

End of life: does green really matter to the millennium generation mobile phone consumer?

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Abstract

Consumer demand for the “latest and greatest” technology before it is obsolete creates a shorter product life cycle for many electronics, especially mobile phones. Only a small percentage of electronics and their components are recycled within the United States, most are discarded improperly within the America or sent to a lesser developed country for disposal. For the purpose of this article, E-waste is defined as discarded electronic devices and their components. E-waste is the fastest growing type of waste with no signs of slowing domestically nor globally. The danger of improperly disposing of electronic products, thus not recycling or reusing is a global problem that is being addressed by mainly governments and non-governmental agencies, as well as the United Nations. The major concern with E-waste is the toxins that are released when not disposed of properly, which then causes a multitude of health issues such as cancer and birth-defects. Until this issue was recently brought to their attention by legislation, manufacturers around the world gave little attention to the idea of eliminating toxic materials in their products. Many consumers are unaware of E-waste and its dangers. Consequently, it plays a very limited role in the decision making or purchase behavior of consumers. The purpose of this paper is to investigate the millennium consumers’ views of E-waste and its impact on purchasing behavior. The research design for this study consists of a pre and post test to determine consumers’ viewpoints when aware of the issues of E-waste. To accomplish this task, this article is divided into five sections; (1) the growth of E-waste, (2) comprehensive literature review, (3) research design, (4) findings from the study, (5) recommendations and conclusions.

Keywords: green, mobile phones, electronic waste, recycle, post-purchase behavior

Introduction

Human consumption is the primary cause of damage to the environment; however, in the past this damage was typically caused from business, starting with a country's industrial revolution. Times have changed; some report that forty percent of current environmental issues are due to consumption within a household (Shabnam, 2013). The number of mobile phone subscribers coupled with the shorter life cycle of mobile phones creates an environment for a plethora of electronic waste around the world. Mobile subscribers worldwide will reach 7.5 billion by the end of 2014 and 8.5 billion by the end of 2016 (Mobile Factbook, 2011).

Consumer behavior research recognizes knowledge as a characteristic that influences all steps within the decision making process. When analyzing the reverse value chain of electronic waste, it is imperative to realize there are many steps within a chain, but consumers are the first step of action in the entire process. Studies have shown that accessibility, demographics, incentives, attitudes, and environmental knowledge are the key driving factors that influence a consumer action after the mobile phone is no longer in use (Makela, 2011).

The purpose of this paper is to investigate the millennium consumer's views of E-waste and its impact on purchasing behavior. The research design for this study consists of a pre and post test to determine consumer's viewpoints when aware of the issues of E-waste. To accomplish this task, this article is divided into five sections; (1) the growth of E-waste, (2) comprehensive literature review, (3) research design, (4) findings from the study, (5) recommendations and conclusions.

Growth of E-waste

Until recently comprehensive data were not available about E-waste nor was there any consistency in how E-waste was defined. For the purpose of this article, E-waste is defined as any electronic product and/or its components that have been discarded. The United Nations is working with governments, nongovernment agencies, and science organizations in a partnership known as the Solving the E-Waste Problem (StEP) Initiative to address the growing issues of E-waste. According to StEP, in 2012 49 million metric tons of E-waste were generated, with the United States being the leader with 9.4 million metric tons (StEP Initiative, 2013). Specifically, Americans dispose of 47.4 million computers, 27.2 million televisions, and 141 million mobile devices per year (StEP Initiative, 2013). With the increased production and consumption of electronics globally, E-waste is expected to be 33 percent higher by 2017 (StEP Initiative, 2013). With the emerging markets, specifically China and India, having a higher demand for electronic goods, the amount of E-waste being produced is expected to rise by as much as 500 percent over the next decade in some countries.

