IRJIF: 5.012

North Asian International Research Journal of Pharmaceutical & Medical Sciences

ISSN: 2456-8287 Vol. 6, Issue-12 December-2022

Index Copernicus Value: 64.15 Fulfill MCI Criteria Indian Citation Index

NAIRJC

A Peer Reviewed Refereed International Journal

DOI: 10.5859/2456-8287/nairjc_00005.54

COMPREHENSIVE ANALYSES OF THE CORRELATIONS BETWEEN MODERATE EXERCISES SUCH AS WALKING AND JOGGING AND OBSTRUCTION SLEEP APNEA (OSA) APHYPI

[1]DR. CATHERINE W. KISAVI-ATATAH, [2]DR. PARK E. ATATAH, [3]DR. LATRICIA L. KYLE

[1] Ph.D., Assistant Professor, College of Education, Department of Health & Kinesiology Health Program Coordinator, Prairie View A&M University, Prairie View, TX, USA

[2] Ph.D. Assistant Professor, College of Education, Department of Health & Kinesiology Research Coordinator, Prairie View A&M University, Prairie View, TX, USA

[3] Ph.D., Adjunct Faculty Los Angeles Pacific University, San Dimas, California, USA

ABSTRACT

This study examined the comprehensive correlations between scheduled slow or mild exercises such as walking and jogging and Obstructive Sleep Apnea (OSA) or Aphypi is normally measured with Apnea Hypopnea Index (AHI). This analyzed 302 participants using genders and ages as the "Independent Potential Confounders Variables" in its data analyses. The study used "Social Construction of the Ideology of Realty Theory" as a lens of analysis. The study found that when it comes to genders' differences between gender and OSA's Aphypi wellbeing overall effects, there were no statistically significant differences between males and females or children in their overall health wellbeing outcomes. Also, the study found no statistically significant differences between age groups as well; because older males or females were able to equally perform effectively as younger boys and girls based on the collected and analyzed dataset statistics. However, conversely to the above findings and results, the study found that there were profound significant statistical differences between slow or mild walking, or slow or mild jogging and OSA's Aphypi overall health wellbeing outcomes at 100% and 96% positive effectiveness correlations against OSA's Aphypi based on the above scheduled weeks and times of exercises. The study recommends that its results and findings be implemented comprehensively as to eventually bring some POSITIVE SOCIAL CHANGES to all its participants and beyond.

KEYWORDS: *Obstructive Sleep Apnea (OSA), Aphypi, Independent Potential Confounders Variables, Sleep Disorder, obstructive sleep apnea syndrome (OSAS), Obstructive sleep apnea–hypopnea syndrome (OSAHS), Airway Interruptions, Air Flow, Breathing Disorders, Endless Sleeps, Short Sleeps, Neck Circumference 1, Neck Circumference 2, Body Mass Index (BMI), Age, Gender.*

INTRODUCTION

According to most recent information obtain,

Obstructive sleep apnea (**OSA**) is the most common sleep-related breathing disorder and is characterized by recurrent episodes of complete or partial obstruction of the upper airway leading to reduced or absent breathing during sleep. These episodes are termed "apneas" with complete or near-complete cessation of breathing, or "hypopneas" when the reduction in breathing is partial. In either case, a fall in blood oxygen saturation, a disruption in sleep, or both may result. A high frequency of apneas or hypopneas during sleep may interfere with restorative sleep, which – in combination with disturbances in blood oxygenation – is thought to contribute to negative consequences to health and quality of life.[1] The terms **obstructive sleep apnea syndrome** (**OSAS**) or **obstructive sleep apnea–hypopnea syndrome** (**OSAHS**) may be used to refer to OSA when it is associated with symptoms during the daytime (e.g. excessive daytime sleepiness, decreased cognitive function). (See American Academy of Sleep Medicine, 2014; American Academy of Sleep Medicine, 2019; Barnes, 2009; Berry et al., 2012 for more)

Based on the most recent dataset statistics obtained from confidential centralized database about OSA, several factors lead to OSA in adults and children across the board alike. For example, many have argued that age has no positive or negative corrections when dealing with OSA. This simply means that OSA can occur in your adolescents as well as in older people equally so long as the derivatives associated with compounding it (OSA) is available regardless of age. Further arguments stipulated that gender also has no correlations between OSA's occurrences and its intensities. However, many physicians have recommended that moderate exercises such as walking and slow jogging regular weekly can alleviate OSA in a short time; so long if these recommended exercises are consistent. The question now becomes does moderate exercises such as slow walking and slow jogging have any correlations with OSA's outcomes. That was the primary focus of this quantitative research study.

LITERATURE REVIEWED

For a long time OSA have been overlooked by healthcare practitioners as a medical disorder until 1990 when it was identified as a severe medical sleeping disorder which can lead to death due to lack of sufficient oxygen circulating in the body. OSA appears to be more complicated than many healthcare practitioners anticipated because;

The fundamental cause of OSA is a blocked upper airway, usually behind the tongue and epiglottis, whereby the otherwise patent airway, in an erect and awake patient, collapses when the patient is lying on his or her back and loses muscle tone upon entering deep sleep.

At the beginning of sleep, a patient is in light sleep and there is no tone loss of throat muscles. Airflow is laminar and soundless. As the upper airway collapse progresses, the obstruction becomes increasingly apparent by the initiation of noisy breathing as air turbulence increases, followed by gradually louder snoring as a Venturi effect forms through the ever-narrowing air passage.

