EFFECT OF GENDER AND PHYSICAL ACTIVITY ON VISUAL AND AUDITORY REACTION TIME AMONG UNDERGRADUATE STUDENTS OF FEDERAL UNIVERSITY OYE EKTI.

BY

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DECLARATION

I declare that this study was carried out by me AKOMOLAFE TOLULOPE DEBORAH in the Department of Psychology, Faculty of Social Science, Federal University Oye –Ekiti.

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CERTIFICATION

I certify that this study was carried out by AKOMOLAFE TOLULOPE DEBORAH in the Department of Psychology of the Federal University Oye- Ekiti under my supervision.

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DEDICATION

I dedicate this project to Almighty because only him is worthy of my praise and he alone is and will continue to be my help in times of trouble. I also dedicate this project to my darling mother in person of Mrs L.Y Akomolafe whom the lord used to cater for all of my needs. Also I dedicate this project to my family members for their support because it was all easy because of them

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ABSTRACT

The aim of this study is to determine the effect of gender and physical activities on visual and auditory reaction time among undergraduates in Federal University Oye Ekiti. While carrying out the research, there were physical activities was involved which means the research was carried out through a field experiment. The study adopted a with-in subject design because the same set of participant were used to test for both visual and auditory reaction time. The researcher made use of 100 participants which is 50 male and 50 females and each participant were chosen through a random såmpling techniques and the researcher ensured that all participants were free of any form of physical disabilities. All participants were asked to fill a form to determine their level of involvement in physical activities on a scale of 1-10.

The following instruments that were used to carry out the research asked to carry out the research:

1) Projector

2) Laptop

3) Bluetooth speaker

4) Stopwatch

The research stated three (3) hypothesis.

H1- Undergraduates who exercise regularly will report more on reaction time than undergraduates who do not exercise regularly

H2- Male undergraduates will report more on reaction time than female undergraduates

H3- Male and female undergraduates who exercise regularly will report more on reaction time than male and female undergraduates who do not involve in physical activities

Independent t-test was used to analyze Hypothesis 1 and 2 while 2×2 Anova was used to analyze hypothesis 3. Result indicates that, physical activities does not affect reaction time, gender does not affect reaction time , Both gender and physical activities jointly or interactively affect reaction time. In conclusion, gender or physical activities does not independently affect reaction time but both gender and physical activities jointly interactively affect reactionn time

It is hereby recommended that undergraduates both male and female should be involved in physical activities as it will help undergraduates' ability to concentrate as this will quicken undergraduates' reaction time.

Word count: 292

Keywords: Gender ,Physical Activities, Visual Reaction Time, Auditory Reaction Time

CHAPTER ONE

1.1 Background to the study

Reaction time or response time refers to the amount of time that takes places between when we perceive something to when we respond to it. It is the ability to detect, process, and respond to a stimulus. Reaction time is defined as an interval of time between the application of stimulus and the initiation of appropriate voluntary response under the condition that the subject has been instructed to respond as rapidly as possible (Teichner 1954). Thus it indicates the time taken by an individual to react to external stimulus (Mishra, Mahajan & Maini 1985). In everyday life one has to respond almost instantaneously to many diverse situations. Many simple situations of reaction time are usually at our home itself e.g. response to a door bell, telephone ring or whistle of pressure cooker. One measure of information processing is reaction time and is used to judge the ability of the person to concentrate and coordinate. It provides an indirect index of the integrity and processing ability of the central nervous system (3) and a simple, non-invasive means of determining sensorimotor co-ordination and performance of an individual (4). According to Joseph Jastrow (1890), "The study of the time relations of mental phenomena is important from several points of view: it serves as an index of mental complexity, giving the sanction of objective demonstration to the results of subjective observation; it indicates a mode of analysis of the simpler mental acts, as well as the relation of these laboratory products to the processes of daily life". Reaction Time also demonstrates the close relation between Physiological and Psychological processes. Reaction Time plays a very important role in our lives as its practical implications may be of great consequences. Reaction Time can also be said to as the interval of time between the presentation of the stimulus and appearance of appropriate voluntary response in the subject. Luce and Welford described three types of Reaction Time,

1) Simple Reaction Time

2) Recognition Reaction Time

3) Choice Reaction Time.

Simple Reaction Time is when there is one stimulus and one response. Simple reaction time can be determined when an individual is asked to press a button as soon as a light or sound appears.

Recognition Reaction Time means that they are some stimulus to that should be responded to, and other that should not get a response,

*Choice Reaction Time are simply multiple stimulus and multiple response.