When analyzing the end of the life of electronic devices, the consumer has the option of recycling; however, most of the E-waste is not being recycled. For example, only 11-14 percent of E-waste is recycled in America (StEP Initiative, 2013). Even more frightening is that the majority of the recycled E-waste, approximately 80 percent, is exported to developing countries in Africa and Asia where it is not recycled properly (The E-Waste Crisis, n.d.). In the article *What's Driving the E-Waste Crisis* (n.d.), there are many major drivers to the E-Waste environmental problem. Developing countries are likely facing the ramifications of the lack of proper recycling due to the flow of E-waste to them from more developed countries such as the United States. They are also suffering from the lack of technology for discarding E-waste properly, a lack of legislation,

and proper enforcement of legislation that does exist. For example, an estimated 70-80 percent of the E-waste that's given to recyclers is exported to countries with developing economies, in effect externalizing the real costs of managing hazardous waste and products (The E-Waste Crisis, n.d.) These substances are harmful and have been shown to cause cancer as well as other detrimental physical problems and because many of these chemicals do not breakdown over time they find their way into sources of both food and water (The E-Waste Crisis, n.d.). Simply put, developing countries often lack infrastructure and resources to operate and monitor responsible E-waste recycling operations.

Literature Review:

Growth of the Mobile Phone Industry

The number of mobile phone subscriptions is not the same as the number of mobile users. Oftentimes consumers have more than one subscription for different mobile phone devices they are using. According to the Pew Institute, in 1990, only 53 percent of Americans owned a mobile phone, where as 90 percent of Americans own a mobile phone in 2014 (Pew Institute, 2014). From a global perspective, there are 4.5 billion mobile users, which is a six percent increase from 2013 (Ericsson, 2014).

The growth in America the past two decades has been impressive, but it does not compare to the growth of mobile phones in the developing world over the past few years. With approximately 7 billion subscriptions, there is almost a 96 percent penetration of mobile phones globally (ITU, 2014). The United States is the third highest ranking country with regard to the highest mobile phone subscription rates, with a little over 20 percent of the subscription rates coming from developed countries. Seventy eight percent, approximately 5.4 billion of the global subscriptions of mobile phones come from the developing world (ITU, 2014). Specifically, China and India are the leaders in the number of mobile phone subscriptions, with China accounting for 19 percent of the world subscriptions and 11 percent of the world subscriptions in India (Ericsson, 2014).

Overall, mobile penetration in the developing world is approximately 90 percent; however, Africa has the lowest mobile penetration just under 70 percent (ITU, 2014). By 2016, it is expected that Africa and the Middle East will overtake Europe as the second largest region for mobile subscribers (ITU, 2014). Any way one analyzes the numbers, from a mobile phone owners or subscription rates, there is no doubt that consumers all around the world are utilizing mobile phones in their daily lives. With the usage of the mobile phones daily, consumers continually demand for the advanced technology, thus mobile phone companies are constantly trying to improve the technology of their product lines, which in turn forces producers to introduce new models of mobile phones to the market at a rapid rate. With the demand from consumers for the latest technology and the ability for companies to meet the demand, the product life cycles of mobile phones have shortened significantly over time.

Product Life Cycle of Mobile Phones

People are using more mobile phones and as the mobile phone industry has become more innovative. The average life span of mobile phones is shrinking. If technology stood still, the mobile phone product life cycle would be approximately 10 years; however, it is significantly shortened due to consumer demand for the latest technology (Fishbein, 2012). In 2010 the average life span of a mobile phone was equivalent to its contract length, thus the mobile phone

life cycle was two years (Geyers and Bless, 2010). Recently, with the buyback promotion mobile phone subscription companies are offering, as well as technologically advanced mobile phones entering the market, the actual product life cycle of a phone purchased today, that is the time the consumer actually uses it as a mobile phone, has dwindled to somewhere between 9 and 18 months (EPA, 2014).

In China, approximately 25% of consumers reported that unwanted phones were either given to others or lost/stolen, so these phones were reused by consumers and the lifespan was extended (Yin, Gao, and Xu, 2014). Due to customer demand, a mobile phone “dies” eight years before it actually reaches its true product life cycle expiration date. Most consumers are aware that their “need” for a new mobile phone is truly a “want”, but they succumb to the want and do not consider the repercussions of the shorten product life cycle. A shortened life cycle coupled with the growth of mobile phones globally, has created an E-waste problem.