The patient's blood-oxygen saturation gradually falls until cessation of sleep noises, signifying total airway obstruction of airflow, which may last for several minutes. Eventually, the patient must at least partially awaken from deep sleep into light sleep, automatically regaining general muscle tone. This switch from deep to light to deep sleep can be recorded using ECT monitors. In light sleep, muscle tone is near normal, the airway spontaneously opens, normal noiseless breathing resumes and blood-oxygen saturation rises. Eventually, the patient

reenters deep sleep, upper airway tone is again lost, the patient enters the various levels of noisy breathing, and the airway blockage returns.

The cycle of muscle-tone loss and restoration coinciding with periods of deep and light sleep repeats throughout the patient's period of sleep. The number of apnoea and hypopnoea episodes during any given hour is counted and given a score. If a patient has an average of five or more episodes per hour, mild OSA may be confirmed. An average of 30 or more episodes per hour indicates severe OSA. (See Brockmann et al., 2012; Bourke et al., 2011; Caporale et al., 2020; Di Mauro et al., 2020; Giordani et al., 2012; Golan et al., 2004; Ezzeddini et al., 2012; Landau et al., 2011; Mbata et al., 2012 for more)

What was fundamental about OSA was/is majority of people who suffered from OSA were/are obsessed and overweight which contributed to the intensity of OSA daily. Beside the above, other factors also contribute to OSA such as excessive drinking, lack of exercise, anxiety disorder, assumptions, and fears of the unknown, neck positioning issues, fatty fats in the airway system, dysfunctional respiratory system, and many others just to mention a few (see Meghanadh , 2022; Mitchell & Kelly, 2006; Punjabi et al., 2009; Stoohs et al., 2005; Wei et al., 2007; Wei et al., 2009; Young et al., 2004 for more). Due to the complex definitions and classifications associated with OSA, limited historic data was used in this medical research study to stay on track and focus. The question now becomes does moderate exercises such as slow walking and slow jogging have any correlations with OSA's outcomes. That was the primary focus of this quantitative research study.

MOTHODOLOGY

This study used Quantitative Research Study using **Non-Experimental Research Descriptive Statistics** as a way to calculate the differences between dependable and independent variables (see Frankfort-Nachmias, & Nachmias, (2000; 2008); Creswell, 2009; Dodgson, 1993 for more).

THEORETICAL FRAMEWORK

In addition to the above-mentioned theories, this quantitative research study added "**Social Construction of the Ideology of Reality Theory**"; which pinpoints the reasons why public policies and health policies decisions' make any valuable decisions during the times of such as crisis hurricanes or fail to make any decisions based on their assumptions against their actual realities' theory of outcomes (see Berger & Luckmann, 1966; Casalini et al., 2016; for more). This theory was selected for several reasons; first, the majority of healthcare practitioners suggest that exercise and weight control often lead to better health and wellbeing. Perhaps that may be possible why moderate exercises may be selected for the control of OSA; above all based on individual approaches, many patients will select moderate exercises over intense and hardcore exercises which are relatively harder to achieve one time. That was why Social Construction of the Ideology of Reality Theory was selected for this healthcare research study because it is all about healthcare practitioners and individualized based decisions making processes.

RESEARCH STUDY DESIGN

Logistic Ordinal Regression Analysis

Data Collection and Classification

This study classified the variables and was analyzed to **answer research questions 1 and 2** in the following way below.

Independent Variables for Research Question 1

RQ-1. What are the correlations between moderate exercises such as slow walking and jogging with OSA and BMI outcomes?

Cardiovascular Exercise (Independent variable) for Research Question 1

1. Walking
2. Jogging

Dependent Variables Research Question 1

1. Obstructive Sleep Apnea (OSA) classified Aphypi
2. Body Mass Index

Independent Potential Confounders Variables for (Research Question 2)

RQ-2. What are the correlations between age and gender with OSA and BMI outcomes?

1. Age
2. Gender

Dependent Variable for (Question 1 & 2)

1. Obstructive sleep apnea (OSA) classified Aphypi
2. Body Mass Index

Other unanalyzed Potential Confounders in this research study to be addressed in future follow-up studies were;

1. Race
2. Ethnicity
3. Race
4. Neck Circumference 1
5. Neck Circumference 2

Dependent Variables for Research Question 2

1. The severity of **Obstructive Sleep Apnea (OSA)** is normally measured with **Apnea Hypopnea Index (AHI).** This AHI used to classify OSA goes this way: mild (5- 15) events per hour, Moderate (15-30) events per hour, Severe (30->) events per hour.

1.1 Note that this study only analyzed **Severe (30->) events per hour** due to possible overwhelming generation of unneeded tables and figures in this study.

The collected data was cleaned up to prevent repeated inconsistencies and fed into Statistical Package for Social Sciences (SPSS) Version 25 and Confidence Interval of the Differences' level was set at 0.05 or 95% for data statistics accuracy.

RESULTS AND FINDINGS OF THE STUDY

Table 1. Interception of likelihood

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	2835.625			
Final	.000	2835.625	272	.000

Link function: Logit.

Table 1: Showed that the point of relationship interception was at 2836, the Sig was .000 or < 95%, and the degree of freedom (df) was 272 (see table 1 as shown above).

Table 2. Goodness of Fit

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	5021.049	52224	1.000
Deviance	1353.730	52224	1.000

Link function: Logit.

