level and fitness is that there is a significant relation between educational level and exercising as well as activeness in daily life at (\(\gamma=.346\), \(p\)-value=.000) and (\(\gamma=-.256\), \(p\)-value=.021) respectively. This means that university students tend to exercise less and are less active.
3.4.2 The Relation Between General Health Determinants and Factors of Technology

In this sub-section we will examine the relations between the three determinants of general health and factors of technology.

1) Physical Disease

- Hours spent per day on PC
  
  In general, there is no significant relation between number of hours spent on PC per day and suffering from physical disease but it significantly affect one disease which is eyestrain at (gamma=.347, p-value=.014)

- Playing games as a common activity on PC
  
  There is a significant relation between playing games as common activity when using PC and suffering from physical disease (Kruskal tau=.019, p-value=.009). It is found that the odds of having physical disease among those who do not play games on PC is 1.8 times the odds of having physical disease among those who play games on PC (or=1/0.54). Figure 3.21 shows this result.

![Figure 3.21 The Relation Between Playing Games and Suffering from Physical Disease](image)

- All other PC common activities have insignificant relation with suffering from physical disease. Although some activities significantly affect certain diseases, for example
  - Surfing the internet significantly affect suffering from eyestrain at (Kruskal tau=0.014. p-value=0.023) and (odds ratio=2.427).
- Word processing significantly affect suffering from eyestrain, headache and ULD at (Kruskal tau=0.019, p-value=.01), (kruskal tau=.012, p-value=.039) and (kruskal tau=.014, p-value=.024) respectively along with odds ratio of 3.034, 2.074 and 3.229 respectively.
- Using e-mail significantly affect suffering from back pain at (kruskal tau=.021, p-value=.005) and (odds ratio=2.077)
- Using chat rooms significantly affect suffering from ULD at (kruskal tau=.013, p-value=.03) and (odds ratio=2.769)

It is worth to mention that internet addiction is considered as a psychiatric disease thus we excluded it from the definition of physical diseases but it is obvious that the factor that significantly affects internet addiction is the hours per day spent on PC. This is confirmed by the gamma measurement (gamma=.508, p-value=.000) which means that those who spend more hours on PC daily are more likely to suffer internet addiction. Figure 3.22 manifests this result.

2) Hours of Sleep Each Night

- Hours spent per day on PC
There is a significant relation between hours spent on PC per day and hours of sleep each night (gamma=.175, p-value=.019). This means that those who spend more hours on PC have less hours of sleep each night.

- **Using social networks as a common activity on PC**
  There is a significant relation between using social networks as common activity when using PC and hours of sleep each night. This relation is negative and weak (gamma=-.290, p-value=.011) which means that those who use social networks as common activity on PC have more hours of sleep each night which is an unexpected result. Figure 3.23 shows that

![Figure 3.23 The Effect of Using Social Networks on Hours of Sleep](image)

- **Doing research as a common activity on PC**
  There is a significant relation between doing research as common activity when using PC and hours of sleep each night (gamma=0.192, p-value=.045) which means that those whose most common activity on PC is doing research have less hours of sleep each night.

3) **Fitness**

- **Hours per day spent on PC**
  ANOVA table showed that there is a significant difference regarding fitness between 4 groups of PC users (F=4.051, p-value=.003). These groups are
  - Less than one hour users
  - 1-2 hours users

52
- 3-5 hours users
- 6+ hours users

From this result we deduced that fitness differ significantly among groups of PC users.

An evidence of this relation is that there is a significant relation between hours per day spent on PC and exercising as well as practicing sports at (gamma=.209, p-value=.001) and (gamma=.167, p-value=.005) respectively. This means that those who spend more hours on PC daily are less likely to exercise or practice sports.

- Using social networks as common activity when using PC
  T-test showed that the fitness of those who use social networks as common activity on PC is significantly different from the fitness of those who do not. (t=-3.119, p-value=.002)
  An evidence of this relation is that there is a significant relation between using social networks as a common activity when using PC and exercising as well as practicing sports at (gamma=.207, p-value=.023) and (gamma=.262, p-value=.004) respectively. This means that those who use social networks as a common activity on PC are less likely to exercise or practice sports.

- Playing games as a common activity on PC
  T-test showed that the mean of fitness of those who play games as a common activity on PC is significantly different from the mean of fitness of those who do not play games commonly on PC (t=3.181, p-value=.002)
  An evidence of this relation is that there is a significant relation between playing games as common activity on PC and exercising, practicing sports as well as activeness in daily life at (gamma=-.178, p-value=.031), (gamma=-.190, p-value=.024) and (gamma=.281, p-value=.023) respectively. This means that those who play games as common activity on PC are more likely to exercise, practice sports and be active in their daily life.

- Using chat rooms as a common activity on PC
  T-test showed that the mean of fitness of those who use chat rooms commonly is significantly different from the mean of fitness of those who do not use chat rooms (t=2.497, p-value=.013).
An evidence of this relation is that there is a significant relation between using chat rooms commonly and exercising (gamma=-.246, p-value=.019) which means that those who use chat rooms commonly are more likely to exercise.

### 3.5 The Achievements

In this section, we will discuss how the different determinants of achievements (for both secondary and university students) are affected by their use of technology, aiming to find out if using technology at high rates would really affect the students’ achievements negatively.

There are 4 main determinants for achievements

1. **Grades** (for secondary and university students).
2. **Extracurricular activities.**
   
   For the secondary students, there are charity, scout and other activities only, but for the university students, academic activities are added to them.

3. **Hobbies**
   
   At first we included 7 hobbies in our research, hobbies that students in both university and secondary levels would practice, and they are (Arts & Crafts, Reading, Writing, Graphics, Playing Music, Photography, Performance arts and other hobbies). We then aggregated those hobbies into 4 main hobbies (Literature, Arts, Performance and other hobbies). Figure 3.24 represents the distribution of students among the four main hobbies.
4- **Courses**
Language, skill, self help, academic and other courses for the university students only.

### 3.5.1 The Achievements and the Sample Characteristics

In this subsection, we will discuss the relation between the achievements of the students and their gender and educational level (whether secondary or university).

1) **The Grades**
The grades of the students in both levels, the secondary and the university, are not related to the gender of the student. Using the gamma measurement of association, we found no significant relation between them.

2) **The Extracurricular Activities**
For both the secondary and university students, there is no significant relation between their gender and whether they participate in any of the extracurricular activities.

3) **The Hobbies**
- Using the Kruskal Tau measurement of association, we found a significant relation between the educational level and the literature hobbies. Such relation is very weak (T=0.013 & p-value=0.031).

Figure 3.25 shows that among the university level, there are more students who tend to practice literature hobbies.
There is also a significant relation between the gender and arts, performance and other hobbies, using Tau measurement a (Ƭ=0.049, T=0.02 and T=0.016) respectively (all relations are very weak).

Figure 3.26 shows that there are more females among the students who practice arts and performance hobbies, while males tend more to practice other hobbies. We can conclude that males are more likely to practice unusual hobbies than females.

Also using the Kruskal Tau measurement, it was found that there is a significant relation between having a hobby in general and the educational level of the student (Ƭ=0.014 & p-value=0.023). We can say that such relation is very weak, and we can illustrate it using figure 3.27 which tells us that the university students tend more to have a hobby than the secondary students.
4) the courses

The courses are only mentioned in our research for the university students, so we can only test its relation with the gender, and using the Kruskal Tau measurement we found no such relation.

3.5.2 The Achievements and the Factors of Technology

1) The Grades

- For the secondary students, we only found a relation between their grades and using e-mail as a common activity when using their PCs. Using the gamma measurement, the value is 0.445 & p-value=0.009 which indicates a moderate positive relation, where using e-mail more often is associated with higher grades.
- For the university students, using ANOVA table, we found out that there is a significant difference between their grades and the different number of hours they spend at personal PCs per week (F=3.426 and p-value=0.006).

2) The Activities

- Activities are not affected by the use of technology among the secondary students. A good explanation for this might be that youth at such ages are active in general and are highly motivated to practice sports and other activities, and technology could not keep them away from such activities.
- And for the university students, we found using the gamma measurement that there is a significant relation between the number of hours per week they spend on PCs and whether they participate in extracurricular activities or not. At gamma value =0.289 & p-value=0.01, we can say that such relation is a weak positive relation, where participating in extracurricular activities is associated with spending more hours on PCs.
- Also for the university students, there is a significant relation according to the Kruskal Tau measurement between participating in academic activities and doing research as a common activity when using PCs. Where at T=0.045 & p-value=0.0475, we can say that such relation is very weak and is explained by figure 3.28 which says that participation in academic activities is associated with doing researches.
University students’ participation in academic activities is also related to using e-mail as a common activity on PCs. Where at $T=0.049$ & $p$-value=0.037, we can say that such relation is also very weak.