Post Purchase Behavior: End of Life of a Mobile Phone Around the World

With the growth of E-waste, as well as the trends on the mobile phone industry, it is necessary to analyze the post-purchase behavior of mobile phones. Post purchase behavior involves any and all of the consumer’s behaviors after purchase. Electronics waste is a bit different than other goods due to the fact that they are not impulse purchases and they are high involvement purchases.

Thus far in the literature, the most in-depth global survey regarding mobile phone end of life behaviors was conducted by Nokia in 2007, revisited in 2011, and it includes 6,500 respondents in 13 countries (Nokia, 2011). With regard to mobile phones, 9 percent of people report they have recycled their old phones which is a jump from 6 percent in 2007 (Nokia, 2011). Fifteen percent of Americans, Spaniards, and Brits report they have recycled their last mobile phone when purchasing their new one. German mobile phone users recycled 10 percent of their mobile phones and consumers in Finland recycled 7 percent of the last mobile phones they owned. On the other hand, consumers in developing countries, such as Argentina and Indonesia, report a 2 percent or less recycling of last mobile phones. Nine percent of consumers who reside in the two most populated countries in the world, India and China, both developing countries report to have recycled the last phone they owned (Yin, Gao, and Xu, 2014).

It has been estimated that only 28 percent of waste mobile phones were recycled in China, 6.6 percent were recycled through “Green Box” programs, just over 2 percent were recycled through the “Old for New” promotion plan, and just over 12 percent of waste mobile phones were sold at second hand markets in China (Yin, Gao, and Xu, 2014). According to the EPA, 141 million mobile phones were discarded by Americans in 2009 and only 12 million of those were collected for recycling (EPA, 2014). Less than 5 percent of consumers reported that they threw away their last mobile phone, thus winding up in a landfill. Many respondents, approximately 60 percent, cited they are storing their cell phones and they believe their “old” phone contained value for storage. Ten percent of the respondents reported keeping it for back up, about 10 percent reported giving the phone away or as a backup phone (Garcia, 2011). Only about 10 percent of average Americans recycle mobile phones, which is only 1 percent higher than all electronic waste. Residents of California are the highest in recycling cell phones, nearly a 25 percent recycle rate (Silveria and Chang, 2010). California residents were willing to pay 1 percent advanced recycling fee, which is a tax paid at the time of purchase to support local recycling (Saphores, et al., 2006). It does not appear, to the aforementioned numbers, that the mobile phone was properly discarded once it left the consumers possession.

Factors Impacting Post Purchase Behavior: End of Life of a Mobile Phone

A wide scope of research has been conducted with regard to recycling. One area of research focuses on consumers being motivated by cost and benefits. It appears that convenience and cost significantly impact recycling behavior (Jenkins, et. Al., 2003). Numerous studies attempt to link demographics and socioeconomic variables, such as income, education, age, and gender, to recycling behaviors; however, many of the findings are inconsistent.

Income level has been proven to significantly impact recycling behavior in some research (Gamba and Oskamp, 1994, Oskamp, 1995) and not significant by other research (Scott, 1999). The education level of consumers has been inconsistent in its relationship with recycling. Some researchers found that education had a positive relationship with recycling (Owens, Dickerson, and Macinitsoh, 2000), while other research did not find such a relationship existed (Gamba and Oskamp, 1994, Werner and Makela, 1998).

According to the Perceived Consumer Effectives (PCE) framework, young consumers tend to recycle at higher rates, because they perceive that the environmental issues impact their lives directly (Saphores, Nixon, Ogunseitan, and Shapiro, 2007). The relationship of age is ambiguous as well, some studies conclude that age is a significant variable (Gamba and Oskamp, 1994, Scott, 1999) and others report age is insignificant (Werner and Makela, 1998, Foster, 2004, and Gronhoj and Olander, 2007). According to some researchers (Schultz, Oskamp, and Mostafa, 2007), females are more likely to recycle than males; however other researchers have not found a relationship between gender and recycling (Gamba and Oskamp, 1994 and Werner and Makela, 1995).

