STRUCTURAL EQUATION MODELLING OF PSYCHOSOCIAL FUNCTIONING AND QUALITY OF LIFE OF ADOLESCENTS IN RESOURCE CONSTRAINED SETTING

By

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IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF A MASTER DEGREE (M.SC.) IN BIOSTATISTICS.

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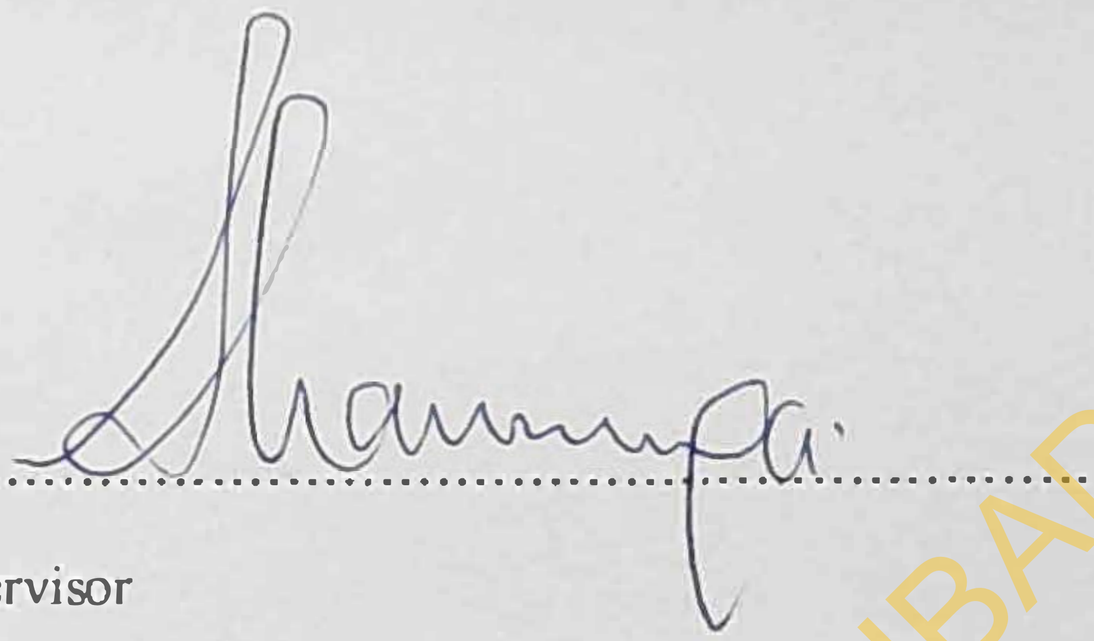
CERTIFICATION

I certify that this project work was carried out under my supervision by Fowobaje Kayode Raphael, of the Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan.



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DEDICATION

This project is dedicated to my lovely parents

Mr Ayodeji and Mrs Grace Fowobaje.

ACKNOWLEDGEMENT

I feel grateful that I have been studying in a program with medical consultants, lecturers and friends who are knowledgeable, enthusiastic, supportive and warm hearted. It is important that I acknowledge my parents Mr Ayodeji and Mrs Grace Fowobaje, without whom I would never have been in this world in the first place and for their undying love, care, financial, moral, and spiritual supports, and for not giving up on me.

I would like to express my profound gratitude to my supervisor, Dr O. M. Akpa, for guiding me through these years. His knowledge and guidance broadened my world in Statistics and measurement, in particular Structural Equation Modelling (SEM). His enthusiasm and commitment to quality taught me what a good researcher should be like. He is a great scholar and editor. He taught me things in all aspect of life. To me he is not only a mentor but a caring father and a good friend. I feel fortunate that I have him as my role model in pursuing my future careers.

I am highly indebted to my very dedicated, kind and approachable lecturer Dr R. F. Afolabi, for his unflinching support and encouragement. May God bless him.