Human Reaction Time works by having a nervous system recognize the stimulus. The neurons then relay the message to the brain. The accepted figures for mean simple Reaction Time for college-age individuals have been about 190 ms for light stimuli and about 160 ms for sound stimuli (Jain, Bansal,Kumar & Signh,2015). Reaction Time in response to situations can significantly affect our lives due its practical implications. Fast Reaction time can produce rewards (e.g. in sports) whereas slow Reaction Time can produce grave consequences (e.g. driving and road safety matters) Jain, Bansal,Kumar & Signh,(2015). Various factors can influence Reaction Time in humans. Examples include but not limited to age, gender, central versus peripheral vision practice, personality traits etc. or years, people have studied exercise and the differing effects it has on the human body. Exercise has been known to control weight management, improve mood, motor function, and cognitive processing (Mayo Clinic, 2014).

Act of exercising has been shown to enhance numerous aspects of mental functioning, such as mood, self-esteem and general psychological well-being (Plante & Rodin 1990). Although controversial, several studies have shown that physical exercises improve and protect the cerebral function, suggesting that physically active individuals have better cognitive function, and are at a lower risk to develop mental disorders compared to individuals with sedentary life style (Antunes, Santos, Cassilhas, Santos, Bueno, Mello 2006). Aerobic exercise also affects cognition and psychomotor function. Aerobic exercise refers to exercise of moderate intensity which is undertaken for a long duration. Aerobic means "with oxygen", and refers to the use of oxygen in a muscle's energy generating process. An effective aerobic exercise should involve 5-10 minutes of warming up at an intensity of 50-60% of maximum heart rate, followed by at least 20 minutes of exercise at an intensity of 70- 80% of maximum heart rate, ending with 5- 10 minutes of cooling down at an intensity of 50-60% of maximum heart rate. The effect of aerobic exercise on visual and auditory RTs has escaped extensive examination and the existing data on the benefit of aerobic exercise on psychomotor performance is not conclusive (Welford, 1980). From a cellular perspective, when an individual engages in intense physical activity, the skeletal muscles utilized consume an increased amount of ATP (energy). The elevated demand of aerobic respiration leads in an increase in the body's requirement for oxygen, therefore explaining the increase in respiration and heart rate effect of exercise. These responses allow more oxygenated blood to flow to the many muscles of the body and help to maintain adequate motor functioning. Increased blood flow also makes its way to the brain and has been shown to have similar benefits for cognitive processing (Poels et al., 2008). Several papers have been published focusing on the study of these post-exercise cognitive improvements by testing short-term and working memory; however, there have been fewer studies that have looked at the connection between cognitive and motor functions (Brisswalter et al.,1997 and Keen et al., 1993). The studies that have looked at this "connection," have tested the reaction times of subjects following different types of physical activities. According to Matthew, Pinn & Hibbs (2007), simple auditory reaction time has the fastest reaction time for any given stimulus. A study done by Thompson, Colebatch, Brown, Rothwell, Day and Obeso (1992), has documented that the mean reaction time to detect visual stimuli is approximately 180 to 200 milliseconds, whereas for sound it is around 140-160 milliseconds.

On the other hand, Yogi, Coburn, Estes and Arruda, (1999), states reaction time to visual stimuli is faster than to auditory stimuli. A study carried out by Verlger (1997), showed that visual reaction time is faster than auditory reaction time during or after exercise

1.2 Statement of Problem

Reaction time is a significant topic in the world of science science most especially in the academic field as reaction time can be used to determine an individual's level of concentration and the topic is relevant and applicable to the understanding of human behavior . Reaction Time Experiments has been conducted by both Psychologist and Physicist and due to the previous studies, numerous variables have been identified to influence or affect reaction time. Meanwhile ,there has been thin literature on visual reaction time and auditory reaction time most especially in Nigeria. In previous studies, factors such gender and physical activities are reported to affect an individual's reaction time

Therefore, this study will seek to contribute relevant literature to the existing body of knowledge.

1.3 Research Objective:

The objectives of this study are to examine the effect of gender and physical activities on visual and auditory reaction time. Specifically, the study will critically examine the following:

1. To determine the effect of gender on visual and auditory Reaction Time

2. To examine the effect of gender on auditory Reaction Time

3. To determine if physical activities will cause a change in visual and auditory Reaction time

4. To examine the effect of both gender and physical activities on visual and auditory

Reaction time

34. To examine the effect of both gender and physical activities on visual and auditory Reaction time .

1.4. Research Questions

At the end of the research, the following questions were answered:

1. Does gender or physical activities independently affect visual and auditory reaction time?

2 Does Gender and Physical Activities interactively affect Visual and Auditory Reaction Time?

1.5 Significance of the Study

The findings of this study will reveal the brain's capacity to react to various Visual Reaction Time and Auditory Reaction Time, which will in turn offer credible and reliable information to psychologist and other science practitioner's. T, the study will also add to or fill the theoretical gap in literature on Reaction Time by improving the body of knowledge.