Other variables studied when analyzing post-purchase behaviors of consumers and their recycling behaviors include the size of the household and disposal choices. The size of the household has also been ambiguous when determining its significant. Some found it a significant predictor of recycling behavior (McQuaid and Murdoch, 1996) and other researchers did not (Scott, 1999). With regard to disposal choice, Harrell and Mcconocha (1992) and Bianchi and Britwistle (2012) concluded that disposal choice includes throwing away, selling/swapping, and giving away. Over time the selling/swapping has been expanded to include the trade-in options, as a response to the large number of trade-in options mobile phone subscription companies are offering.

Many consumers are not doing anything with their unused phones, due to the perceived value thus they are tossed in a drawer somewhere. In 2007, approximately 39 percent of Americans reported storing their old mobile phones, nearly 16 percent of American consumers gave away their old mobile phones, and 9 percent donate their old mobile phones to charities (Saphores, Nixon, Ogunseitan, and Shapiro, 2007). Nearly 48 percent of respondents in China reported that their mobile phones were stored at home (Yin, Gao, and Xu, 2014). Oftentimes, unused electronics are stored in homes, offices and warehouses. It is estimated up to 75 percent of electronic items in India are stored due to uncertainty on how to manage the electronic waste (Borthakur and Sinha, 2013).

According to some researchers, the biggest barrier to recycling is inconvenience, not the cost of recycling or the opportunity cost of storage (Sphores, Nixon, Ogunseitan, and Shapiro, 2007). In Garcia's research, perceived inconvenience and increased exposure to E-waste was studied. Only 6 percent of non-recyclers reported that the inconvenience of mobile phone recycling was a driving factor in their decision to recycle (Garcia, 2011). By comparison, 27 percent of non-recyclers reported a lack of information as a barrier to mobile phone recycling

(Garcia, 2011). Lack of information and knowledge significantly impacts post purchase behaviors of consumers, such as recycling.

Environmental knowledge, also known as Eco literacy, refers to how informed a consumer is about environmental issues (Chan, 1999). Environmental knowledge has been recognized by the marketing community as a factor that influence each phase of the consumer decision making process (Laroche et al, 2001). Knowledge is a significant factor in gathering and organizing information and how consumers evaluate products and services (Murray and Schlacter, 1990). Whether proactive or reactive, environmental green behavior has been a growing body of literature and an emphasis in business, from the various functions of marketing, throughout the entire value chain from suppliers to end consumers.

According to Kempton et. al. many people are not knowledgeable enough about environmental issues to act in an environmentally responsible manner. Furthermore, the Hungerford and Tomera (1987), findings suggest that knowledge is the most significant predictors of environmental actions and Mostafa (2009) reported that environmental knowledge is a significant impact on the consumer's intention to purchase green products. In the study conducted by Nokia, consumers residing in developed countries were more aware of materials and items that could be recycled than those consumers residing in developing countries (Nokia, 2011). Almost half of consumers reported that they were unaware of the possibility to recycle their mobile phone and two-thirds of consumers stated they did not know how to recycle unwanted mobile phones and only 3 percent had ever recycled a mobile phone (Nokia, 2011).

Research Design

Purpose of the Study- The Research Question

The purpose of this paper is to answer the following research question:

Will the millennium consumers' attitudes toward buying behaviors of mobile phones change when they become aware of the dangers of electronic waste to individuals and the environment?

Hypotheses

To answer the research question, the following 5 hypotheses were formed:

Hypothesis 1

H₀ University student attitudes towards buying mobile phones will not change after they become aware of the dangers of electronic waste to individuals and the environment.

H₁ University student attitudes towards buying mobile phones will change after they become aware of the dangers of electronic waste to individuals and the environment.

Hypothesis 2

H₀ There will be no difference in the attitudes of Males and Females as it relates to mobile phone buying behaviors before becoming aware of the dangers of electronic waste to individuals and the environment.

H₂ There will be a difference in the attitudes of Males and Females as it relates to mobile phone buying behaviors before becoming aware of the dangers of electronic waste to individuals and the environment.

Hypothesis 3

H₀ There will be no difference in the attitudes of Males and Females as it relates to mobile phone buying behaviors after becoming aware of the dangers of electronic waste to individuals and the environment.