My appreciation also goes to all other lecturers in the Department for the knowledge and character they have impacted on me throughout my postgraduate program.

I am particularly grateful to God for giving two wonderful and beautiful siblings "for blood is thicker than water": Anuoluwapo Sarah Adelowo (Nee Fowobaje), Opemipo Hannah Fowobaje for their encouragements and support.

I enjoyed the company and encouragement from my fellow postgraduate students during my program. Such people include: Samson Olorunju, Mariam Jaiyeola, Abimbola Oyedapo, Micheal Ekholuenetale, Ibukun Alabi, Olumide Olufayo, Adeola Akinola, Aminat Adelakun, Mrs Kehinde Akinpelu, Opeyemi Ojo, Ayoola Agbaje and others that are too numerous to mentioned. I am grateful to them all.

I give all the praises, glory, honour, and adoration to my Lord and Personal Saviour Jesus Christ who has spared my life from birth up to this moment, and for making my postgraduate program at the University of Ibadan a successful one.

Finally my deepest appreciation goes to my fiancée Miss. Mary Olawunmi Taiwo (Ajike Ade), for her patient, tolerance, and support through these years. Your love and smiles bring the best out of me.

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LIST OF ABBREVIATIONS AND ACRONYMS

ADHD	Attention-Deficient Hyperactivity Disorder
AGFI	Adjusted Goodness-of-fit Index
AIC	Akaike Information Criterion
AMOS	Analysis of Moment Structure
BOS	Boys-only Schools
CAIC	Consistent Akaike Information Criterion
CFA	Confirmatory factor analysis
CFI	Comparative Fit Index
CGF	Chi-square Goodness-of-fit
CPS	Conduct problems Scale
EFA	Exploratory factor analysis
END	Environmental domain
ESS	Emotional Symptoms Scale
GFI	Goodness-of-fit Index
GMS	Gender-Mixed School
GOS	Girls-only school
HAS	Hyperactivity Scale
KMO	Kaiser-Mayer-Olkin measure of sampling adequacy
MEPIN	Medical Education Partnership Initiative in Nigeria
NBS	National Bureau of Statistics
NFI	Incremental Fit Index
NHIS	National Health Interview Survey
PHD	Physical health domain
PPS	Peer Problems Scale
PSD	Psychological health domain
PSF	Psychological functioning
PSS	Prosocial Scale
QOL	Quality of life
RMSEA	Root Mean Square Error of Approximation
SD	Standard deviations
SDQ	Strengths and Difficulties Questionnaire
SEM	Structural equation modelling
SPSS	Statistical Package for Social Sciences
SRD	Social relationship domain
TLI	Tucker-Lewis Index
WHO	World health organization

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Introduction

Psychosocial functioning (PSF) is a factor of Quality of life (QoL). The instruments used to assess this latent relationship among adolescents are developed outside Nigeria. Hence, this study examines the psychometric properties of the Strengths and Difficulties Questionnaire (SDQ) and the adapted WHO-QOL BREF (QoL) as an effective, reliable and valid screening instrument in examining the psychosocial functioning (PSF) and quality of life and to describe the latent dimensions that underlie adolescents responses in a resource constrained setting. It also examined the causal effect of the PSF on the QoL among adolescents with no known health problems in Nigeria.

Methods

A total of 2,095 secondary school adolescents age 10-19years were administered the Strengths and Difficulties Questionnaire (SDQ) and the adapted WHO-QOL BREF (QoL) to assess their psychosocial functioning and quality of life most of whom are males (54.8%) and 49.0% of them lives in Urban area. Internal consistency was measured using Cronbach's alpha and Polychoric coefficients. An exploratory factor analyses was performed to extract the underlying factors, confirmatory factor analyses was used to confirm the theoretical and hypothesized factors, and structural equation modelling was used to model the impact of psychosocial functioning on quality of life of healthy adolescents in Nigeria. Analyses were performed at 5% significance level using IBM SPSS statistics version 20, R package and AMOS version 21.