Table 2: Showed the logistic linked function of **goodness of fit at 1.000 in Pearson as well as in Deviance as shown above.**

Table 3. Pseudo R-Square

Pseudo R-Square

Cox and Snell	1.000
Nagelkerke	1.000
McFadden	.999

Link function: Logit.

Table 3: Showed the logistic of linked function at 1.000 and .999 as shown above.

Figure 1. Relationship between Age and Aphypi

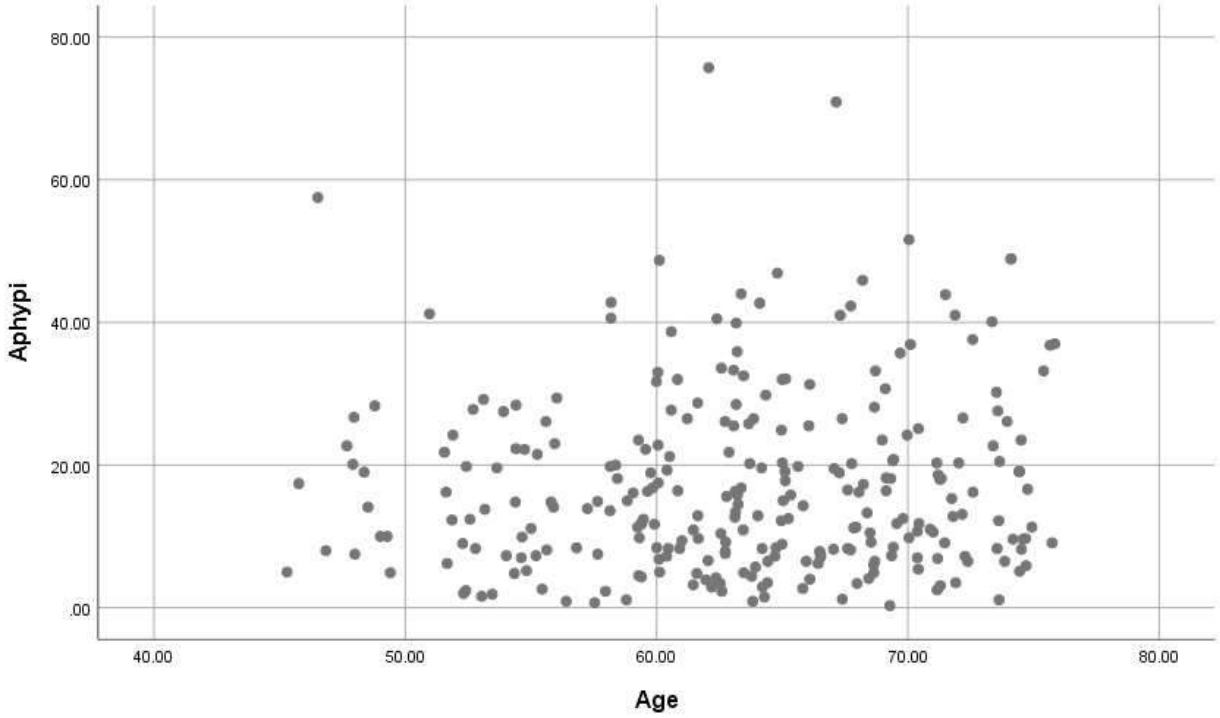

Figure 1: Showed a scattered dotted data distribution in relationship in age and Aphypi as shown above as the majority of the data were aligned above .00 vertically and horizontally; and approximately 60% of the data aligned between in between 60 and 77 years of age.