H₃ There will be a difference in the attitudes of Males and Females as it relates to mobile phone buying behaviors after becoming aware of the dangers of electronic waste to individuals and the environment.

Hypothesis 4

H₀ Males' attitudes towards the buying of mobile phones will not change after they become aware of the dangers of electronic waste to individuals and the environment.

H₄ Males' attitudes towards the buying of mobile phones will change after they become aware of the dangers of electronic waste to individuals and the environment.

Hypothesis 5

H₀ Females' attitudes towards the buying of mobile phones will not change after they become aware of the dangers of electronic waste to individuals and the environment.

H₅ Females' attitudes towards the buying of mobile phones will change after they become aware of the dangers of electronic waste to individuals and the environment.

Pre-Post Test Design

The study is a pre-post treatment design. The subjects of the study were undergraduate students taking a variety of classes. These classes included, Project Management, Introduction to Operations and Supply Chain Management, International Marketing and International Business. To obtain responses from the subjects, a survey instrument was developed.

A survey instrument was developed to measure the respondent's attitude toward buying mobile phones. The survey was distributed to each class at the beginning of the class period. Students were asked to read the disclosure form and were welcomed to not participate in the survey. Once students read the form, they were asked to complete the first part of the survey and to stop at the blank page. After students completed the first part of the survey the treatment was given.

The treatment in this study was a brief lecture on the dangers of electronic waste, as well as the misrepresentation of how electronic products are perceived to be recycled, but may not be handled properly. The presentation lasted approximately 30 minutes. Once the lecture was complete, students were asked to complete the second part of the survey.

The second part of the survey was an exact duplicate of the questions on the first part of the survey. Once the participants completed the survey, they were thanked and excused from the classroom.

The Survey Instrument

The survey instrument was composed of multiple questions, but there were a total of 4 questions specifically to the attitudes of the respondents towards buying mobile phones. To measure the respondents, the following survey questions were used:

On a scale of 1 (Not Important) to 5 (Extremely Important), how important are the following factors in making a decision about purchasing a mobile phone.

Green Image of Manufacturer and/or Retailer	1	2	3	4	5
Recycle Program of Manufacturer and/or Retailer	1	2	3	4	5
Proactive Behavior of Manufacturer and/or Retailer in Being Environmentally Conscious	1	2	3	4	5
Environmental Impact of Product	1	2	3	4	5

There were a total of 83 complete surveys returned, composing of 47 males and 36 females. The scale used in the survey was a 5-point Likert scale with an answer of 1 meaning that the item was not important in the decision to buy a mobile phone and an answer of 5 meaning that the item was extremely important in the decision to buy a mobile phone. Cronbach's alpha on the survey instrument was .885, indicating that the survey instrument is reliable.

Hypothesis Testing

To test Hypothesis 1, a paired T-test was completed to determine if there was a significant difference in the attitudes toward buying electronic goods after the knowledge of individual and environmental impact of the electronic waste were known. Utilizing the average of the four question responses measured, all 83 surveys were used in the paired T-test. A normal distribution was assumed because there were over 30 responses (83 in total).

To test Hypothesis 2, the survey questions were separated by gender. A one-sample T-test assuming equal variances was utilized to see if the mean response differed between genders before the treatment. An F-test was conducted and showed the variances can be assumed equal. A normal distribution was assumed because there were over 30 responses for each gender (47 Male and 36 Female).

To test Hypothesis 3, the survey questions were separated by gender. A one-sample T-test assuming unequal variances was utilized to see if the mean response differed between genders after the treatment. An F-test was conducted and showed that the variances of the two populations were not equal. A normal distribution was assumed because there were over 30 responses for each gender (47 Male and 36 Female).

To test Hypothesis 4, a paired T-test was completed to determine if there was a significant difference in the attitudes of Males toward buying mobile phones after the knowledge of individual and environmental impact of the electronic waste was known. A normal distribution was assumed because there were over 30 responses for each gender (47 Male).