CHAPTER TWO

2.1Theoretical Framework:

2.1.1 Single Channel Theory

The single-channel hypothesis stems from research by Telford (1931). He found that if a relatively short interval (0.5 s or less) separated the stimulus (e.g., auditory tone) for one response (e.g., key press) from the next stimulus for a subsequent response, thenthe reaction time (RT) of the subsequent response increased relative to ones with a longer interval (1 s or more) between stimuli. The RT increase implies that there may be a PRP that is analogous to the refractory period between successive neural impulses. Consistent with this implication, Craik (1948) reported that when participants manually tracked moving visual targets, they produced discrete intermittent responses. Each tracking response was separated from the next by about 0.5 s, even though the target moved continuously. This intermittency, which was confirmed by Vince (1948), led Craik (1948) to speculate that the time lag is caused by the building up of some single "computing" process which then discharges down the motor nerves to new sensory impulses entering the brain while this central computing process [is] going on would either disturb it or be hindered from disturbing it by some "switching" system. There is a minimum interval within which successive stimuli cannot be responded to.

Further promoting Craik's (1948) proposal, Welford (1952) stated the single-channel hypothesis as follows: The refractoriness is in the central mechanisms themselves. It is due to the processes concerned with two separate stimuli not being able to co-exist, so that the data from a stimulus which arrives while the central mechanisms are dealing with the data from a previous stimulus have to be "held in store" until the mechanisms have been cleared, (p. 3) With respect to human multiple-task performance, the importance of the single-channel hypothesis is clear. According to it, some mental processes needed for one task must necessarily wait whenever a person engages in another prior task. If so, this postponement would account directly for decrements in performance under conditions of heavy mental workload. The directness, simplicity, and elegance of the account therefore captured the imaginations of numerous theorists after Welford's (1952) publication. According to the Single Channel Hypothesis, the brain has one channel of processing information which must continually switch between tasks. The brain has limited capacity for processing information. As we try to do more than one thing at once, our performance in doing them suffers. A different perspective on the theory which is the Multiple Channel Hypothesis, states that "the brain has several channels each dedicated to a different task, therefore, performance only suffers if and when two similar tasks are attempted"

2.1.2 Perceptual Bottleneck Model

The perceptual bottleneck theory is a general theory consisting of several theories such as the Broadbent Filter theory and other theories. Under the perceptual bottleneck model, the process that identifies stimuli (i.e., converts "raw" sensory representations to symbolic stimulus codes) and determines their meanings is supposedly limited. For concurrent tasks, this limit could force people to deal with only one task at a time. However, the perceptual bottleneck model makes no specific claims about what, if any, constraints exist on subsequent processes (e.g., response selection and movement production) after stimulus identification; therefore, it also has been called the early-selection theory.

One prominent special case of the perceptual bottleneck model was introduced by Broadbent (1958). He proposed that stimuli may first enter a sensory buffer in parallel, where their physical features (e.g., locations, intensities, and pitches of sounds) are analysed and made available to a selective attentional filter. On the basis of these features, past experience, and accompanying task demands, this filter was originally assumed to select particular stimuli for transmission through a limited-capacity channel that identifies them, determines their meanings, and performs other perceptual operations at a fixed maximum rate. Because of this channel's limited capacity, it would reduce the speed with which stimuli for concurrent tasks can be identified, thereby yielding significant between-tasks interference.

To support his assumptions, Broadbent (1958) cited results from experiments on choice RT, dichotic listening, and oral shadowing (e.g., Broadbent, 1952, 1954; Cherry, 1953; Hick, 1952; Hyman, 1953). Nevertheless, soon afterward, other studies yielded significant counterevidence. For example, Moray (1959) and Treisman (1960, 1964) showed that under some conditions, observers notice significant amounts of semantic information in putatively unattended auditory messages. Such results, along with other complementary discoveries (e.g., Corteen & Wood, 1972; Gray & Wedderburn, 1960; Lewis, 1970; MacKay, 1973; von Wright, Anderson, & Stenrnan, 1975), seem antithetical to the filter theory's initial assumptions. Yet phenomena such as the PRP effect, which implies strong constraints on multiple-task performance, have persisted (Welford, 1967). Thus, some theorists have looked beyond perceptual (stimulus identification) processes for bottlenecks elsewhere in the human information processing system.

An influential product of this search is late-selection theory, which has emerged in various related forms (Deutsch & Deutsch, 1963; Keele, 1973; LaBerge, 1975; Morton, 1969; Norman, 1968; Posner, 1978; Reynolds, 1964). The key claim here is that semantic analysis and identification may proceed simultaneously for each of two or more stimuli. On the basis of these processes, stimuli are supposedly selected for transmission to other functionally subsequent stages, such as conscious attention, memory storage, response selection, and movement production, wherein a single-channel bottleneck might reside. (Welford, 1967). The response selection bottleneck model has been used by Smith (1967) and Welford (1967) to account for various results from the PRP procedure. Because this model implies that response selection involves a single-channel mechanism, both the PRP effect and the slope of the PRP curve are consistent with it. A response-selection bottleneck, coupled with perceptual processes that identify concurrent stimuli in parallel, also explains why the PRP effect may be less than Task 1 RTs. Moreover, other results have suggested a possible response selection bottleneck. For example, during several early studies using the PRP procedure, the difficulty of response selection required by Task 1 was varied. Experimenters reasoned that if a response-selection bottleneck exists, the PRP effect on Task 2 RTs should be related directly to the duration of Task 1 response selection.