Figure 2. Relationship between Gender and Aphypi

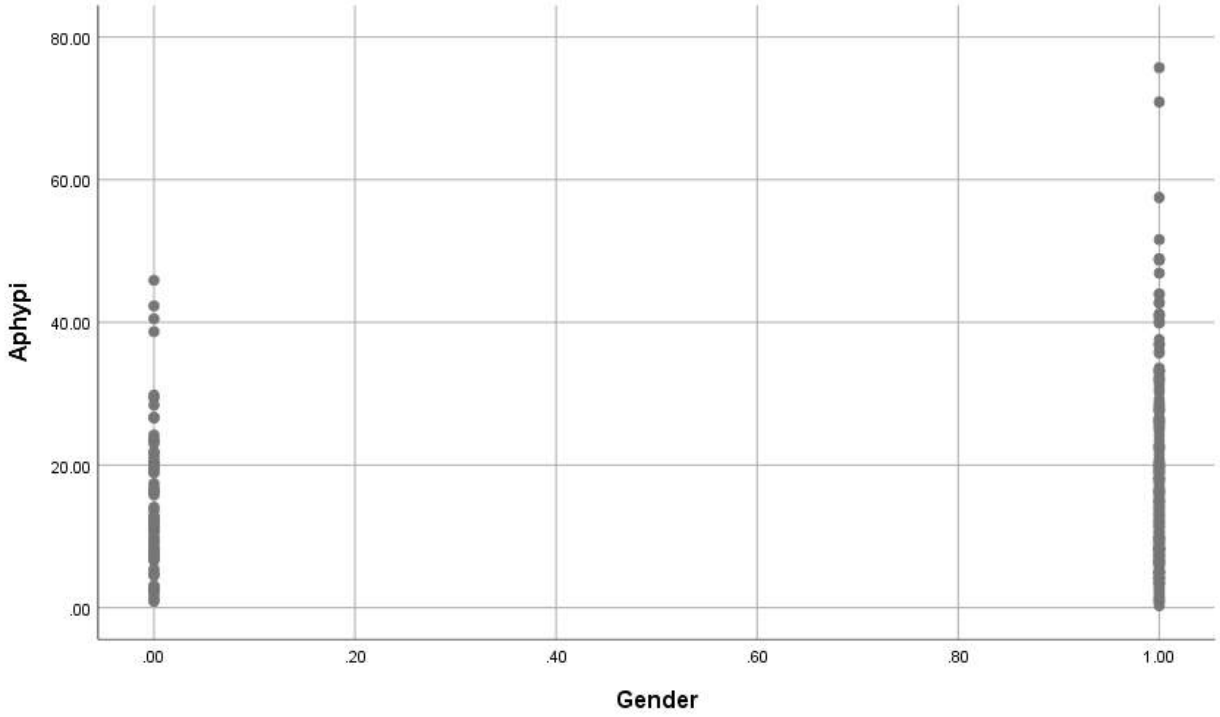

Figure 2: Showed a scattered dotted data distribution in relationship in gender and Aphypi as shown above as the majority of the data were aligned above .00 and up to approximately 43% at the lower end and approximately 88% in the upper end.

Table 4. T-Test

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Gender	302	.7384	.44023	.02533
Age	301	63.2450	7.30173	.42086
Aphypi	275	17.2753	12.72855	.76756

Table 4: Showed the T-Test mean of .7384 for gender, 63.25 for age and 17.28 for Aphypi as shown above.

Table 5. Probability Plot or P-Plot

P-Plot Model Description

Model Name		MOD_1
Series or Sequence	1	Gender
	2	Age
	3	Aphypi
Transformation		None
Non-Seasonal Differencing		0
Seasonal Differencing		0
Length of Seasonal Period		No periodicity
Standardization		Not applied
Distribution	Type	Normal
	Location	estimated
	Scale	estimated
Fractional Rank Estimation Method		Blom's
Rank Assigned to Ties		Mean rank of tied values

Applying the model specifications from MOD_1

Table 5: Showed the probability model plot between age, gender, and Aphypi as indicated above.

Table 6. Case Processing Summary

Case Processing Summary

		Gender	Age	Aphypi
Series or Sequence Length		302	302	302
Number of Missing Values in the Plot	User-Missing	0	0	0
	System-Missing	0	1	27

The cases are unweighted.

Table 6: Showed the valid case processing summary with 1 missing data in age.

Figure 3. Normal P-P Plot for Gender

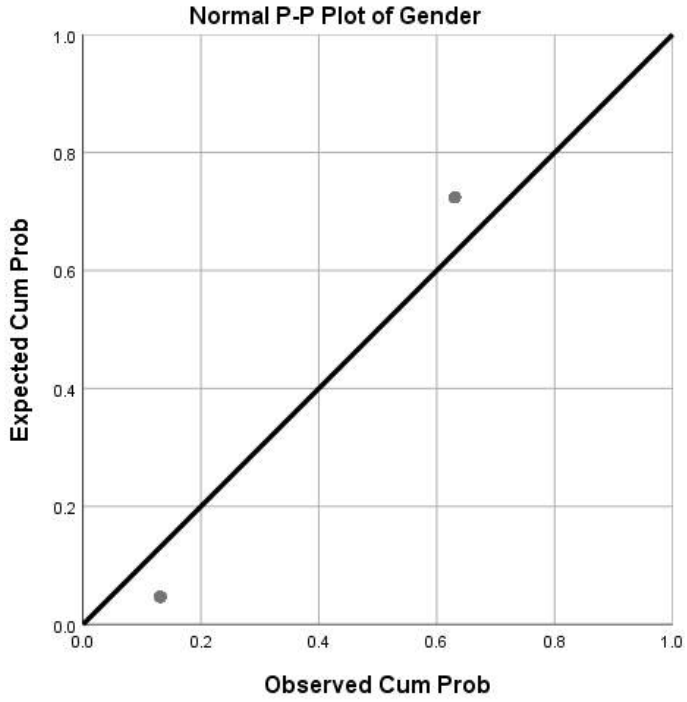

Figure 3: Showed the normal plot distribution expected cumulative probability (CP) frequency versus observed (CP) of gender data as shown above

Figure 4. Detrended Normal P-P Plot of Gender

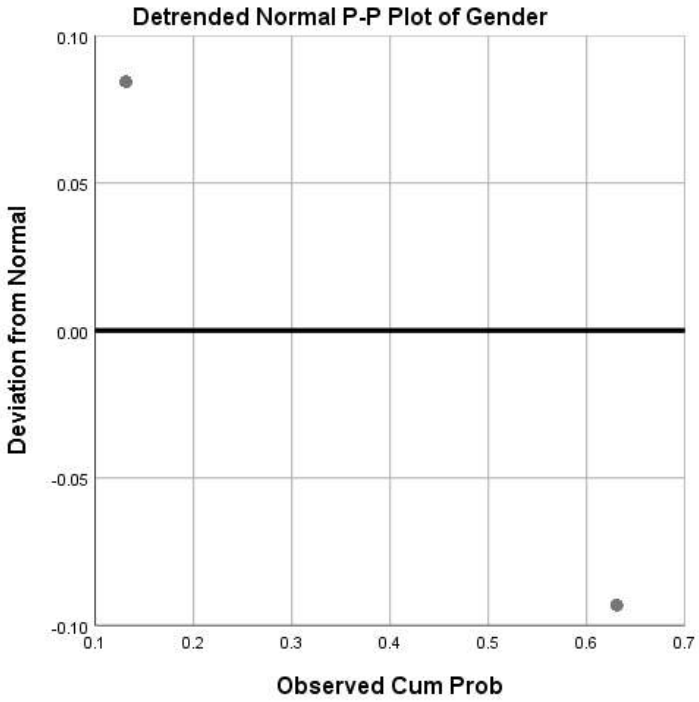

Figure 4: Showed the deviation from normal distribution and the observed cumulative probability distribution (see figure 4 above).