Results

The study findings show that Cronbach's alpha deflates the reliability estimates when compared with Polychoric alpha. The theoretical 5-factors SDQ and 4-factors of WHO-QOL BREF were not confirmed. Only items that were meant to assess the Prosocial Scale (PSS) are confirmed for SDQ, the three negatively worded questions on the QoL formed a component. The final hypothesized models yielded a 20-item 3-factors SDQ and 23-item 2-factors QoL that provided the best fit to the observed data. Their relative χ^2 yielded $\chi^2/df < 3 = 2.67$ and $\chi^2/df < 3 = 2.98$ and SEM shows that poor psychosocial functioning of adolescent's results in poor quality of life with $\chi^2/df < 3 = 2.91$ while other fit indices were in the acceptable range.

Conclusions

The present results, however suggest that the domains published and validated in other countries may not be appropriate in a sample of healthy Nigerian adolescents. The components identified and confirmed in this study will provide a better measure of the underlying structure of these instruments in a resource constraint setting.

Keywords

Polychoric alpha, Cronbach alpha, Exploratory factor analysis, Confirmatory factor analysis, Structural equation modelling

Word Count: 378

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Adolescents has been defined as any person between ages 10-19 years, while young population includes those aged 15-24 years (WHO, 2014a). It signifies the crucial transition from childhood to adulthood. As such, adolescents are prone to many health issues such as: teenage unwanted pregnancies, sexual abuse, unhealthy abortions, alcohol and substance use/abuse and violence, vulnerability to risks associated with early sexual activity, mental health disorders, school failure and eating disorder etc. (Stein et al., 2003; WHO, 2014a). The magnitude and seriousness of these problems may cause policy makers, social scientists and parents to ignore those who are functioning well. Previous studies have reported that teenagers that excel in school, have positive family and peer relationships, and have minimal participation in risky health behaviours such as stated above (Demon, 2004; Moore, 2004).

Psychological functioning (PSF) is a factor of quality of life (QoL) and had been an area of essential improvements during the last 20 years but its study in relation to childhood and adolescence has been relatively more limited, though during the 1990s an increase of interest towards the development of adequate instruments has taken place (Casas et al., 2000). The most significant limitations for the study of psychological functioning in adolescence are pertaining to knowing or cognizing, as a mental activity in nature (Monica et al., 2008).

Globally, 1 in 6 persons is an adolescent; that is, 1.2 billion people age 10 – 19 years and in year 2012 it was estimated that 1.3 million adolescents died mostly from treatable or preventable causes. However, 50% of all mental health disorders in adulthood appear to have started from 14 years but most cases are undetectable and untreated (WHO, 2014b). Poor mental health has been implicated and associated with a broad spectrum of health and development of adolescents (WHO, 2014b). In addition, children and adolescents with low emotional and social functioning are more likely to have difficulties at home and in their peer groups at school and usually manifest negative emotions (depression, worry, stress), negative behaviours (e.g., bullying), academic underachievement and disengagement which if left unchecked may lead to mental health problems or disorder.

In Nigeria and indeed many countries in sub-Saharan Africa, studies have identified and associated a number of factors with psychosocial disorders among children and adolescents. For instance, among vulnerable adolescents, girls were more likely than boys to report depression and low self-esteem as well as being affected by traumatic life events (Akpa et al., 2015; Zhou, 2012). Apart from that, inabilities of parents, guardians and/or teachers to meet the psychosocial needs of children at any stage of their developmental process have caused personality disorders (Moime, 2009). Factors specific to individual adolescent can influence his/her emotional and social wellbeing, such as particular cognitive styles, learning styles, innate skills and abilities and temperament (Bernard et al., 2007).

In general, the concept of health enunciated by WHO as all encompassing and the interaction between mental and physical health and social functioning and outcomes such as educational achievement, development of positive personal relationships, productivity at work, reduction in crime rates and decreasing harms related with alcohol and substance use (Helen et al., 2005).