To test Hypothesis 5, a paired T-test was completed to determine if there was a significant difference in the attitudes of Females toward buying mobile phones after the knowledge of individual and environmental impact of the electronic waste was known. A normal distribution was assumed because there were over 30 responses for each gender (36 Female).

Findings

As indicated in Table-1, there is a significant difference at the 98 percent level to indicate that there was a change in the attitude of buying behaviors as it pertains to mobile phones. Therefore, null hypothesis 1 can be rejected. University student attitudes towards buying mobile phones will change after they become aware of the dangers of electronic waste to individuals and the environment.

A one-sample T-test was conducted to see if there is a difference in the mean response of Male and Female before the treatment. As indicated in Table-2, at the 98 percent level, there is a significant difference in the mean response of Male and Female responses before the treatment. Therefore, null hypothesis 2 can be rejected. There is a difference in the attitude of Males and Females as it relates to electronic buying behaviors before becoming aware of the dangers of electronic waste to individuals and the environment.

A one-sample T-test was conducted to see if there is a difference in the mean response of Male and Female after the treatment. The T-test provided the following results: As indicated in Table-3, at the 98 percent level, there is not a significant difference in the mean response of Male and Female responses after the treatment. Therefore, null hypothesis 3 cannot be rejected. There is not a difference in the attitude of Males and Females as it relates to electronic buying behaviors after becoming aware of the dangers of electronic waste to individuals and the environment.

There is a significant difference at the 98 percent level to indicate that there was a change in the attitude of buying behaviors of males as it pertains to mobile phones as indicated in Table-4. Therefore, null hypothesis 4 can be rejected. Male university student attitudes towards buying mobile phones will change after they become aware of the dangers of electronic waste to individuals and the environment.

There is a significant difference at the 98 percent level to indicate that there was a change in the attitude of buying behaviors of females as it pertains to mobile phones as indicated in Table-5. Therefore, null hypothesis 5 can be rejected. Female university student attitudes towards buying mobile phones will change after they become aware of the dangers of electronic waste to individuals and the environment.

Recommendations and Conclusions

Electronic waste is an issue that does not appear to be declining. As technology continues to improve and mobile phone use continues to penetrate country after country, electronic waste will continue to be a problem. To help address the problem of electronic waste, an understanding of buying behaviors of the next generation of consumers is a valid addition to the body of knowledge because it has long reaching implications into both the marketing of mobile phones and the supply chain/reverse supply chain design of mobile phone manufacturers. The findings of this study deserve discussion. In particular, there is a change in attitude once the dangers of E-waste are known. This was prevalent in all students and when separated into gender. However, the data indicated different findings when comparing genders.

Before the treatment, there was a difference between the mean response of males and females, but after the treatment, there was not a difference in the mean response between the two genders. Also worthy of note, and a possible area for future research, is that the variance of the mean response of males increased after the treatment whereas the variance of the female response decreased after the treatment. The reason for this difference is not known, but is a worthy addition to the body of knowledge.

If attitudes towards mobile phone recycling become more informed, then pressure may be

placed on organizations to deal with electronic waste properly and market that program to its consumers. However, to operate a successful recycling program for mobile phones, developing an efficient reverse logistics program that can effectively move the unwanted mobile phone backwards through the supply chain will likely be necessary.

Future research needs to be conducted as to the attitudes of future consumers as it relates to electronic waste and the gender differences as to mean and variance. Could this difference be in the way that the information on electronic waste is delivered or are there some other factors that lead to the difference between male and female responses of attitudes toward buying mobile phones? Future research should be conducted to better understand the gender dynamic as it pertains to electronic waste.

Taken as a whole, this work has added to the body of knowledge through investigating the next generation of mobile phone buyers and their attitudes toward electronic waste after knowing the negative impact on the individual and the environment. Understanding that there are possible gender differences may impact the marketing efforts of mobile firms, while understanding that recycling mobile phones does impact buying behaviors may also lead to more efficient reverse logistics systems to properly recycle mobile phones. In any case, the electronic waste problem is real and should be researched further to help better understand the problem as well as to help determine the solution.