Figure 5. Normal P-P Plot of Age

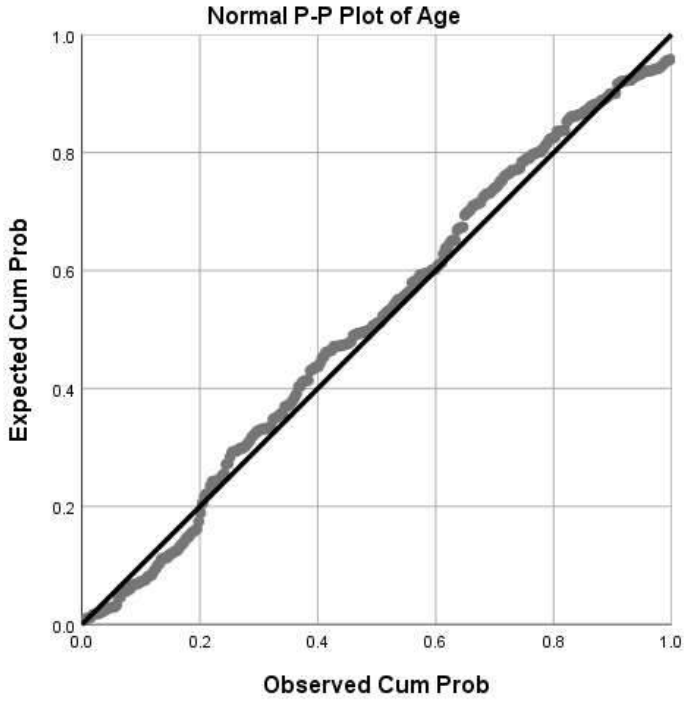

Figure 5: Showed the above compared the expected cumulative probability (CP) data distribution to the observed cumulative probability (CP) of age.

Figure 6. Detrended Normal P-P Plot of Age

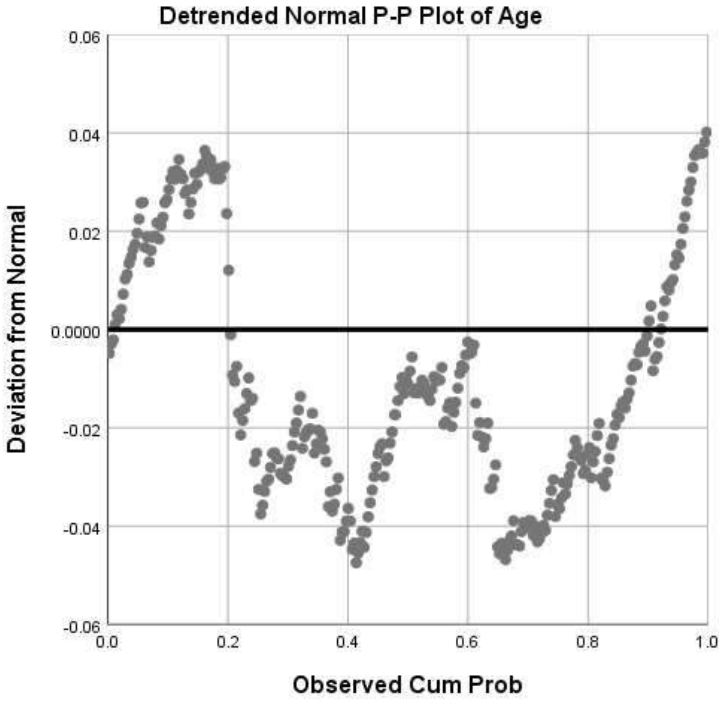

Figure 6: Showed the deviation from normal distribution versus the observed cumulative probability (CP) data distribution of age as shown above.