Figure 3.29 also shows that university students participation in academic activities is associated with using e-mail as a common activity when using PCs.
3) The Hobbies
We used the Kruskal Tau measurement of association to check if there is a relation between the different hobbies and the determinants of technology.

- Using Kruskal Tau ($\tau=0.019$) for both, we can say that there is a very weak significant relation between doing research and using social networks as common activities when using PCs and practicing literature hobbies.

Figure 3.30 shows the relation between them, where practicing literature hobbies is associated with doing research and using social networks as common activities when using PCs.

![Figure 3.30 Relation Between Literature Hobbies and Different Common Activities when Using PCs](image)

4) Courses (For the University Students Only)
Using the gamma measurement of association, we found that

- There is a significant relation between the number of hours per week the university student spends on PC and attending language courses, where at gamma value $\gamma=0.265$ and $p$-value=$0.032$, we can say that those who attend language courses spend more hours on their PCs.

- The same relation is between the hours per week spent on PCs and attending academic courses, where at gamma=$0.3$ and $p$-value=$0.016$ we can say that those students who attend academic courses spend more hours on their PCs.
Using the Kruskal Tau measurement

- There is a significant relation between attending skill development courses and surfing the internet and using e-mail as common activities when using PCs, at $T=0.042$ & $T=0.024$ respectively.

Such relations are very weak and illustrated by figure 3.31, where surfing the internet and using e-mail as common activities on PCs are associated with the attendance of skill development courses.

**Figure 3.31 Relation Between Attending Skill Development Courses and Different Common Activities on PCs**

<table>
<thead>
<tr>
<th>Attending skill development courses</th>
<th>Surfing the internet</th>
<th>Using e-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>no</td>
<td>79.71</td>
<td>72.65</td>
</tr>
<tr>
<td>yes</td>
<td>20.29</td>
<td>27.35</td>
</tr>
<tr>
<td>no</td>
<td>59.66</td>
<td>42.25</td>
</tr>
<tr>
<td>yes</td>
<td>40.34</td>
<td>57.75</td>
</tr>
</tbody>
</table>

Surfing the internet and using e-mail as a common activity on computers.
Chapter Four

Data Analysis
In this chapter we will aggregate all determinants of each of the four elements of personal behavior in one variable then conduct some statistical analysis, like ANOVA tables and regression models, on its relation with technology.

4.1 Sociability Index
We have computed an index for sociability through adding together its determinants which are
- Number of friends a student has
- How often a student hang with his/her friend
- Starting a conversation with a stranger
- Interacting with strange people
- Joining an ongoing debate
- Making new friends
- Working with others in teams
Then we used visual binning to categorize this index into 3 categories which are
- Low degree of sociability
- Moderate degree of sociability
- High degree of sociability
To test the equivalence of the degree of sociability among the different intervals of number of hours spent on the PC, we use the ANOVA table. It shows that there is insignificant difference of degree of sociability among the different intervals of the number of hours spent on the PC (p-value=0.173).
Thus, we conclude that the number of hours spent on the PC does not affect the degree of sociability of the students.

4.2 Family Relations Index

4.2.1 Generating an Index For Family Relations
We needed to generate one index that represents strength of relation with family. In order to do this, all determinants of relation with family (number of hours student spends watching television with his/her family, eating with his/her family, number of hours the student spend with his/her siblings, discussing problems with family, whether he/she feels supported by his/her family and whether he/she shares feelings with his/her family) were reduced into two categories then summed up in one variable that represents the strength of relation with the
family. Visual binning was then used to generate a variable with three categories “weak”, “moderate” and “strong”.

One-way ANOVA was performed to check the equality of means of strength of relation with family across the four groups of PC users according to the hours per week they spend using PC. The results indicated that the relation with family does not differ significantly across the four groups (p-value= 0.844).

4.2.2 The Multinomial Logistic Regression Model of Technology on Relation with Family

Strength of relation with family depends on several factors. Multinomial logistic regression is conducted in order to determine how the strength of relation depends on these factors. The dependent variable represents the strength of relation with family, having three categories (weak, moderate and strong).

Independent variables are
1. Gender
2. Educational level
3. Owning laptop
4. Owning smart phone
5. Playing games as a common activity when using the PC
6. Surfing the internet
7. Using word processing
8. Doing research
9. Using e-mail
10. Using chat rooms
11. Using social networks
12. Overuse of internet (divided into two categories which are moderate use and overuse)
13. Whether parents complain about using the PC.

The multinomial logistic regression model is constructed with these 13 independent variables.

Testing for Multicollinearity

To test the existence of multicollinearity between the 13 independent variables we used the principal components technique. Table 4.1 shows the eigenvalues corresponding to the 13 components. We can notice that no eigenvalue is approximately equal to zero which indicates the absence of multicollinearity.
Table 4.1 Eigen values for testing
Multicollinearity (The Family Relations Model)

<table>
<thead>
<tr>
<th>component</th>
<th>Eigen value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.109</td>
</tr>
<tr>
<td>2</td>
<td>1.524</td>
</tr>
<tr>
<td>3</td>
<td>1.303</td>
</tr>
<tr>
<td>4</td>
<td>1.167</td>
</tr>
<tr>
<td>5</td>
<td>1.052</td>
</tr>
<tr>
<td>6</td>
<td>.939</td>
</tr>
<tr>
<td>7</td>
<td>.888</td>
</tr>
<tr>
<td>8</td>
<td>.794</td>
</tr>
<tr>
<td>9</td>
<td>.774</td>
</tr>
<tr>
<td>10</td>
<td>.679</td>
</tr>
<tr>
<td>11</td>
<td>.660</td>
</tr>
<tr>
<td>12</td>
<td>.606</td>
</tr>
<tr>
<td>13</td>
<td>.507</td>
</tr>
</tbody>
</table>

Also using the Kappa index rule which states that if the value of \( \frac{\lambda_1}{\lambda_{13}} \) is greater than 30, then there exists a serious problem of multicollinearity where \( \lambda_1 \) and \( \lambda_{13} \) are the first and last eigen values, respectively. Since the estimated Kappa index = \( \frac{2.109}{.507} = 4.159 \), this indicates the absence of multicollinearity. Thus we can include those 13 variables in the logistic model.

We used main effects approach to introduce the model. The final multinomial logistic regression model is adequate and presents good prediction for the strength of relation with family. From table 4.2 we find that it is statistically significant (chi-squared= 41.675, p-value= 0.027) which indicates that the full model fits the data better than an intercept-only (null model).

Table 4.2 Model Fitting Information (Family Relations Model)

<table>
<thead>
<tr>
<th>Model</th>
<th>Model Fitting Criteria</th>
<th>Likelihood Ratio Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-2 Log Likelihood</td>
<td>Chi-Square</td>
</tr>
<tr>
<td>Intercept Only</td>
<td>547.777</td>
<td></td>
</tr>
<tr>
<td>Final</td>
<td>506.103</td>
<td>41.675</td>
</tr>
</tbody>
</table>
From table 4.3, giving the pseudo R-square, we conclude that the fit of the model is considerably weak.

<table>
<thead>
<tr>
<th>Table 4.3 Pseudo R-Square (The Family Relations Model)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cox and Snell</td>
</tr>
<tr>
<td>Nagelkerke</td>
</tr>
<tr>
<td>McFadden</td>
</tr>
</tbody>
</table>

From the results of the multinomial logistic regression model given in table 4.4, we can conclude that strength of relation with family is affected by the gender of the students and whether parents complain about using the PC.

<table>
<thead>
<tr>
<th>Table 4.4 Likelihood Ratio Tests (The Family Relations Model)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effect</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Intercept</td>
</tr>
<tr>
<td>gender</td>
</tr>
<tr>
<td>edustage</td>
</tr>
<tr>
<td>laptop</td>
</tr>
<tr>
<td>smartphone</td>
</tr>
<tr>
<td>Q9.a.games</td>
</tr>
<tr>
<td>Q9.b.surfing.net</td>
</tr>
<tr>
<td>Q9.c.wordprocessing</td>
</tr>
<tr>
<td>Q9.d.research</td>
</tr>
<tr>
<td>Q9.e.email</td>
</tr>
<tr>
<td>Q9.f.chat</td>
</tr>
<tr>
<td>Q9.g.socialnetwork</td>
</tr>
<tr>
<td>hours.overuse</td>
</tr>
<tr>
<td>parents.complain.pc</td>
</tr>
</tbody>
</table>

In table 4.5 we can see that the gender of the student did not significantly predict whether he/she has weak or moderate relation with his/her family (p-value=.847 > .05). While
whether parents complain about using the PC significantly predicted whether the student has weak or moderate relation with his/her family (p-value=.005 < .05). The odds ratio tells that as parents complain changes from no complain to complain, the change in the odds of having moderate relation with family compared to having weak relation with family is 0.426. In other words, the odds of a student whose parents complain about using the PC having moderate relation with his family compared to having weak relation with his family is 1/0.426=2.35 times more than for a student whose parents do not complain.