Accordingly, the PRP effect was found to decrease (Davis, 1959; Fraisse, 1957; Kay & Weiss, 1961; Nickerson, 1965) and even disappear (Borger, 1963; Davis, 1962; Rubinstein, 1964) when participants did not have to respond overtly to Task 1 stimuli. Null PRP effects also sometimes occur when Task 1 involves "simple" reactions (i.e., only one S-R pair; Adams & Chambers, 1962; Reynolds, 1966). By contrast, as the numerosity of Task 1 S-R pairs increases from one to five, both Task 1 RTs and the PRP effect increase (Karlin & Kestenbaum, 1968; Smith, 1969). Paralleling these results, Broadbent and Gregory (1967) found that increasing the incompatibility between Task 1 stimuli and responses increases both Task 1 RTs and the PRP effect. This is exactly what the response-selection bottleneck model predicts, given that both S-R numerosity and S-R compatibility probably have their main effects on response selection (Fitts & Seeger, 1953; Hick, 1952; Hyman, 1953; Kornblum, Hasbroucq, & Osman, 1990; Sanders, 1980; Sternberg, 1969)

Nevertheless, some troublesome observations have cast doubt on the response-selection bottleneck model (Kantowitz, 1974; Keele & Neill, 1978). For example, along with varying the number of Task 1 S-R pairs in the PRP procedure, Karlin and Kestenbaum (1968) also varied the number of Task 2 S-R pairs. In a simple RT condition of their study, Task 2 involved a single S-R pair, so participants had to do little or no response selection on each trial after the Task 2 stimulus was presented. In another choice RT condition, Task 2 included two S-R pairs that presumably made the duration of response selection longer. As a result, the Task 2 KB at long SOAs were substantially greater under the choice RT condition than under the simple RT condition.

At short SOAs, however, virtually no difference occurred between the mean Task 2 RTs for these two conditions; both simple and choice reactions exhibited a PRP effect, but it was substantially less for the choice reactions, yielding an interaction between SOA and Task 2 response-selection difficulty (see Figure 3). As Keele (1973; Keele & Neill, 1978) argued, this interaction is awkward to explain on the basis of a response-selection bottleneck; instead, it appears that the locus of the bottleneck may be in some later stage of processing.

The successes and failures of the alternative bottleneck models have significant theoretical implications. Evidence for specific processing stages that deal with only one input at a time and thereby limit multiple-task performance has proved to be ambiguous (Allport, 1980a, 1987; Broadbent, 1982; Neumann, 1987). On occasion, some studies have suggested a perceptual bottleneck, whereas others have suggested either response-selection or movement-production bottlenecks. No general agreement has emerged about where the bottleneck really is.

2.2 Conceptual Framework

The diagram above shows the conceptual framework of the research as it illustrates that Gender and physical will independently influence reaction time among undergraduates which could be visual or auditory

2.3 Review Of Empirical Studies

2.3.1 Gender and Reaction Time

A critical review of literature shows that gender influences reaction time; males have faster Reaction Times compared to females, and female disadvantage is not reduced by practice, Jain, Bansal, Kumar & Singh, (2015). Study done by Shelton and Kumar (2010), also reported similar findings to support females have longer Reaction time than males. A research conducted by Jain, Bansal, Kumar & Singh, (2015), reported that male medical students have faster Reaction Time when compared to female medical students for both auditory, as well as visual stimuli.

In another study conducted by Shenvi D. and Balasubaramanian P (1994), it was reported that females have a faster processing ability and hence have a shorter reaction time as compared to their male counterparts. Also, Skandhan K, Mehta S. et al, (1980), reported that girls above eight years age have mental alertness superior to the boys of comparable age and have intellectual abilities which are at least one to two years ahead of the boys. Shenvi D and Balasubaramanian P. (1994), also reported no significant differences in the auditory reaction time to high and low pitch stimuli among the male participants; this was also reported among the female participants in their study. Also, Shenvi and Balasubaramanian (1994), reported that Reaction Time was significantly higher in boys than girls, they went on to state that their research explodes the Myth of male superiority in certain occupations and sports.

Reaction Time to visual stimuli was reported Shenvi and Balasubaramanian (1994), to be shorter in both male and female than auditory stimuli. This is because, light travels faster than sounds, and therefore, response to visual stimulus will be quicker.