Figure 7. Normal P-P Plot of Aphypi

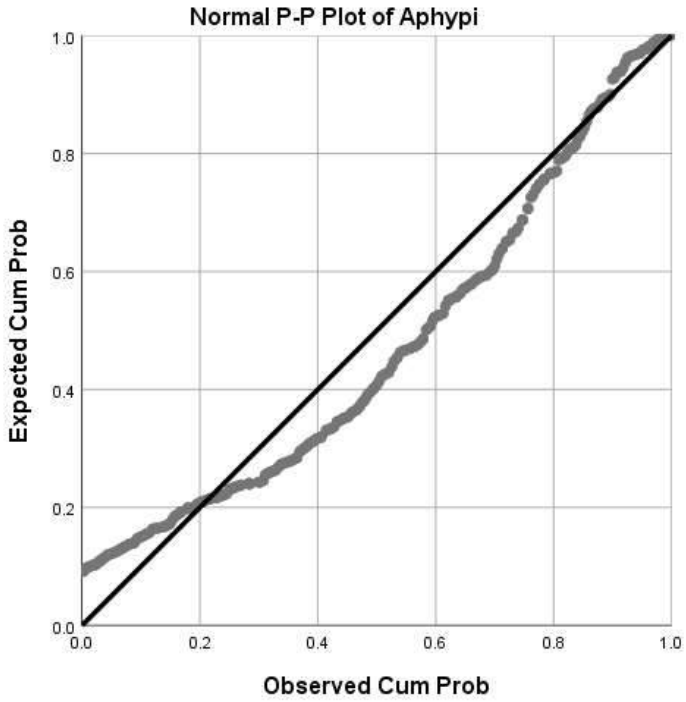

Figure 7: Showed the compared expected cumulative probability (CP) versus observed cumulative probability (CP) of age against Aphypi.

Figure 8. Detrended Normal P-P Plot Aphypi

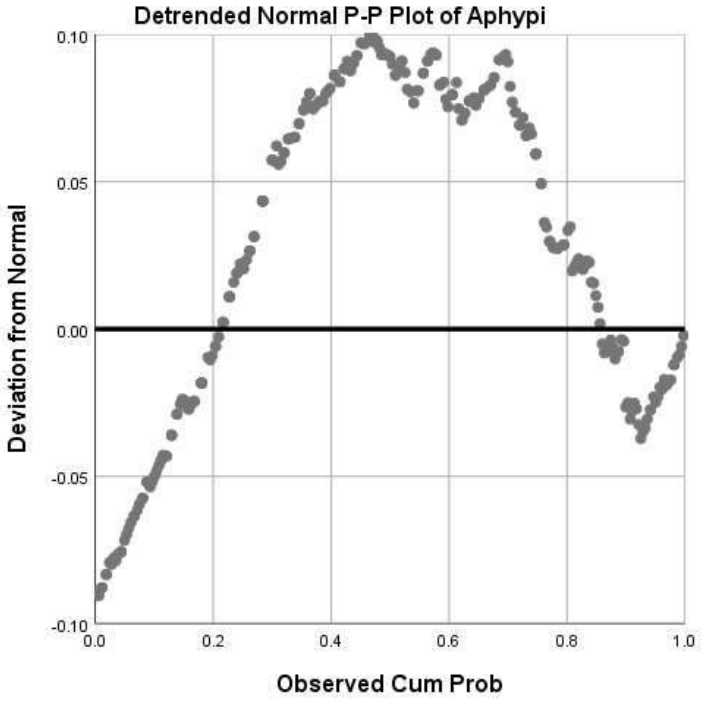

Figure 8: Showed compared the deviation from normal data distribution against observed data cumulative probability (CP) of age versus Aphypi.

Table 7. Model Fitting Information

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	1107.501			
Final	1096.778	10.723	16	.826

Link function: Logit.

Table 7: Showed the model fitting information of logit's function with sig of .826 as shown above.

Table 8. Goodness-of-Fit

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	3190.700	3422	.998
Deviance	658.174	3422	1.000

Link function: Logit.

Table 8: Showed the goodness of fit with Pearson sig of .998 and the deviation of 1.000 as shown above.

Table 9. Pseudo R-Square

Pseudo R-Square

Cox and Snell	.039
Nagelkerke	.039
McFadden	.004

Link function: Logit.

Table 9: Showed sig of .039, .039 and .004 as shown above.

Table 10. T-Test One-Sample Statistics

T-Test One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Active walking In Minutes Per Week	298	10.5235	14.18378	.82164
Active jogging In Minutes Per Week	298	.7081	4.17690	.24196
Aphypi	275	17.2753	12.72855	.76756

Table 10: Showed one sample T-Test with mean of 10.5 for active walking, .71 for active jogging and 17.3 for Aphypi with standard deviation of 12.73.

Table 11. One-Sample Test

One-Sample Test

Test Value = 0

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference Lower	Upper
Active walking In Minutes Per Week	12.808	297	.000	10.52349	8.9065	12.1405
Active jogging In Minutes Per Week	2.926	297	.004	.70805	.2319	1.1842
Aphypi	22.507	274	.000	17.27527	15.7642	18.7863

Table 11: Showed the confidence internal interval of the differences between the data statistics with .000 for active walking, .004 for walking, and .000 for Aphypi.

STATISTICAL INTERPRETATIONS OF THE RESULTS AND FINDINGS OF THE STUDY

The found that when it comes to genders' differences between gender and OSA's Aphypi wellbeing overall effects, there were no statistically significant differences between males and females or children in their overall health wellbeing outcomes. For example, the males performed equally as high and as similar to the females' performances after some slow walking or slow jogging for weeks. The study further found no statistically significant differences between gender's performances after the severity of **Obstructive Sleep Apnea (OSA)** is normally measured with **Apnea Hypopnea Index (AHI).** This AHI used to classify OSA goes this way: mild (5- 15) events per hour, Moderate (15-30) events per hour, Severe (30->) events per hour. Note that this study only analyzed **Severe (30->) events per hour** due to possible overwhelming generation of unneeded tables and figures in this study. Also, the study found no statistically significant differences between age groups as well; because older males or females were able to equally perform effectively as younger boys and girls based on the collected and analyzed dataset statistics (see figures 1 to 7 & tables 1 to 11 for more).