The gender of the student significantly predict whether he/she has weak or strong relation with his/her family (p-value=.001 <.05). The odds ratio tells that as gender of the student changes from male to female, the change in the odds of having strong relation with family compared to having weak relation with family is 0.362. The odds of a female having strong relation with her family compared to having weak relation with her family is 1/0.362= 2.76 times more than for a male. While whether parents complain about using the PC didn’t significantly predict whether the student has strong or weak relation with his/her family (p-value=.522 >.05)

<table>
<thead>
<tr>
<th>relation.family (Binned)a</th>
<th>B</th>
<th>Std. Error</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
<th>95% Confidence Interval for Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>moderate</td>
<td>1.056</td>
<td>.646</td>
<td>2.668</td>
<td>1</td>
<td>.102</td>
<td></td>
<td></td>
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<td>.305</td>
<td>.037</td>
<td>1</td>
<td>.847</td>
<td>.943</td>
<td>.519 - 1.715</td>
</tr>
<tr>
<td>[gender=1]</td>
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<td>.</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>.315</td>
<td>4.248</td>
<td>1</td>
<td>.039</td>
<td>.523</td>
<td>.282 - .969</td>
</tr>
<tr>
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<td>.</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>.846</td>
<td>1.759</td>
<td>1</td>
<td>.185</td>
<td>.325</td>
<td>.062 - 1.710</td>
</tr>
<tr>
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<td>.</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[smartphone=0]</td>
<td>-.553</td>
<td>.525</td>
<td>1.109</td>
<td>1</td>
<td>.292</td>
<td>.575</td>
<td>.205 - 1.610</td>
</tr>
<tr>
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<td>.</td>
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<td>[Q9.a.games=1]</td>
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<td>.</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>[Q9.c.wordpreocessing=0]</td>
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<td>.533</td>
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<td>1</td>
<td>.174</td>
<td>.485</td>
<td>.171 - 1.377</td>
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</table>
Table 4.5 Parameter Estimates (Family Relations Model) - Continued

<table>
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<tr>
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<td>.741</td>
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<td>.563</td>
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<td>[Q9.f.chat=0]</td>
<td>.377</td>
<td>.433</td>
<td>.758</td>
<td>1</td>
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<td>1.458</td>
<td>.624</td>
<td>3.405</td>
</tr>
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<td>.439</td>
<td>.375</td>
<td>1.373</td>
<td>1</td>
<td>.241</td>
<td>1.552</td>
<td>.744</td>
<td>3.235</td>
</tr>
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<td>.</td>
</tr>
<tr>
<td>[hours.overuse=1.00]</td>
<td>.380</td>
<td>.315</td>
<td>1.451</td>
<td>1</td>
<td>.228</td>
<td>1.462</td>
<td>.788</td>
<td>2.712</td>
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</tr>
<tr>
<td>[parents.complain.pc=0]</td>
<td>-.854</td>
<td>.302</td>
<td>8.002</td>
<td>1</td>
<td>.005</td>
<td>.426</td>
<td>.236</td>
<td>.769</td>
</tr>
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<td>.</td>
<td>.</td>
<td>0</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>

strong Intercept .506 | .696 | .528 | 1 | .467 |

[gender=0] -1.015 | .312 | 10.569 | 1 | .001 | .362 | .196 | .668 |

[gender=1] 0^b | . | . | 0 | . | . | . | . |

[edustage=0] -.165 | .322 | .261 | 1 | .609 | .848 | .451 | 1.594 |

[edustage=1] 0^b | . | . | 0 | . | . | . | . |

[laptop=0] -.349 | .673 | .269 | 1 | .604 | .705 | .189 | 2.637 |

[laptop=1] 0^b | . | . | 0 | . | . | . | . |

[smartphone=0] -.034 | .494 | .005 | 1 | .945 | .966 | .367 | 2.545 |

[smartphone=1] 0^b | . | . | 0 | . | . | . | . |

[Q9.a.games=0] -.440 | .346 | 1.620 | 1 | .203 | .644 | .327 | 1.269 |

[Q9.a.games=1] 0^b | . | . | 0 | . | . | . | . |

[Q9.b.surfing.net=0] .059 | .302 | .038 | 1 | .846 | 1.060 | .586 | 1.918 |

[Q9.b.surfing.net=1] 0^b | . | . | 0 | . | . | . | . |

[Q9.c.wordprocessing=0] .490 | .628 | .609 | 1 | .435 | 1.632 | .477 | 5.589 |

[Q9.c.wordprocessing=1] 0^b | . | . | 0 | . | . | . | . |

[Q9.d.research=0] -.428 | .357 | 1.435 | 1 | .231 | .652 | .324 | 1.313 |

[Q9.d.research=1] 0^b | . | . | 0 | . | . | . | . |

[Q9.e.email=0] .000 | .382 | .000 | 1 | .999 | 1.000 | .473 | 2.117 |

[Q9.e.email=1] 0^b | . | . | 0 | . | . | . | . |


[Q9.f.chat=1] 0^b | . | . | 0 | . | . | . | . |
Using the percentage of correct classification shown in table 4.6 we find that 64.2% of those who have weak relations with their families are correctly classified by the model. Also, 43.5% of those who have moderate relations with their families are correctly classified by the model. Finally 34.6% of those who have strong relations with their families are correctly classified by the model. In general 48.7% of the students in our sample are correctly specified by the model.

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted</th>
<th>Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>weak</td>
<td>moderate</td>
</tr>
<tr>
<td>weak</td>
<td>68</td>
<td>20</td>
</tr>
<tr>
<td>moderate</td>
<td>37</td>
<td>40</td>
</tr>
<tr>
<td>strong</td>
<td>34</td>
<td>19</td>
</tr>
<tr>
<td>Overall Percentage</td>
<td>49.8%</td>
<td>28.3%</td>
</tr>
</tbody>
</table>

4.3 General Health Index
In this section we will generate one index to represent general health and test its relation with factors of technology using t-tests and ANOVA tables.
In the second sub-section we will regress all factors of technology (as independent variables) along with gender and educational level on the generated index that represents general health.

4.3.1 Generating an Index to Represent the General Health
We needed to generate one index that represents general health. In order to do this, all determinants of general health (physical disease, hours of sleep, exercising, practicing sports and activeness) were reduced into two categories then summed up in one variable that represents the level of general health. Visual binning was then used to generate a binary
variable with categories “bad health” and “good health”. Many tests are then performed to examine the effect of technology on general health using this binned variable.

We should mention that the mean of general health is the proportion of those who have good health in case of binary variable.

T-tests were performed to check the equality of means of general health among
- Those who own a laptop and those who do not.
- Those who own smart phone and those who do not.
- Those who use any of PC activities and those who do not.

But all tests were insignificant which indicates that owning a laptop or smart phone or using social networks do not affect general health.

One-way ANOVA table was performed to check the equality of means of general heath across the four groups of PC users according to the hours per week they spend using PC. The results indicated that the general health significantly differ across the four groups (p-value=0.013).

Also, when a gamma measure was obtained it showed that those who spend more hours on PC have bad health (gamma=-2.33, p-value=.004).

### 4.3.2 Logistic Regression of Technology on General Health

In this part we will regress the binary variable representing general health that we created on 11 independent variables which are

1. Gender
2. Educational level
3. Owns laptop
4. Owns smart phone
5. Playing games as common activity on PC
6. Surfing the internet as common activity on PC
7. Word processing as common activity on PC
8. Doing research as common activity on PC
9. Using e-mail as common activity on PC
10. Using social channels
11. Hours spent daily on PC (This variable is created by the first two categories of hours per day spent on PC (2 hour or less) as a moderate user category and the last two categories (more than 3 hours) as an overuse user category).
Testing for Multicollinearity

To test the existence of multicollinearity between the 11 independent variables we used the principal components technique. Table 4.7 shows the eigenvalues corresponding to the 11 components. We can notice that no eigenvalue is approximately equal to zero which indicates the absence of multicollinearity.