2.3.2 Physical Activities on Reaction Time

In relation to physical activities on reaction time, a study conducted by Jain, Bansal, Kumar & Singh, (2015), showed that regularly exercising healthy medical students have faster RT than medical students with sedentary lifestyles and the difference between the two groups was statistically significant. These findings confirm the effect of physical activity and doing sports on improving RT which is supported by literature review done in this regard. Nakamoto and Mori (2008) found that college students who played basketball and baseball had faster RTs than sedentary students. There are several possible explanations for this. Spirduso (1975) proposed that less RT of athletes as compared to non-athletes was attributed to faster central nervous system processing times producing faster muscular movements in athletes.

According to Gavkare et al (2013) shorter RT in athletes could be due to improved concentration and alertness, better muscular coordination, improved performance in the speed and accuracy task. Also, motor response execution is a physical task, so it is logical that people trained in physically reactive sports may have superior motor response ability. After thorough research, it was decided to conduct an experiment in which subjects were tested with a simple reaction time model immediately after participating in acute-intense physical activity. Based on the physiology that heart rate is directly proportional to exercise intensity, "acute-intense exercise" was defined as having subjects pedal on a stationary bicycle (set at a specific resistance) and increasing their heart rate to double that of the participant's resting heart rate. Simple reaction time model was used because the purpose of the study was to investigate a biological response to one stimulus, while limiting the amount influence from higher order cognitive processes (e.g. recognition and stimuli discrimination) that are required by the other reaction time assessments. In one study faster RTs for both auditory and visual stimuli were reported among aerobic exercisers compared to controls (Park 1998).

Two other studies reported faster RTs among physically fit subjects and among basketball/baseball players (Ostrow 1989). Another study reported that the fastest RTs were observed when the subjects were exercising sufficiently to produce a heart rate of 115 beats per minute (Jevas, Yan 2001). Studies on older subjects had also reported the beneficial effects of aerobic exercise (Marsh & Geel 2000). Our study findings indicate that using 30 minutes of regular aerobic exercises in gymnasium improved reaction time. The improvement was found irrespective of age and gender. There was a trend for delayed reaction times with increasing age and in females as reported earlier also (Lofthus 1981).

Various mechanisms have been proposed for faster RT in aerobic exercisers. This may be due to improved concentration, alertness, better muscular co-ordination and improved performance in the speed and accuracy (Botwinick & Brinley 1962). Aerobic activity leads to enhanced cognitive performance, in particular cognitive flexibility, a measure of executive function (Lajoie & Gallagher 2004). Exercise training elicits an adaptive increase in mitochondrial content and respiratory capacity of those skeletal muscles which were being used during the exercise training leading to sparing of glycogen and increased capacity to oxidise fatty acid, thus prolongation in work time, delay in fatigue and increase in enzymatic activity, increasing oxidation of ketones and increased removal (Lovejoy 1998). Aerobic physical exercise may also protect the central nervous system (CNS) from oxidant stress by increasing the oxidant enzyme activity, in a similar way to what happens in other tissues such as the skeletal muscle, thus increasing the defence ability against the damages caused by reactive oxygen species (Bruce & Russell 1962).

Two studies found no effect of exercise on RT in soccer players (McMorris, Sproule, Draper, Child, 2000). Another study reported that choice RT and error rate in soccer players were not affected by exercise on a stationary bicycle (Lemmink & Vissher 2005). Another study found no post-exercise effect in runners, but did find that exercise improved RT during the exercise (Collardeau, Brisswalter, Audiffren 2001). They attributed this to increased arousal during the exercise. The type of exercises used in these studies were different than used in our study. An earlier study reported that the response latency for green colour was lesser than red i.e., green colour evoked faster response due to its strong stimulation on visual receptors and hence it had minimum reaction time (Venkatesh, Ramachandra, Baboo, Rajan 2002). However, in our study, the VRT values for red, green and yellow colour were not significantly different from each other in both the groups. Additionally, an auditory stimulus was used because previous research has confirmed that it is an accurate measure of simple reaction time and more efficient than the use of visual stimuli. (Galton, 1899; Woodworth and Schlosberg, 1954; Fieandt et al., 1956; Welford, 1980; Brebner and Welford, 1980).

2.3.3 Factors affecting Reaction Times

Practice and errors have been attributed to influencing reaction times. Sanders (1998,) cited studies showing that when subjects are new to a reaction time task, their reaction times are less consistent than when they've had an adequate amount of practice. Also, if a subject makes an error, subsequent reaction times are slower, as if the subject is being more cautious. Koehn et al. (2008) also found that "accusing" subjects of making an error slowed their processing of the next stimulus more than indicating that they had made a correct choice. Ando et al. (2002) found that reaction time to a visual stimulus decreased with three weeks of practice, and the same research team (2004) reported that the effects of practice last for at least three weeks. Fontani et al. (2006) showed that in karate, more experienced practitioners had shorter reaction times, but in volleyball, the inexperienced players had shorter reaction times (and made more errors too). Visser et al. (2007) found that training on a complex task both shortened reaction time and improved accuracy.