1.2 PROBLEM STATEMENT

Globally the burden of mental ill-health is far beyond the treatment capacities of developed and developing countries and the treatment of mental health alone will not reduce the social and economic costs associated with this growing burden (WHO, 2001c).

Data from the 2004 NHIS establish that over 1 in 10 (11.6%) adolescents ages 12-17 had serious behavioural difficulties, as rated by parents using a modified version of the Strengths and Difficulties Questionnaire. In a study conducted among American adolescents with behavioural and emotional problems, male adolescents were slightly more likely to have these mental health difficulties than female peers (12.3% vs. 10.9%); low-income adolescents had at least twice the rate of higher-income adolescents (17.9% vs. 8.0%) (David et al., 2008). In particular, the relationship between mental disorders and poverty appears to be universal, occurring in all societies regardless of their levels of development. Factors such as insecurity and hopelessness, rapid social change and the risks of violence and physical ill-health may perhaps explain this greater vulnerability (Patel & Kleinman, 2003).

Recent data collected by WHO validates the large gap that exists between the burden caused by mental health problems and the resources available in countries to prevent and treat them (WHO, 2001a). With this limitation, there is a tendency to measure the impact of

psychosocial functioning on the quality of life of apparently healthy adolescents (adolescents with no known health problems) in a resource constrained setting.

The present study will provide a framework for understanding the complex relationship between psychosocial functioning and quality of health of adolescents, and to assess the nature of the relationship between psychosocial functioning and quality of life among adolescents with no known health problems?.

1.3 JUSTIFICATION

There are numerous studies on psychosocial functioning and health related quality of life of children and adolescents (Ayuk et al., 2013; David et al., 2004; Dejan et al., 2011; Akpa and Bamgboye, 2015) but there are dearth of information on psychosocial functioning and quality of life of children and adolescents with no known health problems in Nigeria. These studies are within ill-health adolescents' population and the statistics used in estimating the variable of interest does not reflect the real characteristics of these individuals since observed scores are always to some extent contaminated by measurement error (Peter and Russell, 2009; Yao et al. 2008; Chien et al. 2007; Leung et al. 2005).

Although most ill-health adolescents are physically fit and have few somatic symptoms, the psychosocial impact of the illness is universal, involving the family members, schools and the society at large (Onyiriuka and Ehkator, 2013). This psychosocial impact include cost of medical care, misunderstandings, external influences such as acceptance or rejection of the ill-health adolescent by peers and the needs imposed by illness itself (Ayuk et al., 2013; Onyiriuka and Ehkator, 2013).

In psychometric theory, the scores generated from the psychological instruments are seen as the sum of two components. Individual's true score on the characteristics of interest is the first component which reflects the real characteristics of the individual but they can not be assessed directly and the second component is the measurement error. Measurement error has a gradual diminishing effect on measure of association, the magnitude of the association among true scores tend to be underestimated by observed scores correlations. Structural equation modelling techniques provides a method of estimating correlations among latent unobservable variables free from this gradual diminishing effect (Peter and Russell, 2009). This method is more scientific and objective compared with the conventional methods such

as: descriptive analysis and some test methods like correlation analysis and T test and so on (Hengqing et al., 2010).

The extent to which the theoretical models are supported as well as the hypothesized models will be assessed. Also to determine whether there will be a positive significant relationship between psychosocial functioning and quality of life among adolescents with no known health problems.

1.4 BROAD OBJECTIVE AND SPECIFIC OBJECTIVES

1.4.1 BROAD OBJECTIVE

The broad objective of this study is to use structural equation modelling to assess the relationship between psychosocial functioning and quality of life of adolescents in a resource constrained setting.