<table>
<thead>
<tr>
<th>component</th>
<th>Eigen value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.059</td>
</tr>
<tr>
<td>2</td>
<td>1.455</td>
</tr>
<tr>
<td>3</td>
<td>1.098</td>
</tr>
<tr>
<td>4</td>
<td>1.027</td>
</tr>
<tr>
<td>5</td>
<td>0.950</td>
</tr>
<tr>
<td>6</td>
<td>0.909</td>
</tr>
<tr>
<td>7</td>
<td>0.852</td>
</tr>
<tr>
<td>8</td>
<td>0.792</td>
</tr>
<tr>
<td>9</td>
<td>0.677</td>
</tr>
<tr>
<td>10</td>
<td>0.654</td>
</tr>
<tr>
<td>11</td>
<td>0.525</td>
</tr>
</tbody>
</table>

Also using the Kappa index rule we can see that estimated Kappa index $= \frac{2.059}{0.525} = 3.922$ which also indicates the absence of multicollinearity. Thus we can include those 11 variables in the logistic regression model.

Measuring the model’s performance

First: using difference in $G^2$

From table 4.8 we can conclude that the model is significant at 0.05 level of significance. The likelihood ratio chi-square of 31.745 with a p-value of .001 indicates that it is worth to include the independent variables and loose 11 degrees of freedom to gain this reduction in $G^2$. 

70
Second: Using R²
The Cox and Snell R² and Nagelkerke R² shows that the fit of the model is considerably weak.

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R²</th>
<th>Nagelkerke R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>438.418</td>
<td>.089</td>
<td>.119</td>
</tr>
</tbody>
</table>

Third: using the percentage of correct classification
Table 4.10 is the classification table that shows how well the model explains the dependent variable of general health. 68.9% of those who have bad health are correctly classified by the model. Also, 56.3% of those who have good health are correctly classified by the model. In general 62.9% of the students in our sample are correctly specified by the model.

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>general.health.yesno (Binned)</td>
</tr>
<tr>
<td>Step 1</td>
<td>general.health.yesno (Binned)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall Percentage</td>
<td></td>
</tr>
</tbody>
</table>

The explanation of the binary and dummy variables created by the model
First: The response variable of general health
As table 4.11 shows, the value 0 indicates bad health and the value 1 indicates good health.

Table 4.8 Measuring the model performance using difference in G2 (The General Health Model)

<table>
<thead>
<tr>
<th></th>
<th>Chi-square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>31.745</td>
<td>11</td>
<td>.001</td>
</tr>
<tr>
<td>Block</td>
<td>31.745</td>
<td>11</td>
<td>.001</td>
</tr>
<tr>
<td>Model</td>
<td>31.745</td>
<td>11</td>
<td>.001</td>
</tr>
</tbody>
</table>

Table 4.9 Measuring the model performance using R2 (The General Health Model)
Table 4.11 Dependent Variable Encoding (General Health Model)

<table>
<thead>
<tr>
<th>Original Value</th>
<th>Internal Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>bad health</td>
<td>0</td>
</tr>
<tr>
<td>good health</td>
<td>1</td>
</tr>
</tbody>
</table>

**Second:** The explanatory variables

Table 4.12 shows that the base categories of the 11 independent variables are as follows:

1. “Moderate use” for hours spent on PC per day
2. “secondary school” for educational level
3. “no” for owning a laptop
4. “no” for owning a smart phone
5. “no” for playing games as a common activity on PC
6. “no” for surfing the internet as a common activity on PC
7. “no” for word processing as a common activity on PC
8. “no” for using social networks as a common activity on PC
9. “no” for using e-mail as a common activity on PC
10. “no” for doing research as a common activity on PC
11. “male” for gender

Table 4.12 Categorical Variables Encoding (The General Health Model)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Parameter coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>hrs.overuse</td>
<td>Frequency</td>
<td>(1)</td>
</tr>
<tr>
<td>moderate use</td>
<td>114</td>
<td>0.000</td>
</tr>
<tr>
<td>over use</td>
<td>226</td>
<td>1.000</td>
</tr>
<tr>
<td>educational level</td>
<td>Frequency</td>
<td>(1)</td>
</tr>
<tr>
<td>secondary school</td>
<td>164</td>
<td>0.000</td>
</tr>
<tr>
<td>university</td>
<td>176</td>
<td>1.000</td>
</tr>
<tr>
<td>owns a laptop</td>
<td>Frequency</td>
<td>(1)</td>
</tr>
<tr>
<td>no</td>
<td>13</td>
<td>0.000</td>
</tr>
<tr>
<td>yes</td>
<td>327</td>
<td>1.000</td>
</tr>
<tr>
<td>owns a smart phone</td>
<td>Frequency</td>
<td>(1)</td>
</tr>
<tr>
<td>no</td>
<td>29</td>
<td>0.000</td>
</tr>
<tr>
<td>yes</td>
<td>311</td>
<td>1.000</td>
</tr>
<tr>
<td>games as a common activity no</td>
<td>Frequency</td>
<td>(1)</td>
</tr>
<tr>
<td>when using PC</td>
<td>249</td>
<td>0.000</td>
</tr>
<tr>
<td>yes</td>
<td>91</td>
<td>1.000</td>
</tr>
<tr>
<td>surfing the internet as a common</td>
<td>Frequency</td>
<td>(1)</td>
</tr>
<tr>
<td>activity when using PC</td>
<td>142</td>
<td>0.000</td>
</tr>
<tr>
<td>yes</td>
<td>198</td>
<td>1.000</td>
</tr>
</tbody>
</table>
The explanation of the coefficients of the model

Table 4.13 shows the coefficients of the independent variables and their significance.

Table 4.13 Variables in the Equation Encoding (General Health Model)

<table>
<thead>
<tr>
<th>Step 1</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender</td>
<td>-.830</td>
<td>.240</td>
<td>11.978</td>
<td>1</td>
<td>.001</td>
<td>.436</td>
</tr>
<tr>
<td>edustage</td>
<td>-.510</td>
<td>.253</td>
<td>4.079</td>
<td>1</td>
<td>.043</td>
<td>.600</td>
</tr>
<tr>
<td>laptop</td>
<td>-.067</td>
<td>.604</td>
<td>.012</td>
<td>1</td>
<td>.912</td>
<td>.935</td>
</tr>
<tr>
<td>smartphone</td>
<td>.518</td>
<td>.426</td>
<td>1.484</td>
<td>1</td>
<td>.223</td>
<td>1.679</td>
</tr>
<tr>
<td>Q9.a.games</td>
<td>.264</td>
<td>.267</td>
<td>.979</td>
<td>1</td>
<td>.322</td>
<td>1.302</td>
</tr>
<tr>
<td>Q9.b.surfing.net</td>
<td>.226</td>
<td>.238</td>
<td>.897</td>
<td>1</td>
<td>.344</td>
<td>1.253</td>
</tr>
<tr>
<td>Q9.c.wordpreocessing</td>
<td>-.451</td>
<td>.437</td>
<td>1.061</td>
<td>1</td>
<td>.303</td>
<td>.637</td>
</tr>
<tr>
<td>Q9.d.research</td>
<td>-.060</td>
<td>.282</td>
<td>.046</td>
<td>1</td>
<td>.830</td>
<td>.941</td>
</tr>
<tr>
<td>Q9.e.email</td>
<td>.421</td>
<td>.291</td>
<td>2.090</td>
<td>1</td>
<td>.148</td>
<td>1.523</td>
</tr>
<tr>
<td>Q9.g.socialnetwork</td>
<td>-.152</td>
<td>.294</td>
<td>.267</td>
<td>1</td>
<td>.606</td>
<td>.859</td>
</tr>
<tr>
<td>hrs.overuse</td>
<td>-.533</td>
<td>.248</td>
<td>4.597</td>
<td>1</td>
<td>.032</td>
<td>.587</td>
</tr>
<tr>
<td>Constant</td>
<td>.336</td>
<td>.735</td>
<td>.208</td>
<td>1</td>
<td>.648</td>
<td>1.399</td>
</tr>
</tbody>
</table>

The estimated model is

\[
\log \left( \frac{P}{1-P} \right) = (0.336) + (-0.830) X_1 + (-0.510) X_2 + (-0.067) X_3 + (0.518) X_4 + (0.264) X_5 + (0.226) X_6 \\
+ (-0.451) X_7 + (-0.060) X_8 + (0.421) X_9 + (-0.152) X_{10} + (-0.533) X_{11}
\]

Where: 

- \( X_1 \) is the gender (=1 if female)
- \( X_2 \) is educational level (=1 if university student)
\( X_3 \) is owning laptop (=1 if yes)
\( X_4 \) is owning smart phone (=1 if yes)
\( X_5 \) is playing games as common activity on PC (=1 if yes)
\( X_6 \) is surfing the internet as common activity on PC (=1 if yes)
\( X_7 \) is word processing as common activity on PC (=1 if yes)
\( X_8 \) is doing research as common activity on PC (=1 if yes)
\( X_9 \) is using e-mail as common activity on PC (=1 if yes)
\( X_{10} \) is using social networks as common activity on PC (=1 if yes)
\( X_{11} \) is hours per day spent on PC (=1 if over use)

The model shows that there are 3 variables that affect the response of general health significantly which are gender, educational level and hours spent on PC per day (all with p-values<0.05). This can be shown as follows

The odds of a female to have good health is 0.436 the odds of a male to have good health (which means that the odds of a male to have good health is \((1/0.436)=2.29\) times the odds of a female to have good health) (p-value=.001).