Also, distraction seem to be another factor influencing reaction times among people. Richard et al. (2002) and Lee et al. (2001) found that college students given a simulated driving task had longer reaction times when given a simultaneous auditory task. They drew conclusions about the safety effects of driving while using a cellular phone or voice-based e-mail. Horrey and Wickens (2006) and Hendrick and Switzer (2007) had similar conclusions about cell phone use while driving, and said that hands-free phones did not improve reaction time performance. Reaction time suffered more than tasks like keeping in the right lane. Redfern et al. (2002) found that subjects strapped to a platform that periodically changed orientation had slowed reaction time before and during platform movement. The reaction time to auditory stimuli was more affected than response to visual stimuli. Hsieh et al. (2007) found that simulated vibration of a computer monitor increased reaction times to stimuli presented on the monitor, worsened error rates, and caused more visual fatigue. The effect of distraction may depend on emotional state and prior experiences. Reed and Antonova (2007) frustrated some subjects by giving them unsolvable problems, and then tested the reaction times of all the subjects with distraction. Subjects who had been given the difficult problems were more slowed and distracted than subjects who had not been frustrated before the reaction time measurement. Similar results were cited by Gerdes et al. (2008), who found that subjects who were phobic about spiders had their reaction time slowed more by distracting pictures of spiders than by distracting pictures of objects like flowers and mushrooms. This was caused by the phobic subjects' failure to look away from the spider pictures as fast as they looked away from the other pictures. Martinie et al. (2010) found that being forced to write an essay defending opinions that the writer did not really share actually improved reaction time, possibly due to increased arousal.

2.4 Hypothesis

1. Male undergraduate students will be faster in Reaction Time than female undergraduate students

2. Male Undergraduate students who exercise regularly will be faster in Reaction time than Male undergraduates who do not exercise regularly.

3. Male and Female undergraduates students who exercise regularly will be faster in Reaction Time than male and female undergraduates who doesn't exercise frequently.

2.5 Operational Definition of Terms

Gender

This means the psychological identification that an individual as of him/herself as either a male or female. Gender is the ability of an individual to be able to be identified with a particular sex role i.e male or female

Visual Reaction Time

Visual Reaction time is the total amount of time it takes an individual to respond to a visual stimulus such as light. Visual reaction time (VRT) is a time required to respond to visual stimuli.

Auditory Reaction Time

Auditory reaction time is the total amount of time between when a auditory stimulus is being presented and when the stimulus is being responded to. This is the amount of time required to respond to a sound stimuli

Physical Activities

For the purpose of this study, physical activities will be defined as any form of physical exercise such as jogging ,swimming and running that an individual performs in order med to keep the body fit.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Design

For this study, Within-Subject research design was used. The reason for this, is that all participants was ill be tested under the same conditions. The independent variables in the study includes gender and physical activity while the dependent variable is the reaction times of student in auditory and visual forms. The research design was utilized to provide maximum control of extraneous participants' variables.

3.2 Setting

The study was.ill be conducted in the premises of Federal University Oye- Ekiti, Ekiti state, Nigeria.

3.3 Sampling Technique

Simple random sampling technique was used in this study. This will eliminate any confounding variables such as but not limited to intelligence, practice, sleeping pattern and diet. Students will be selected by names chosen out of the hat.

3.4 Participants

Research participants are undergraduate student from Federal university, Oye Ekiti. They include students of the Faculty of Social Science Federal University Oye-Ekiti participate in this study. They comprise of 50 Male participants and 50 Female participants. All participants will be free of noticeable deficiencies such as hearing and visual impairment.

reaction time of research participants based on the physical activities performed. Also the combination of gender and physical activities jointly influenced the reaction time of participants.

5.3 Recommendation

Reaction time experiments may seem to be experiments pertinent to the field of cognitive psychology. However, this topic is significant to vastly all fields like in the case of academics it helps student pay attention to key elements of what they are taught in their various classes. In this regard, the researcher therefore recommends that individuals participate more in physical activities to boost their reaction times. For instance students should engage in more morning exercises so as to be more effective when learning in their various institutions. Although there is a significant difference in the reaction times of participants based on their gender, female should be encourage with more masculine activities to close the gap between sexes.

5.4 Limitation of Study

The study is limited in regards to its findings as such the findings from this research should be perceived based on these limitations. One of such limitations is the number of research participants which may not be sufficient to make a good generalization. Although this is an experimental research, some variables like age and familiarity with the test object was not adequately controlled for.

Another limitation of this research is that there was no control group

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3.5 Instruments:

The following would used in this study:

1. Projector

2. Stop-watch

3. Bluetooth Speaker

4. Laptop

3.6 Procedure

After approval of the academic board of the Faculty, experimental protocol was explained to the participants and written consent was also obtained from them. Participants were then be asked to fill out a form, indicating their level of physical activity on a scale of 1-10. Physical activities include jogging, push-ups, swimming, running at least 4 times in a week. All participants were thoroughly acquainted with the research apparatus and a practice trial was allowed in order to further familiarize the participants with the research procedure. The four stimuli via red and blue lights and high and low pitch sound was then be presented at random. 4 readings was then taken and their respective averages calculated.