Conversely to the above findings and results, the study found that there were profound significant statistical differences between slow or mild walking, or slow or mild jogging and OSA's Aphypi overall health wellbeing outcomes based on the above scheduled weeks and times of exercises. For example, the study found that walking had 100% correlation with OSA's Aphypi while jogging had 96% correlation with OSA overall outcomes benefits to the participants of the study. Both walking and jogging have 100% correlation with OSA's Aphypi due to their performances in the research study. It should be noted that there was one unknown missing number which was insignificant due to 1 out of 302 or 0.003% which could not have swayed the findings or the results of this study anyway (see table 6 for more). Overall, the study found profound statistically significant correlations between slow or mild walking and jogging and OSA's Aphypi overall wellbeing outcomes. Conversely, the study found statistically insignificant corrections between genders and ages differences in OSA's Aphypi performances. However, it should be noted that BMI was not analyzed in this research study; but previous research studies have shown that there were direct positive correlations between slow or mild walking and jogging and the reduction of

BMI. Above all, evidence has shown that systematic and symmetrical gradual reduction of BMI counts always has positive correlations with individualized and groups' health wellbeing overall outcomes (see Kavitha et al., 2018; "BMI Corporate Health"., 2013; Fernbrae Hospital., 2019; BMI The Somerfield Hospital in Maidstone has officially closed"., 2019; and others for more).

SIGNIFICANCE OF THE STUDY

This study sheds light on the significance of moderate exercises such as slow or mild walking or jogging to public health practitioners and patients equally. This study also shed to professional healthcare practitioners to always suggest moderate exercises as a way of systematically overcoming and healthcare issues such as OSA's Aphypi regardless of genders or ages differences.

LIMITATIONS OF THE STUDY

This research study had several limitations as stipulated bellow;

1. Confidential private seconding dataset data were used to conduct this research study; which limits its' comprehensive evaluation of the validity and reliability of the data used in this study.
2. This study cannot be generalized across the board due to the originality of the secondary dataset used in this study.
3. This study used analyses of **"Non-Experimental Research Study" or "Descriptive Statistics"** which is different from real "**Experimental Research Study.**"
4. Finally, the results and findings of the research study are subject to replications by other researchers by using the same dataset' data to comprehensively verify or dismiss its' results and findings.

CONCLUSION AND DISCUSSION

This comprehensive research study addressed some issues associated with OSA's implications which have been debatable by many public health practitioners and public health policies' decision-makers for generations endlessly. Many believed that OSA's Aphypi are sometimes overrated as a serious healthcare condition; while others believed that OSA's Aphypi is a serious healthcare condition that needs to be taken very seriously by all healthcare practitioners. For example, it should be noted that many patients have died due to OSA's Aphypi complexations and complications in their sleep due to lack of treatments. This research study demonstrates that OSA's Aphypi is a very serious private or public healthcare issues that needs to be taken very seriously by all public and private healthcare practitioners; because its' untreated implications can be detrimental to the patients, the patients' family members, and the private, or public healthcare practitioners who knowingly undermine the significance of treating OSA's Aphypi upon its immediate diagnosis. The study recommends that its results and findings be implemented comprehensively as to eventually bring some **POSITIVE SOCIAL CHANGES** to all its participants and beyond.

REFERENCES

1. American Academy of Sleep Medicine. (2014). International Classification of Sleep Disorders, 3rd edition. Darien, IL: American Academy of Sleep Medicine.
2. American Academy of Sleep Medicine. (2019). "AASM Practice Guidelines". AASM. Retrieved 19 June 2019.
3. Barnes, L. (2009). Surgical pathology of the head and neck (3rd ed.). New York: Informa healthcare. ISBN 9781420091632.
4. "BMI Corporate Health". (2013). BMI Healthcare. Archived from the original on December 10, 2013. Retrieved December 17, 2022.
5. BMI The Somerfield Hospital in Maidstone has officially closed". (2019). Kent Online. April 10, 2019. Retrieved December 15, 2022.
6. Berry, R. B., Budhiraja, R., Gottlieb, D. J., Gozal, D., Iber, C., Kapur, V. K., Marcus, C. L., Mehra, R., Parthasarathy, S., Quan, S. F., Redline, S., Strohl, K. P., Ward, S. L. D., Tangredi, M. M., American Academy of Sleep Medicine (2012). "Rules for Scoring Respiratory Events in Sleep: Update of the 2007 AASM Manual for the Scoring of Sleep and Associated Events". Journal of Clinical Sleep Medicine. **08** (5): 597–619. doi:10.5664/jcsm.2172. PMC 3459210. PMID 23066376.
7. Brockmann, P . E., Urschitz, M. S., Schlaud, M., Poets, C . F. (2012). "Primary snoring in school children: Prevalence and neurocognitive impairments". Sleep and Breathing. **16** (1): 23–29. doi:10.1007/s11325-011-0480-6. PMID 21240656. S2CID 27480963.
8. Bourke, R., Anderson, V., Yang, J. S.C., Jackman, A . R., Killedar, A., Nixon, G . M., Davey, M. J., Walker, A. M., Trinder, J., Horne, R . S.C. (2011, May). "Cognitive and academic functions are impaired in children with all severities of sleep-disordered breathing". Sleep Medicine. **12** (5): 489–496. doi:10.1016/j.sleep.2010.11.010. PMID 21493135.
9. Berger, P.L. and Luckmann, T. (1966) The Social Construction of Reality: A Treatise in the Sociology of Knowledge. Doubleday & Company, New York
10. Caporale et al. (2020, 23 May). "Cognitive impairment in obstructive sleep apnea syndrome: a descriptive review". Sleep and Breathing. **25** (1): 29–40. doi:10.1007/s11325-020-02084-3. PMID 32447633. S2CID 218835830.
11. Casalini, A., Fioretti, G., Pyka, A. (2016). Playfulness, ideology, and the technology of foolishness in the creation of a novel market niche for distributed control: The... Journal of Organization Design, 12/2016, Volume 5, Issue 1. 6.
12. Creswell, J.W. (2009) Research Design: Qualitative, Quantitative, and Mixed Methods Approach. 3rd Edition, Sage Publications, Inc., Thousand Oaks. 7.
13. Di Mauro et al. (2021). "The Effect of Adenotonsillectomy on Children's Behavior and Cognitive Performance with Obstructive Sleep Apnea Syndrome: State of the Art". Children. **8** (10): 921. doi:10.3390/children8100921. ISSN 2227-9067. PMC 8535044. PMID 34682186.
14. Dodgson, M. (1993). Organizational learning: A review of some literature. Organization Studies, 14/3: 375-394. 8.
15. Frankfort-Nachmias, C. & Nachmias, D. (2000; 2008) Research Methods in the Social Sciences. 6th Edition, Wadsworth, New York.