The odds of having good health among secondary students is \((1/0.600)=1.67\) the odds of having good health among university students. (p-value=.043).

Finally, the odds of having good health among moderate users of PC is \((1/0.587)=1.704\) times the odds of having good health among over users. (p-value=.032).

### 4.4 Achievements Index

#### 4.4.1 Generating Indices to Represent the Achievements

We needed to generate two indices in this section, one for the secondary students’ achievements and the other for the university students’ achievements.

- For the secondary students’ achievements, we computed an index from the variables representing such achievements (hobbies, grades & activities).
  
  For such index, we used visual binning to generate a binary variable with only two categories (high and low achievements).

- For the university students’ achievements, we also computed an index, but the variables representing their achievements are (hobbies, grades, activities & courses).
  
  And then we used the same procedure of visual binning to generate a binary variable with high & low achievements categories.
1) **The Secondary Students**

T-tests were performed to check the equality of means of secondary students’ achievements among
- Those who own a laptop and those who do not.
- Those who own smart phone and those who do not.
- Those who do activities on PC and those who do not.

And we found out that there is no significant difference between the achievements of the secondary students among the all variables.

2) **For The University Students**

The same t-tests were performed to check the equality of means of university students’ achievements and we reached the same results where no significant difference was found between the achievements of the university students among the previously mentioned variables.

One-way ANOVA table was performed to check the equality of means of achievements (for both secondary and university students) across the four groups of PC users according to the hours per week they spend using their PCs.

Only among the university students there was a difference between their achievements according to the different number of hours per week they spend on PCs.

4.4.2 **Logistic Regression of Factors of Technology on Achievements**

Here, we will regress the two generated binary variables, each on the following variables
- The gender.
- Owning a personal laptop.
- Owning a smart phone.
- Hours per day spent using PC.
- Different common activities on PC (playing games, surfing the internet, word processing, doing research, using e-mail, using chat rooms & using social networks).

**Testing for Multicollinearity**

The following tabulation shows (using the principle components technique) the eigenvalues of the 11 components entering the regression in this section. It shows that none of the eigen
value is close to zero, also using the Kappa index $\frac{\lambda_1}{\lambda_{11}} = \frac{1.943}{0.546} = 3.558$ indicate no multicollinearity.

### Table 4.14 Eigen values for testing multicollinearity (The Achievements Model)

<table>
<thead>
<tr>
<th>component</th>
<th>Eigenvalues</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.943</td>
</tr>
<tr>
<td>2</td>
<td>1.454</td>
</tr>
<tr>
<td>3</td>
<td>1.207</td>
</tr>
<tr>
<td>4</td>
<td>1.055</td>
</tr>
<tr>
<td>5</td>
<td>.924</td>
</tr>
<tr>
<td>6</td>
<td>.870</td>
</tr>
<tr>
<td>7</td>
<td>.809</td>
</tr>
<tr>
<td>8</td>
<td>.769</td>
</tr>
<tr>
<td>9</td>
<td>.757</td>
</tr>
<tr>
<td>10</td>
<td>.666</td>
</tr>
<tr>
<td>11</td>
<td>.546</td>
</tr>
</tbody>
</table>

### Measuring the model’s performance

- For the university students’ achievements, such model was insignificant. Obviously the mentioned variables have no significant effect on the university students, there might be some other factors that affect their achievements, like their character or family and friends relations.

- For the secondary students’ achievements

**First:** using difference in $G^2$

Table 4.15 shows that such model is significant at p-value=0.047, it is worth to include the 11 independent variables and loose 6 degrees of freedom to gain this reduction in $G^2$.

### Table 4.15 Measuring the model performance using difference in $G2$ (The Achievements Model)

<table>
<thead>
<tr>
<th></th>
<th>Chi-square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step</td>
<td>22.549</td>
<td>13</td>
<td>.047</td>
</tr>
<tr>
<td>Block</td>
<td>22.549</td>
<td>13</td>
<td>.047</td>
</tr>
<tr>
<td>Model</td>
<td>22.549</td>
<td>13</td>
<td>.047</td>
</tr>
</tbody>
</table>
Second: Using $R^2$
Table 4.16 shows that the fit of the model is weak.

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>193.072$^a$</td>
<td>0.135</td>
<td>0.180</td>
</tr>
</tbody>
</table>

Third: using the percentage of correct classification
Table 4.17 is the classification table that shows how well the model explains the dependent variable of secondary students’ achievements. 75.9% of those who have low achievements are correctly classified by the model. Also, 56.2% of those who have high achievements are correctly classified by the model. In general 66.7% of the secondary students in our sample are correctly specified by the model.

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>achievements.sec.select (Binned)</td>
</tr>
<tr>
<td></td>
<td>low</td>
</tr>
<tr>
<td>Step 1</td>
<td>low</td>
</tr>
<tr>
<td></td>
<td>high</td>
</tr>
<tr>
<td>Overall Percentage</td>
<td></td>
</tr>
</tbody>
</table>

The explanation of the binary and dummy variables created by the model
First: The response variable of secondary students’ achievements
As shown in table 4.18, the 0 indicates low achievements, and the 1 indicates high achievements.

<table>
<thead>
<tr>
<th>Original Value</th>
<th>Internal Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>low</td>
<td>0</td>
</tr>
<tr>
<td>high</td>
<td>1</td>
</tr>
</tbody>
</table>
Second: The explanatory variables

Table 4.19 shows that the base category of the variable of the hours per day spent using PCs less than 1. The base category of the variables of the different common activities on PCs is the no. Also the base category of owning PCs and smart phones is the no. The base category of the gender variable is male.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Parameter coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>hours per day spent using the less than 1 personal PC</td>
<td>9</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>1-2</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>3-5</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>6 or more</td>
<td>0.000</td>
</tr>
<tr>
<td>owns a laptop</td>
<td>10</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>yes</td>
<td>1.000</td>
</tr>
<tr>
<td>owns a smart phone</td>
<td>12</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>yes</td>
<td>1.000</td>
</tr>
<tr>
<td>games as a common activity when using PC</td>
<td>107</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>yes</td>
<td>1.000</td>
</tr>
<tr>
<td>surfing the internet as a common activity</td>
<td>74</td>
<td>0.000</td>
</tr>
<tr>
<td>when using PC</td>
<td>82</td>
<td>1.000</td>
</tr>
<tr>
<td>word processing as a common activity when</td>
<td>149</td>
<td>0.000</td>
</tr>
<tr>
<td>using PC</td>
<td>7</td>
<td>1.000</td>
</tr>
<tr>
<td>doing research as a common activity when</td>
<td>126</td>
<td>0.000</td>
</tr>
<tr>
<td>using PC</td>
<td>30</td>
<td>1.000</td>
</tr>
<tr>
<td>social network as a common activity when</td>
<td>28</td>
<td>0.000</td>
</tr>
<tr>
<td>using PC</td>
<td>128</td>
<td>1.000</td>
</tr>
<tr>
<td>chat rooms as a common activity when using</td>
<td>121</td>
<td>0.000</td>
</tr>
<tr>
<td>PC</td>
<td>35</td>
<td>1.000</td>
</tr>
<tr>
<td>e-mail as a common activity when using PC</td>
<td>126</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>1.000</td>
</tr>
<tr>
<td>gender</td>
<td>male</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>82</td>
</tr>
</tbody>
</table>

Third: The explanation of the model’s coefficients
$\log \left( \frac{1}{1-\pi} \right) = (-2.025) + (0.779) X_1 + (1.814) X_2 + (-0.18) X_3 + (0.002) X_4 + (-0.363) X_5 + (0.986) X_6 + (1.071) X_7 + (-0.165) X_8 + (-0.145) \text{chatting} + (0.319) X_9 + (0.142) X_{10} + (-0.76) X_{11} + (-0.435) X_{12}.$

Where:
- $X_1$ is the gender (=1 if female)
- $X_2$ is owning laptop (=1 if yes)
- $X_3$ is owning smart phone (=1 if yes)
- $X_4$ is playing games as common activity on PC (=1 if yes)
- $X_5$ is surfing the internet as common activity on PC (=1 if yes)
- $X_6$ is word processing as common activity on PC (=1 if yes)
- $X_7$ is doing research as common activity on PC (=1 if yes)
- $X_8$ is using e-mail as common activity on PC (=1 if yes)
- $X_9$ is using social networks as common activity on PC (=1 if yes)
- $X_{10}$ is spending 1 or 2 hours on PC (=1 if 1-2 hours)
- $X_{11}$ spending from 3 to 5 hours on PC (=1 if 3-5 hours)
- $X_{12}$ spending 6 or more hours on PC (=1 if 6+ hours)