Comparison was made between:

A. Visual R.T to different stimulus in male and female participants

B. Auditory R.T to different stimulus in male and female participants

C. Visual R.T to different stimulus in physical active and non- physical activities participants

D. Auditory R.T to different stimulus in physical active and non-physical active

CHAPTER FOUR

RESULTS

This chapter deals with the data analysis and interpretation of results as acquired from the statistical result output. The data collected from all participants were coded, entered onto the SPSS spreadsheets, and analyzed using software package SPSS. Descriptive statistics for all variables in the study were examined using SPSS frequencies. The results of the study are however addressed by each hypothesis.

Table 4.1: Description of the study sample

Socio-Demographics	N = 100	Frequency(n)	%
Gender	Male	50	50
	Female	50	50
Level of Study	100 level	25	25
	200 level	25	25
	300 level	25	25
	400 level	25	25

Table 4.1

revealed that all subjects were equal in gender and level of study. Male and Female subjects were (50%) respectively. The level of study revealed that (25%) of subjects were in 100, 200, 300 and 400 level respective

Hypothesis 1

Undergraduates who exercise regularly will report more on reaction than those who exercise less often.

Table 4.2: Independent sample t-test – physical activity on reaction time

	High Physical Activity		Low Physical Activity			
ariable	M	SD	M	SD	$t_{(98)}$	95% CI
eaction Time	6..38	1.42	6.87	1.54	-1.651	[-1.08, .099]

P > .05

An independent sample t-test (table 4.2) showed that the difference in reaction time scores between subjects high on physical activity (*M* = 6.38, *SD* = 1.42) and those on physical activity (*M* = 6.87, *SD* = 1.54) were not statistically significant, t (98) = -1.651, *p* = .102. This means that subjects who are high on physical activity were in no way better than those low on physical activity on reaction time. Therefore, hypothesis one is rejected.

Hypothesis 2

Male undergraduate will report more on reaction than female undergraduate.

Table 4.3: Independent sample t-test – physical activity on reaction time

	Males		Females			
Variable	M	SD	M	SD	$t_{(98)}$	95% CI
Reaction Time	6.59	1.52	6.67	1.48	-.282	[-.680, .511]

$P > .05$

An independent sample t-test (table 4.3) showed that the difference in reaction time scores between subjects who are males (M = 6.59, SD = 1.52) and those who are females (M = 6.67, SD = 1.48) were not statistically significant, t (98) = -.282, p = .779. This means that subjects who are male are not better than those who are female on reaction time. Therefore, hypothesis two is rejected

Hypothesis 3

Male and Female undergraduates who exercise regularly will report more on reaction time than those who exercise less.

Table 4.4: 2x2 ANOVA showing interaction effects of gender and physical activity on reaction time

Source	Sum of Squares	Df	Mean Square	F	Sig.
Gender (A)	.366	1	.336	.152	.698
Physical Activity	6.295	1	6.295	2.851	.095
(B)	4388.519	1	4388.519	1987.183	.000
A and B	214.216	97	2.208		
Error	4613.224	99			
Total					

An unvariate analysis of variance (table 4.4) showed that there is an interactive effect between gender and physical activity on reaction time [F (1, 97) = 1987.183, $p <> .05$]. Therefore, hypothesis three is supported.

CHAPTER FIVE

5.1 Discussion

From the results in the previous chapter, it was discovered that there was a no significant gender difference in the reaction times of the participants. Thus, it was established that male participants did not show better reaction times than the female counterparts. This is not congruent with findings from certain researches on the subject matter. For example, a critical review of literature shows that gender influences reaction time; males have faster Reaction Times compared to females, and female disadvantage is not reduced by practice, Jain, Bansal, Kumar & Singh, (2015). A research conducted by Jain, Bansal, Kumar & Singh, (2015), reported that male medical students have faster Reaction Time when compared to female medical students for both auditory, as well as visual stimuli. In another study conducted by Shenvi and Balasubaramanian (1994), it was reported that females have a faster processing ability and hence have a shorter reaction time as compared to their male counterparts. Also, Skandhan K.P, Mehta S.K et al, (1980), reported that girls above eight years age have mental alertness superior to the boys of comparable age and have intellectual abilities which are at least one to two years ahead of the boys. Study done by Shelton and Kumar (2010), also reported similar findings to support females have longer Reaction time than males. Shenvi and Balasubaramanian (1994), reported that Reaction Time was significantly higher in boys than girls, they went on to state that their research explodes the Myth of male superiority in certain occupations and sports.