16. Fernbrae Hospital. (2019). Dundee private care centre to close with loss of 50 jobs". The Courier. 19 March 2019. Retrieved December 18, 2022.
17. Giordani et al. (2012, January 1). "Changes in Neuropsychological and Behavioral Functioning in Children with and without Obstructive Sleep Apnea Following Tonsillectomy". Journal of the International Neuropsychological Society. **18** (2): 212–222. doi:10.1017/s1355617711001743. PMID 22272653. S2CID 42003791.
18. Golan et al. (2004, March). "Sleep Disorders and Daytime Sleepiness in Children with Attention-Deficit/ Hyperactive Disorder". Sleep. **27** (2): 261–266. doi:10.1093/sleep/27.2.261. PMID 15124720.
19. Kavitha, S., Sabhanayagham, T., & Thenmozhi, R. (2018). Analysis of Body Mass Index Based on Correlation and Regression. Available at https://rjptonline.org/search.aspx?key=S.%20Kavitha
20. Ezzeddini et al. (2012, April). "Circulating phospholipase-A2 activity in obstructive sleep apnea and recurrent tonsillitis". Int J Pediatr Otorhinolaryngol. **76** (4): 741
21. Landau et al. (2011, September 8). "Impaired behavioral and neurocognitive function in preschool children with obstructive sleep apnea". Pediatric Pulmonology. **47** (2): 180–188. doi:10.1002/ppul.21534. PMID 21905262. S2CID 24664118.
22. Mbata, G . C., Chukwuka, J. C. (2012). "Obstructive Sleep Apnea Hypopnea Syndrome". Annals of Medical and Health Sciences Research. **2** (1): 74–77. doi:10.4103/2141-9248.96943. PMC 3507119. PMID 23209996.
23. Meghanadh, K . R. (2022, February 24). "Obstructive Sleep Apnea's symptoms, causes, diagnosis, treatment". Medy Blog. Retrieved 2022-03-14.
24. Mitchell, R. B. & Kelly, J. (2006). "Behavior, neurocognition and quality-of-life in children with sleep-disordered breathing". International Journal of Pediatric Otorhinolaryngology. **70** (3): 395–406. doi:10.1016/j.ijporl.2005.10.020. PMID 16321451.
25. Punjabi et al. (2009, August 18). "Sleep-Disordered Breathing and Mortality: A Prospective Cohort Study". PLOS Medicine. **6** (8): e1000132. doi:10.1371/journal.pmed.1000132. PMC 2722083. PMID 19688045.
26. Stoohs et al. (2005, March). "Comparison of pleural pressure and transcutaneous diaphragmatic electromyogram in obstructive sleep apnea syndrome". Sleep. **28** (3): 321–329. PMID 16173653.
27. Tung, P., Levitzky, Y . S., Wang, R., Weng, J., Quan, S. F., Gottlieb, D. J, et al. (2017, July). "Obstructive and Central Sleep Apnea and the Risk of Incident Atrial Fibrillation in a Community Cohort of Men and Women". Journal of the American Heart Association. **6** (7). doi:10.1161/jaha.116.004500. PMC 5586257. PMID 28668820.
28. Wei et al. (2007). "Improved Behavior and Sleep After Adenotonsillectomy in Children with Sleep-Disordered Breathing". Archives of Otolaryngology–Head & Neck Surgery. **133** (10): 974–979. doi:10.1001/archotol.133.10.974. PMID 17938319.
29. Wei et al. (2009, July 1). "Improved Behavior and Sleep After Adenotonsillectomy in Children With Sleep-Disordered Breathing: Long-term Follow-up". Archives of Otolaryngology - Head and Neck Surgery. **135** (7): 642–646. doi:10.1001/archoto.2009.74. PMID 19620583.
30. Young, T., Skatrud, J., Peppard, P. E. (2004, April 28). "Risk Factors for Obstructive Sleep Apnea in Adults". JAMA. **291** (16): 2013–2016. doi:10.1001/jama.291.16.2013. PMID 15113821. S2CID 12315855.