Table 4.20 Variables in the Equation (Achievements Model)

<table>
<thead>
<tr>
<th>Step 1</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender(1)</td>
<td>.779</td>
<td>.387</td>
<td>4.061</td>
<td>1</td>
<td>.044</td>
<td>2.180</td>
</tr>
<tr>
<td>laptop(1)</td>
<td>1.814</td>
<td>1.048</td>
<td>2.996</td>
<td>1</td>
<td>.083</td>
<td>6.137</td>
</tr>
<tr>
<td>smartphone(1)</td>
<td>-.180</td>
<td>.728</td>
<td>.061</td>
<td>1</td>
<td>.805</td>
<td>.835</td>
</tr>
<tr>
<td>Q9.a.games(1)</td>
<td>.002</td>
<td>.395</td>
<td>.000</td>
<td>1</td>
<td>.995</td>
<td>1.002</td>
</tr>
<tr>
<td>Q9.b.surfing.net(1)</td>
<td>-.363</td>
<td>.378</td>
<td>.922</td>
<td>1</td>
<td>.337</td>
<td>.696</td>
</tr>
<tr>
<td>Q9.c.wordprocessing(1)</td>
<td>.986</td>
<td>.949</td>
<td>1.080</td>
<td>1</td>
<td>.299</td>
<td>2.681</td>
</tr>
<tr>
<td>Q9.d.research(1)</td>
<td>1.071</td>
<td>.506</td>
<td>4.487</td>
<td>1</td>
<td>.034</td>
<td>2.919</td>
</tr>
<tr>
<td>Q9.e.email(1)</td>
<td>-.165</td>
<td>.484</td>
<td>.116</td>
<td>1</td>
<td>.734</td>
<td>.848</td>
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<tr>
<td>Q9.f.chat(1)</td>
<td>-.145</td>
<td>.458</td>
<td>.099</td>
<td>1</td>
<td>.753</td>
<td>.865</td>
</tr>
<tr>
<td>Q9.g.socialnetwork(1)</td>
<td>.319</td>
<td>.510</td>
<td>.390</td>
<td>1</td>
<td>.532</td>
<td>1.375</td>
</tr>
<tr>
<td>hrs.day.PC</td>
<td>5.406</td>
<td>.372</td>
<td>2.936</td>
<td>1</td>
<td>.087</td>
<td>.132</td>
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<tr>
<td>hrs.day.PC(1)</td>
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<td>.921</td>
<td>.024</td>
<td>1</td>
<td>.878</td>
<td>1.152</td>
</tr>
<tr>
<td>hrs.day.PC(2)</td>
<td>-.760</td>
<td>.919</td>
<td>.684</td>
<td>1</td>
<td>.408</td>
<td>.468</td>
</tr>
<tr>
<td>hrs.day.PC(3)</td>
<td>-.435</td>
<td>1.008</td>
<td>.186</td>
<td>1</td>
<td>.666</td>
<td>.648</td>
</tr>
</tbody>
</table>
The model shows that the only variables that affect the secondary students achievements are the gender and doing research as a common activity on PCs, all at p-values $< 0.05$.

From the model we can say that

- The odds of female secondary students to have high achievements, is approximately 2 times the odds of male secondary students to have high achievements.
- The odds of the secondary students doing research as a common activity on PCs is approximately 3 times the odds of the secondary students who do not.
Chapter Five

Conclusions and Recommendations
In this research we aimed to find out how factors of technology affect the 4 elements of personal behavior. The following are some primary conclusions about the sample

- For the common activities on PC, females tend to use social networks more, while males are more likely to play games
- University students spend significantly more hours on PC than secondary students.
- University students spend such hours in useful activities such as doing research, word processing, using e-mail and surfing the internet. While secondary students spent more time on chat rooms

Further analysis was conducted to test the validity of the assumptions mentioned in chapter 1. The following are the conclusions found about each element of human behavior.

5.1 Conclusions

5.1.1 Conclusions about the Effect of Technology on Relations with Friends

We found that the sociability of students is unaffected by PC usage whether moderate or over use and also both arguments of Rosen are satisfied at the same time,

- Satisfying the first argument which is the positive side of modern technology having the capability to foster openness, self-confidence, and a greater sense of ease, comfort in dealing with others, widening the circle of friendship. This has appeared in our sample when we concluded that students who have large number of friends use social networks and chat rooms as a common activity when using PCs. Also, students who hang out with their friends once or more per week use their PCs daily.
- Satisfying the alternative argument is that the technology (PCs and smart phones) can have a significantly negative influence on students by reducing sociability and causing psychological disorders. This has appeared in our sample when we concluded that students who occasionally hang out with their friends use social network as a common activity. Also, students who have no friends are more likely to use social networks as a common activity when using their PCs. This could mean that Technology (owning laptops and smart phones) is attractive to so many people because it offers something we do not have in the real world. People who are shy or have trouble speaking to others can have intense discussions online. People who feel they are unattractive or unpopular can
have many online friends. Students might prefer the social networks as a substitute for hanging out with their friends. In fact, there’s really no need to leave the house anymore.

- As for the psychological health, social network showed that it might cause frequent mood changes also students may become angry over unimportant stuff. The student on a social network can be anyone he/she wishes to be, even if he/she is unattractive, shy, unpopular, or have trouble carrying on a conversation with people face to face, as if he is wearing a mask, thus he is completely satisfied with his comments and reactions. On the other hand, when he/she comes to face to face communication he does not feel at ease, he is obliged to give instant reactions and he gets true feedbacks about himself from people which may or may not be in his favor so he suffers from mood changes and becomes angry more frequent.

5.1.2 Conclusions about the Effect of Technology on Family Relations

- Surprisingly we found that the number of hours spent on the PC per week has no effect on family relations including hours spent watching television with the family, eating with the family and hours spent interacting with siblings. This result doesn’t satisfy our assumption as we thought that the increase of number of hours spent on the PC will have a negative impact on family relations.

- Both the increase of number of hours spent on the PC and using chat rooms as a common activity lead to the increase of parents’ complain about using the PC. This result meets our assumption but we found that parents’ complains decrease when students use games as a common activity although we assumed the opposite. Parents’ complain about using PC differs among gender satisfying our assumption. Parents complain more for females than males which is logic as parents intervene in their daughters’ lives more than their sons’. Also reasons for complaining differ among gender as we assumed. Males are more likely to get complains from their parents due to studying, behavior and ethical reasons more than females. While females are more likely to get complains due to health related reasons and less interaction with their parents.

- Although we thought that social networks would have a great effect on family relations and on complaining about using the PC due the intense usage of social networks and wasting their time using them, we found that using social networks has no effect on family relations. This result might be because students sometimes use social networks while interacting with their families whether by watching television, eating, or interacting
with their siblings. In general, according to the regression results, family relations are affected by gender and parents’ complain about using the PC.

5.1.3 Conclusions about the Effect of Technology on General Health

- Our assumption that technology has negative impact on suffering from physical diseases is proved. The increase in hours spent on PC per day and per week, doing word processing and surfing the internet are proved to cause eyestrain. Also, the increase in hours spent on PC per week and using e-mail commonly are proved to cause back pain. Finally, doing much word processing and overuse of chat rooms cause upper limb disorder.

- The assumption that technology may affect the period of sleep a student gets each night is also proved to be true. The increase in hours per day spent on PC and doing research commonly on PC significantly decrease the hours of sleep.

- A conclusion that was against our assumptions was that over use of social networks do not affect the hours of sleep a student gets each night. On the contrary there was a significant relation between high use of social networks and high hours of sleep each night.

- The assumption that over use of technology has a negative impact on student’s fitness was also proved to be true. It was proved that the increase in hours spent per day on PC and over use of social networks is accompanied by less exercising and less sports.

- An assumption that was proved to be false is that PC games could replace football matches or practicing sports for boys. It is proved that playing games commonly on PC is accompanied by more exercising, practicing more sports and being more active in daily life. Also, playing games commonly on PC is accompanied by less physical diseases.

- In general, the regression model showed that general health is negatively affected by the increase in hours per day spent on PC.

5.1.4 Conclusions about the Effect of Technology on Students’ Achievements

- Technology turned out to have no negative impact on the students’ achievements in both secondary and university levels.
In general, according to the regression model, the university students' achievements are not affected by technology as much as the secondary students’ achievements. The secondary students’ grades are affected by the number of hours spent on PCs, while those of the university students are not affected.