1.4.2 SPECIFIC OBJECTIVES

i. To evaluate the psychometric properties of the Adapted WHO-QOL BREF and the Strength and Difficulty Questionnaire in the population of adolescents in Nigeria

ii. To assess the interrelationships among the established (theoretical) and hypothesized latent constructs of the Adapted WHO-QOL BREF and the Strength and Difficulty Questionnaire among adolescents with no known health problems in Nigeria.

iii. To establish a regression type structural equation for assessing the causal effect of the Strength and Difficulty Questionnaire on the Adapted WHO-QOL BREF in the population of adolescents in Nigeria.

iv. To compare the extent to which the established (theoretical) and hypothesized models fits the relationship between psychosocial functioning and quality of life among adolescents with no known health problems.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

Generally, questionnaires are valuable instruments in public mental health, psychology and psychiatry to assess individual differences when measuring mental health problems in large samples of children and adolescents which can be filled by parents, teachers or the child. Its uses and development have been widely reported in psychometric literature (Akpa et al., 2015; Goodman, 1997). Therefore, with the increasing global awareness of mental health problems in children and adolescents and its impact on public health issues as well as the socio-economic future of the countries, it is extremely important to have empirically tested records at hand to measure psychopathology in a standardized way. Hence, there is need to examine the psychometric properties of these instruments.

2.1 The Strengths and Difficulties Questionnaire (SDQ)

The Strengths and Difficulties Questionnaire (SDQ) has over a decade become one of the most commonly used assessment tools in child and adolescent mental health research (Goodman, 1997). The SDQ has been translated into about 60 languages, and studies with the SDQ have been published from all continents (Goodman, 1994). Publications available include psychometric evaluation in different languages and cultural setting, epidemiological surveys, and assessment of at-risk groups of children and adolescents. It is a short instrument including positive descriptions of children and adolescents, it is rapid to administer and well accepted even in non-clinical populations. Some items were modified in order to form five subscales and include positive as well as negative descriptions of behaviour (Goodman, 1997). It has 25 items, five each for the subscales Emotional symptoms, Conduct problems, Hyperactivity, Peer problems and Prosocial behaviour. The sum of the first four makes up the Total difficulties scale. The three response categories are 0 = Not true, 1 = Some what true and 2 = Certainly true. There are versions of the SDQ for parents, teachers and self-report for age 11 and above. It covers the age range 5-17 years and a separate parent version exists for 3-4 year-olds. There are also versions for repeated assessment following treatment in the clinic (follow-up). Questionnaire, scoring manual, an additionally computerised procedures for predicting psychiatric disorder by bringing together information on symptoms and impact

from SDQs 18 completed by multiple informants and scoring software are available for use from the web-site www.sdginfo.com.

2.1.1 Reliability of the SDQ

The psychometric qualities of the SDQ have been assessed in various studies in different countries. The first of these studies (Goodman, 2001), evaluated the psychometric properties of the original version of the SDQ in a total of 10,438 British children aged 5 to 15 years. The internal consistency coefficients (Cronbach's α) for the parent-rated SDQ subscales and the total problem score were generally satisfactory (mean 0.73), particularly for the total difficulties and total impact scores (all 0.80 or higher). Cronbach's alpha coefficients for the teacher-rated version were fairly high for all scales. The lowest value was found for the subscale measuring peer problems (0.70) and the highest alpha coefficients were found for hyperactivity/ inattention (0.88) and Prosocial behaviour (0.84) subscales. Thus, reliability of the parent-rated and teacher-rated version of the SDQ in this sample was very satisfactory. However, the internal consistency of the self-report peer problems scale was only moderate (0.41 - 0.67).