Appendix A

Table-1
Hypothesis 1

Paired Samples Statistics

t-Test: Paired Two Sample for Means

	<i>MOBILE BEFORE</i>	<i>MOBILE AFTER</i>
Mean	2.43373494	3.653614458
Variance	0.693726124	0.856450191
Observations	83	83
Pearson Correlation	0.562167015	
Hypothesized Mean Difference	0	
df	82	
t Stat	-13.44238316	
P(T<=t) one-tail	9.77863E-23	
t Critical one-tail	1.663649184	
P(T<=t) two-tail	1.95573E-22	
t Critical two-tail	1.989318557	

Table-2
Hypothesis 2

t-Test: Two-Sample Assuming Equal Variances

	<i>Male Before</i>	<i>Female Before</i>
Mean	2.184397163	2.675925926
Variance	0.79617638	0.504673721
Observations	47	36
Pooled Variance	0.670218441	
Hypothesized Mean Difference	0	
df	81	
t Stat	-2.710827502	
P(T<=t) one-tail	0.00409568	
t Critical one-tail	1.663883913	
P(T<=t) two-tail	0.00819136	
t Critical two-tail	1.989686323	

Table-3
Hypothesis 3

t-Test: Two-Sample Assuming Unequal Variances

	<i>Male After</i>	<i>Female After</i>
Mean	3.560283688	3.898148148
Variance	1.280707164	0.367107584
Observations	47	36
Hypothesized Mean Difference	0	
df	73	
t Stat	-1.745969973	
P(T<=t) one-tail	0.042511598	
t Critical one-tail	1.665996224	
P(T<=t) two-tail	0.085023197	
t Critical two-tail	1.992997126	

Table-4
Hypothesis 4

t-Test: Paired Two Sample for Means

	<i>Male Before</i>	<i>Male After</i>
Mean	2.184397163	3.560283688
Variance	0.79617638	1.280707164
Observations	47	47
Pearson Correlation	0.421713172	
Hypothesized Mean Difference	0	
df	46	
t Stat	-8.521725099	
P(T<=t) one-tail	2.54669E-11	
t Critical one-tail	1.678660414	
P(T<=t) two-tail	5.09338E-11	
t Critical two-tail	2.012895599	

Table -5
Hypothesis 5

t-Test: Paired Two Sample for Means

	<i>Female Before</i>	<i>Female After</i>
Mean	2.675925926	3.898148148
Variance	0.504673721	0.367107584
Observations	36	36
Pearson Correlation	0.761923028	
Hypothesized Mean Difference	0	
df	35	
t Stat	-15.78346119	
P(T<=t) one-tail	8.66281E-18	
t Critical one-tail	1.689572458	
P(T<=t) two-tail	1.73256E-17	
t Critical two-tail	2.030107928	

Appendix B

F-Test Two-Sample for Variances

<i>Descriptive Statistics</i>			
VAR	Female Before	Male Before	
<i>Sample size</i>	36	47	
<i>Mean</i>	2.67593	2.1844	
<i>Variance</i>	0.50467	0.79618	
<i>Standard Deviation</i>	0.7104	0.89229	
<i>Mean Standard Error</i>	0.1184	0.13015	

<i>Summary</i>			
<i>F</i>	1.57761	<i>F Critical value (2%)</i>	1.96616
<i>p-level 1-tailed</i>	0.08171	<i>p-level 2-tailed</i>	0.16343
<i>H0 (2%)?</i>	<i>accepted</i>		

F-Test Two-Sample for Variances

<i>Descriptive Statistics</i>			
VAR	Female After	Male After	
<i>Sample size</i>	36	47	
<i>Mean</i>	3.89815	3.56028	
<i>Variance</i>	0.36711	1.28071	
<i>Standard Deviation</i>	0.60589	1.13168	
<i>Mean Standard Error</i>	0.10098	0.16507	

<i>Summary</i>			
<i>F</i>	3.48864	<i>F Critical value (2%)</i>	1.96616
<i>p-level 1-tailed</i>	0.00011	<i>p-level 2-tailed</i>	0.00022
<i>H0 (2%)?</i>	<i>rejected</i>		

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