For the hobbies, the university students practice hobbies more than the secondary students, and those who practice literature hobbies are more likely to do researches and use social networks as common activities on PCs.

For the extracurricular activities, participation in extracurricular activities for the university students is associated with more number of hours spent on PCs. Also those who participate in academic activities are more likely to use e-mail and do researches as common activities on PCs. The secondary students’ participation in extracurricular activities is not affected by technology.

This validates the assumption that the factors affecting the secondary students’ achievements are different than those affecting the university students’ achievements.

5.2 Recommendations

5.2.1 Recommendations for Parents
- Parents should pay attention to their children’s mood changes. They should advise them to get involved in face in face communication more than electronic communication.
- Do not worry about the hours your children spend on PC, it does not affect their relations with family.
- On the other hand parents should pay attention to the postures of their children on PCs because wrong postured could cause severe complications.
- Give advice to your child, especially in university level, to regularly conduct a medical check-up
- For parents whose children are in the secondary level, you should pay attention that their grades are significantly affected by hours spent on PC.
- Also, for parents whose are in the secondary level, you should encourage them to practice more hobbies.

5.2.2 Recommendations for Youth
- Be yourself. Do not try to be someone else on social networks to grab attention.
- Do not waste much time on PCs doing unimportant stuff but rather make good use of such time.
- Do not spend continuous long hours on PC, try to take a 10 minutes break every 50 minutes. Also, Long spells of intensive screen work should be broken up by periods of non-intensive work of a different kind.

- Consider right postures when using a PC, sit straight, the screen should be below your eye level. Place your feet on the floor or on a footrest which will increase comfort by relieving stress on the legs, back and neck.
References


Appendices
Appendix A

Questionnaire Form for University Level

Cairo University
Faculty of Economics and Political Science
Statistics Department

Dear Student,

This questionnaire is a method of data collection for our graduation project. It is about the effect of technology on youth. Please check the answer that better suits you in the following questions. Do not check more than one answer unless mentioned.

Data collected here is confidential and will not be used except for scientific research purposes.

1- What is your gender?

☐ Male    ☐ Female

2- Do you have a personal laptop?

☐ Yes    ☐ No

3- Do you have a smart phone?

☐ Yes    ☐ No (go to question 6)

4- What do you prefer to use when you (choose one only)

<table>
<thead>
<tr>
<th></th>
<th>PC or laptop</th>
<th>Smart Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check your Facebook</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use your e-mail</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chat</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5- Do your parents complain about your use of smart phone?

☐ Yes    ☐ No

If Yes, What are the reasons? (Choose only one)

☐ Studying reasons
☐ Behavior reasons
□ Ethical reasons
□ Health related reasons
□ Less interaction with your parents
□ Other

6- How many days a week do you spend on the PC?
□ 1-2 □ 3-4 □ 5-6 □ Daily

7- How many hours a day do you spend on the PC?
□ Less than 1 □ 1-2 □ 3-5 □ 6 or more

8- Choose the most common activities when using a PC? (you can choose more than one)
□ Playing games
□ Surfing the internet
□ Word processing
□ Doing research
□ Using your e-mail
□ Chat rooms
□ Social network (Facebook, Twitter, MySpace, Google+, etc)

- Please answer the following questions about you and your friends

9- How many friends do you have?
□ None (go to question 11) □ 1-2 □ 3-5 □ 6-10 □ More than 10

10- How often do you hang out with your friends?
□ Once or more per week
□ Once or more per month
□ Occasionally
□ Never

11- Rate yourself as a communicator
□ Very bad □ Bad □ Good □ Very good □ Excellent
12- Have you ever pretended things in order to seek attention?
☐ Yes   ☐ Sometimes   ☐ Never

13- Are you satisfied with your

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don’t care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relation with your friends</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relation with your family</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grades</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extracurricular activities</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14- When you are bored, you **prefer** to (choose one only)
☐ Hang out with a friend or call him/her
☐ Talk to a family member
☐ Use the internet
☐ Other, State ……………………………………………………………………………………

15- Do you become angry over unimportant stuff?
☐ Never   ☐ Rarely   ☐ Often   ☐ Usually   ☐ Always

16- Does your mood change frequently?
☐ Never   ☐ Rarely   ☐ Often   ☐ Usually   ☐ Always

17- When you need to talk to a friend about emotions, family issues, friendships, … , you **prefer** to contact them through (choose one only)
☐ Mobile instant messages (WhatsApp, BBM,.. etc)
☐ Facebook
☐ Face to Face
☐ Telephone call
☐ PC chatting

18- When you defend a cause you believe in, how would you express yourself?
☐ In face of opposition
☐ Through social networks (Facebook status, Twitter, BBM,.. etc)
☐ Chatting rooms
19- When you are working on a research related to your study, you prefer to work as

□ Individual  □ Group

20- Rate yourself in the next statements

<table>
<thead>
<tr>
<th></th>
<th>Very bad</th>
<th>Bad</th>
<th>Good</th>
<th>Very good</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performing in front of audience</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Starting a conversation with a stranger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interacting with people you have never met before</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joining an ongoing debate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making new friends</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Listening to others without interrupting them</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attention to other people’s discussions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solving problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working with others in a team</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Please answer the following questions about your family

21- Who do you live with?

□ Parents

□ One parent only

□ Other (go to question 27)

22- How many hours a week do you spend watching television with family?

□ 0 □ 1-3 □ 4-6 □ 7 or more

23- How often do you eat with your family

□ Everyday

□ 4 times a week
☐ Twice a week  
☐ Never  
24- How many hours a week do you spend interacting with your siblings?  
☐ 0  ☐ 1-3  ☐ 4-6  ☐ 7 or more  ☐ I am an only child  
25- Do your parents complain about your use of PC?  
☐ Yes  ☐ No  
If Yes, What are the reasons? (Choose only one)  
☐ Studying reasons  
☐ Behavior reasons  
☐ Ethical reasons  
☐ Health related reasons  
☐ Less interaction with your parents  
☐ Other  
26- Please check the suitable answer about your family  

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Often</th>
<th>Usually</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>I discuss my problems and concerns with my family</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My family supports me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I share my feelings with my family</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Please answer the following questions about your general health  
27- How many hours of sleep do you get on average each night?  
☐ More than 8  
☐ 6-8  
☐ Less than 6  
28- How often do you exercise, walk, jog or go to gym?  
☐ Everyday  
☐ 3 to 4 times a week
☐ 1 to 2 times a week
☐ Occasionally
☐ Never
29- How often do you practice sports (swimming, football, etc)?
☐ 4 times a week
☐ Twice a week
☐ Once a week
☐ Only in vacations
☐ I don’t practice a certain sport
30- Do you suffer any of the following diseases?
(You can check more than one answer)
☐ Eyestrain
☐ Headaches
☐ Back pain
☐ Upper Limb Disorder (pain in arms, from fingers to shoulders and neck)
☐ Internet addiction
☐ None
31- How active are you in your daily life?
☐ Not active at all ☐ Moderate ☐ Very active

- Please answer the following questions about your achievements

32- What is your favorite hobby other than sports?
(You can check more than one answer)
☐ Arts and crafts
☐ Reading
☐ Writing (stories, poems, articles, .. etc)
☐ Graphics
☐ Playing music
☐ Photographing
☐ Performance arts (singing, acting, dancing …)
☐ Other, (state it)

……………………………………………………………………………………..

☐ None (go to question 34)
33- How often do you practise your hobby per week?
☐ Once ☐ 2-3 times ☐ 4 or more
34- Have you ever received any medals or awards?
☐ Yes ☐ No
35- In what faculty are you?

……………………………………………………………………………………..

36- In which level are you?
☐ First year
☐ Second year
☐ Third year
☐ Fourth year
☐ Fifth year
37- What is your average grade?
☐ A ☐ B ☐ C ☐ D ☐ E ☐ F
38- Do you participate in any extracurricular activities?
☐ Yes ☐ No
If yes, what is it? (You can check more than one answer)
☐ Charity activities
☐ Scout
☐ Academic activities (i.e. models)
☐ Other, (State)

……………………………………………………………………………………..

39- Have you ever attended any of the following courses? (other than university courses)
☐ Languages
☐ Skill development courses (leadership, communication skills, active listening, … etc)
☐ Self help courses (Psychological courses)
☐ Academic courses (engineering, PC, … etc)
☐ I have never attended such courses
☐ Other,(State)

................................................................................................................................................