Reaction Time to visual stimuli was reported Shenvi and Balasubaramanian (1994), to be shorter in both male and female than auditory stimuli. This is because, light travels faster than sounds, and therefore, response to visual stimulus will be quicker.

However, the research finding is related to findings from Shenvi and Balasubaramanian (1994), who reported no significant differences in the auditory reaction time to high and low pitch stimuli among the male participants; this was also reported among the female participants in their study.

Another discovery from the present research is that there is no significant difference in the physical activities of the participants based on their reaction times. This is against a study conducted by Jain, Bansal, Kumar & Singh, (2015), showed that regularly exercising healthy medical students have faster RT than medical students with sedentary lifestyles and the difference between the two groups was statistically significant. These findings confirm the effect of physical activity and doing sports on improving RT which is supported by literature review done in this regard. Nakamoto and Mori (2008) found that college students who played basketball and baseball had faster RTs than sedentary students. There are several possible explanations for this. Spirduso (1975) proposed that less RT of athletes as compared to non-athletes was attributed to faster central nervous system processing times producing faster muscular movements in athletes. According to Gavkare et al (2013) shorter RT in athletes could be due to improved concentration and alertness, better muscular coordination, improved performance in the speed and accuracy task. Also, motor response execution is a physical task, so it is logical that people trained in physically reactive sports may have superior motor response ability. After thorough research, it was decided to conduct an experiment in which subjects were tested with a simple reaction time model immediately after participating in acute-intense physical activity. Based on the physiology that heart rate is directly proportional to exercise intensity, "acute-intense exercise" was defined as having subjects pedal on a stationary bicycle (set at a specific resistance) and increasing their heart rate to double that of the participant's resting heart rate. Simple reaction time model was used because the purpose of the study was to investigate a biological response to one stimulus, while limiting the amount influence from higher order cognitive processes (e.g. recognition and stimuli discrimination) that are required by the other reaction time assessments. Additionally, an auditory stimulus was used because previous research has confirmed that it is an accurate measure of simple reaction time and more efficient than the use of visual stimuli. (Galton, 1899; Woodworth and Schlosberg, 1954; Fieandt et al., 1956; Welford, 1980; Brebner and Welford, 1980).

5.2 Conclusion

The research, based on its numerous findings concludes that male participants did not have better reaction time (visual and auditory) than their female counter part. This means that there are no gender differences in the reaction time of individuals. The research also asserts that physical activities performed by participants of the research did not ensure that they had faster reaction times than those who did not perform any form of physical activity. This means that there was no significant difference in the

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Group Statistics

	Physical Activity	N	Mean	Std. Deviation	Std. Error Mean
Reaction Times	High physical activity	50	6.3835	1.41992	.20081
	low physical activity	50	6.8720	1.53702	.21737

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Reaction Times	Equal variances assumed	1.248	.267	-1.651	98	.102	-.48850	.29593	-1.07576	.09876
	Equal variances not assumed			-1.651	97.391	.102	-.48850	.29593	-1.07580	.09880

This table shows that participants involved in high physical activity ($M= 6.38$, $SD=1.42$) did not exhibit higher reaction time than participants involved in low physical activity ($M=6.87$, $SD=1.53$). This means that there is no significant difference in the level of physical activity performed by the participants on reaction times and that physical activity does not influence reaction times ($t(98) =-1.651$, $p>.05$). This hypothesis is therefore rejected.

Group Statistics

	GENDER	N	Mean	Std. Deviation	Std. Error Mean
Reaction Times	male	50	6.5855	1.51888	.21480
	female	50	6.6700	1.47977	.20927

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Reaction Times	Equal variances assumed	.001	.969	-.282	98	.779	-.08450	.29989	-.67962	.51062
	Equal variances not assumed			-.282	97.933	.779	-.08450	.29989	-.67963	.51063

This table shows that male participants (M= 6.58, SD=1.52) did not exhibit higher reaction time than female participants (M=6.67, SD=1.48). This means that there is no significant difference between male and female students on reaction times and gender does not affect reaction times (t (98) =.052, p>.05). This hypothesis is therefore rejected.

Between-Subjects Factors

		Value Label	N
GENDER	1	Male	50
	2	Female	50
Physical Activity	1	High physical activity	50
	2	low physical activity	50

Tests of Between-Subjects Effects

Dependent Variable: Reaction Times

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	6.301[a]	2	3.151	1.427	.245
Intercept	4388.519	1	4388.519	1987.183	.000
Physical Activity	6.295	1	6.295	2.851	.095
GENDER	.336	1	.336	.152	.698
Error	214.216	97	2.208		
Total	4613.224	100			
Corrected Total	220.517	99			

a. R Squared = .029 (Adjusted R Squared = .009)

This is a univariate analysis of variance also called two way analysis of variance. This table shows that there is an interactive effect between gender and physical activity on reaction times ($F(1,1)= 1987.183$), $P>.05$)