In the course of the last 10 years several studies have shown that the SDQ scales provide a satisfactory to good internal consistency for different cultures. In one of the first studies in a Swedish non-clinical sample (Smedje, 1999) the Cronbach's alpha coefficients for reliability in the scales demonstrated a moderate to good consistency. A good consistency of the SDQ scale was found for these children who were rated by their parents. Comparable results were reported in a Dutch study (Muris, 2003), in which healthy children and adolescents were surveyed. It was revealed that the internal consistency for the various SDQ scales were generally satisfactory for the parent version (mean=0.70) and for the teacher version (mean=0.64). Only the consistency for the self report conduct problems (0.45) and peer problems (0.54) was notably low. Additional investigation in a community sample from Australia (Hawes, 2004) showed a moderate to strong internal reliability across all SDQ scales in a parent-rated survey. The results of the German standardization of the SDQ (Woerner, 2002) revealed that homogeneity of the SDQ scales was satisfactory to good. The Cronbach's alpha value was 0.82 for the entire scale, and the values for the individual subscales were 0.58 - 0.76. The internal consistencies obtained for adult informant-rated SDQ scales in this clinical sample were rated again as good. None of the internal consistency coefficients was lower than 0.70 (0.72 - 0.81 for parent subscales; 0.75 - 0.83 for teacher subscales). For the total difficulties score based on 20 items, parent- and teacher-rated

instruments yielded identical coefficients (0.83). Thus, both parent and teacher versions can be considered to be sufficiently reliable (Becker, 2004b). Recently, evidence of the good internal consistency of the SDQ was also found in a prospective/non-interventional study in 10 European countries in which 1459 children with the diagnosis of ADHD participated (Becker, 2006b). The Cronbach's alpha coefficients were quite high in the evaluated sample. This was fairly consistent for all countries. Results on the internal consistency demonstrate the homogeneous scale structure, with reliabilities for the parent total difficulties score ranging between 0.82 (Goodman, 1998) and 0.71 (Koskelainen, 2000) and 0.76 (Muris, 2004) for the self version in several studies of different societies.

2.1.2 Factor Structure of the SDQ

The factor structure of the 25 SDQ items has been extensively assessed in different cultural settings by means of exploratory factor analysis (EFA) and most studies have been able to confirm the five factor structure (Koskelainen et al., 2000; Goodman, 2001; Niclasen et al,. 2012). However, as the development of the SDQ was theory driven and since it is assumed that the 25 items reflect five underlying latent dimensions, it seems more appropriate to validate the five scales by means of confirmatory factor analysis (CFA). It constitutes the measurement part of structural equation modelling (SEM). It is a technique that analyses measurement models in which both the number of factors and their corresponding indicators are explicitly specified a priori.

Relatively few studies have employed structural confirmatory methods in relation to the SDQ and their results vary (Van et al., 2008; Sanne et al., 2009). Thus, some studies have found support for a five-factor model (Sanne et al., 2009; Van et al., 2008; Palmieri and Smith, 2007) and others for a three-factor solution (Goodman et al., 2010; Dickey and Blumberg, 2004). A study conducted by Goodman et al., (2010) found a three-factor model (internalising/externalising/prosocial) to have a better fit in a low risk epidemiological sample of 5–16-year-olds, but that a five factor model was superior in high risk samples.

While one central issue is concerned with whether SDQ items are truly valid indicators of the proposed five behavioural domains or whether an even simpler structure would be superior, another key issue concerns the impact of the positively worded items. The inclusion of these items was originally intended to increase the acceptability of the SDQ to respondents, making it particularly suitable for use in non-clinical, epidemiological studies. The disadvantage however is, as several studies have pointed out, that positively worded items can confound

the factor structure (Palmieri and Smith, 2007; Goodman, 2001). One study which included alternative data from custodial grandmothers found that a model which contained a positive construct method factor fitted the data better than the three- and five-factor models (Palmieri and Smith, 2007). Similarly, a Norwegian study using self-rating data also found a significant improvement of the model fit by introducing a positive construct factor (Van et al., 2008). On the other hand, Sanne et al., (2009) did not find support for a positive construct factor for parent and teacher alternative data.