Thank you
# Appendix B

## SPSS Output

### Table B.1 Two independent samples t-test for the gender Vs. using social network

<table>
<thead>
<tr>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>---</td>
<td>------</td>
<td>---</td>
</tr>
<tr>
<td>gender Equal variances assumed</td>
<td>65.260</td>
<td>.000</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>-3.776</td>
<td>128.226</td>
</tr>
</tbody>
</table>

### Table B.2 Two independent samples t-test for the gender Vs. playing games on PC

<table>
<thead>
<tr>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>---</td>
<td>------</td>
<td>---</td>
</tr>
<tr>
<td>gender Equal variances assumed</td>
<td>45.677</td>
<td>.000</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>4.277</td>
<td>211.593</td>
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</tbody>
</table>
Table B.3 One way ANOVA to compare secondary and university students regarding number of hours spent per day on PC

ANOVA

<table>
<thead>
<tr>
<th>educational level</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>4.112</td>
<td>3</td>
<td>1.371</td>
<td>5.710</td>
<td>.001</td>
</tr>
<tr>
<td>Within Groups</td>
<td>87.858</td>
<td>366</td>
<td>.240</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>91.970</td>
<td>369</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table B.4 Two independent samples T-test for educational level Vs. doing word processing

Independent Samples Test

<table>
<thead>
<tr>
<th>educational level</th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>equal variances</td>
<td>199.079</td>
<td>.000</td>
<td>-3.489</td>
</tr>
<tr>
<td>not assumed</td>
<td>-4.168</td>
<td>.000</td>
<td>-4.168</td>
</tr>
</tbody>
</table>
**Table B.5 Two independent samples T-test for educational level Vs. surfing the internet**

Independent Samples Test

<table>
<thead>
<tr>
<th></th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>educational level</td>
<td>Equal variances assumed</td>
<td>2.533</td>
<td>.112</td>
</tr>
<tr>
<td></td>
<td>Equal variances not assumed</td>
<td>-2.257</td>
<td>329.323</td>
</tr>
</tbody>
</table>

**Table B.6 Two independent samples T-test for educational level Vs. doing research**

Independent Samples Test

<table>
<thead>
<tr>
<th></th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>educational level</td>
<td>Equal variances assumed</td>
<td>45.518</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Equal variances not assumed</td>
<td>-7.045</td>
<td>313.978</td>
</tr>
</tbody>
</table>
## Table B.7 Two independent samples T-test for educational level Vs. using e-mail

### Independent Samples Test

<table>
<thead>
<tr>
<th></th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>educational level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal variances assumed</td>
<td>34.761</td>
<td>.000</td>
<td>-3.672</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>-3.772</td>
<td>213.884</td>
<td>.000</td>
</tr>
</tbody>
</table>

## Table B.8 Two independent samples T-test for educational level Vs. using chat rooms

### Independent Samples Test

<table>
<thead>
<tr>
<th></th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>educational level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal variances assumed</td>
<td>2.061</td>
<td>.152</td>
<td>2.397</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>2.410</td>
<td>89.473</td>
<td>.018</td>
</tr>
</tbody>
</table>
Table B.9 One sample t-test for testing the significance of proportion of parents complain about smart phones

<table>
<thead>
<tr>
<th></th>
<th>Test Value = 0</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t</td>
<td>df</td>
</tr>
<tr>
<td>whether parents complain about using smart phones</td>
<td>15.670</td>
<td>340</td>
</tr>
</tbody>
</table>

Table B.10 One sample t-test for testing the significance of proportion of parents complain about PCs

<table>
<thead>
<tr>
<th></th>
<th>Test Value = 0</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t</td>
<td>df</td>
</tr>
<tr>
<td>parents complain about PC</td>
<td>15.947</td>
<td>346</td>
</tr>
</tbody>
</table>

Table B.11 Factor analysis output for fitness

**Correlation Matrix**

<table>
<thead>
<tr>
<th></th>
<th>excercise, walk, jog, or go to the gym</th>
<th>practising sports</th>
<th>activeness in daily life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>excercise, walk, jog, or go to the gym</td>
<td>1.000</td>
<td>.517</td>
<td>-.237</td>
</tr>
<tr>
<td>practising sports</td>
<td>.517</td>
<td>1.000</td>
<td>-.268</td>
</tr>
<tr>
<td>activeness in daily life</td>
<td>-.237</td>
<td>-.268</td>
<td>1.000</td>
</tr>
</tbody>
</table>

**KMO and Bartlett's Test**

| Kaiser-Meyer-Olkin Measure of Sampling Adequacy | .586 |
| Bartlett's Test of Sphericity                | Approx. Chi-Square: 144.401 |
| df                                          | 3 |
| Sig.                                        | .000 |
Communalities

<table>
<thead>
<tr>
<th></th>
<th>Initial</th>
<th>Extraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>excercise, walk, jog, or go to the gym</td>
<td>1.000</td>
<td>.661</td>
</tr>
<tr>
<td>practising sports</td>
<td>1.000</td>
<td>.686</td>
</tr>
<tr>
<td>activeness in daily life</td>
<td>1.000</td>
<td>.352</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.

Total Variance Explained

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Extraction Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% of Variance</td>
</tr>
<tr>
<td>1</td>
<td>1.700</td>
<td>56.654</td>
</tr>
<tr>
<td>2</td>
<td>.818</td>
<td>27.279</td>
</tr>
<tr>
<td>3</td>
<td>.482</td>
<td>16.067</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.

Component Matrix

<table>
<thead>
<tr>
<th>Component Matrix</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>excercise, walk, jog, or go to the gym</td>
<td>.813</td>
</tr>
<tr>
<td>practising sports</td>
<td>.828</td>
</tr>
<tr>
<td>activeness in daily life</td>
<td>-.594</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.

a. 1 components extracted.
### Table B.12 Two independent samples T-test among the gender regarding their fitness

<table>
<thead>
<tr>
<th>Levene’s Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>Fitness according Equal variances to factor assumed</td>
<td>8.672</td>
<td>.003</td>
</tr>
<tr>
<td>Equal variances assumed</td>
<td>6.930</td>
<td>-</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>7.022</td>
<td>.000</td>
</tr>
</tbody>
</table>

### Table B.13 Two independent samples t-test between secondary and university students regarding their fitness

<table>
<thead>
<tr>
<th>Levene’s Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>REGRfactor Equal variances assumed</td>
<td>3.160</td>
<td>.076</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>3.737</td>
<td>-</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>3.714</td>
<td>-</td>
</tr>
</tbody>
</table>
Table B.14 One way ANOVA for fitness across 4 groups of PC users regarding the hours they spend per day on PC

ANOVA

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>15.613</td>
<td>4</td>
<td>3.903</td>
<td>4.051</td>
<td>.003</td>
</tr>
<tr>
<td>Within Groups</td>
<td>342.975</td>
<td>356</td>
<td>.963</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>358.588</td>
<td>360</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table B.15 Two independent samples t-test to compare between fitness of those who use social networks as common activity on PC and those who do not

Independent Samples Test

<table>
<thead>
<tr>
<th>Fitness according to factor analysis of exercising, sports, active</th>
<th>Levene’s Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>Equal variances assumed</td>
<td>.273 .602</td>
<td>-</td>
<td>360</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>3.119</td>
<td>.003</td>
<td>-</td>
</tr>
<tr>
<td>Equal variances assumed</td>
<td>3.076</td>
<td>.003</td>
<td>-</td>
</tr>
</tbody>
</table>
Table B.16 Two independent samples t-test to compare between fitness of those who commonly play games on PC and those who do not

<table>
<thead>
<tr>
<th>Independent Samples Test</th>
<th>Levene’s Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>Fitness according to factor assumed</td>
<td>.510</td>
<td>.476</td>
<td>3.181</td>
</tr>
<tr>
<td>Analysis of Equal variances not assumed</td>
<td>.3142</td>
<td>182.779</td>
<td>3.142</td>
</tr>
</tbody>
</table>

Table B.17 Two independent samples t-test to compare between fitness of those who commonly use chat rooms and those who do not

<table>
<thead>
<tr>
<th>Independent Samples Test</th>
<th>Levene’s Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>Fitness according to factor assumed</td>
<td>2.368</td>
<td>.125</td>
<td>2.497</td>
</tr>
<tr>
<td>Analysis of Equal variances not assumed</td>
<td>2.311</td>
<td>78.692</td>
<td>2.311</td>
</tr>
</tbody>
</table>
Table B.18 One way ANOVA to test equality of means of general health across 4 groups of PC users according to hours per week they spend on PC

ANOVA

general.health.yesno (Binned)

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>2.656</td>
<td>3</td>
<td>.885</td>
<td>3.626</td>
<td>.013</td>
</tr>
<tr>
<td>Within Groups</td>
<td>80.824</td>
<td>331</td>
<td>.244</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>83.481</td>
<td>334</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>