Thus, the advantages of the structural confirmatory methods are that they provide a comprehensive means for assessing and modifying theoretical models and therefore have a great prospective for further theory development.

2.2 The Adapted WHO Quality of Life-BREF (WHOQOL-BREF)

In contemporary research, there has been an increasing focus on measuring health beyond traditional indicators such as mortality and morbidity, and quality of life (QoL) has turned into an important outcome in clinical and interventional studies (Fairclough, 2002). The World Health Organization Quality of Life Group defines quality of life as individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns (WHOQOL, 1991).

Instruments on quality of life and functioning instruments abound in health care literature, ranging from simple to complex. Researchers have invariably incorporated an array of subjective and objective indices which measure impact of disease and impairment on daily activities and behaviour, perceived health measures and disability/functioning-status (Ware et al. 1993; David et al., 2004; Dejan et al., 2011; Ayuk et al., 2013; Onyiriuka and Ehkator, 2013). A short version of the World Health Organization Quality-100 called WHOQOL-BREF with 26 items and four domains of health, namely, physical, psychological, social relationships, and environmental is considered an equally valid and reliable alternative to the assessment of domain profiles used in the WHOQOL-100 (WHOQOL, 1991). Its interesting results are reported in several epidemiological and clinical trials (Akpa et al., 2015; Noerholam et al. 2004; Fairclough, 2002; Goodman, 1997).

2.2.1 Reliability of the Adapted WHO Quality of Life-BREF. (WHOQOL-BREF)

Psychometric validation of the WHOQOL-BREF in terms of it reliability, internal consistency, construct validity, criterion validity, and discriminant validity has attracted the attention of the health researchers. However, the research has yielded different results and studies are limited in sample population (Min et al. 2002) while some have aimed at comparing small groups, without making any effort to ensure that items of the WHOQOL-BREF really represent the same constructs across groups (Noerholam et al. 2004; Fang et al. 2002).

In a study conducted among a sample of Iranian adult by Usefy et al. (2008), the internal consistency of the domains was satisfactory to good, yielding Cronbach's Alpha ranging from 0.78 for psychological health to 0.82 for social relationships. The Cronbach's alpha for the entire sample, the clinical, and the non-clinical were 0.82, 0.82, and 0.84 respectively.

Among Indian adolescents, the internal consistency of the domains yielded poor to satisfactory values ranging from 0.44 for physical to 0.57 for psychological to 0.70 for social relationships and 0.82 for environment (Shally Awasthi et al., 2010). However, when the analysis was repeated for physical domain by dropping the two negatively scored items, Cronbach's alpha rose from 0.44 to 0.75. Similarly, when the analysis was repeated after dropping one negatively scored item in the psychological domain. its Cronbach's alpha increased from 0.57 to 0.73 (Shally Awasthi et al., 2010).

2.2.2 Factor Structure of the Adapted WHO Quality of Life-BREF (WHOQOL-BREF)

Some researchers have tried to confirm whether their observed data represent the original structure prescribed by the WHOQOL-Group, using laborious and tedious statistical methods including confirmatory factor analysis (CFA) (Nedjat et al. 2008; Berlim et al. 2005; Trompenaars et al. 2005; Yao and Wu 2005; Lima et al. 2005; Izutsu et al. 2005). Others have relied simply on descriptive statistics and reliability Cronbach Alpha, without ruling out the possibility of factor invariance (Yao et al. 2008; Chien et al. 2007; Leung et al. 2005). Most of the studies were conducted in countries with different cultures and languages (Yao et al. 2008, Chien et al. 2007; Leung et al. 2005). Particularly, evidence in Iran by Nedjat et al. (2008) produced acceptable reliability (0.55–0.84) and discriminant validity for the interview version of the WHOQOL-BREF. This instrument also demonstrated statistically significant correlation with the Iranian version of the SF-36. However, their samples was limited to urban population in Tehran, Iran; in addition they did not apply factor analysis (Nedjat et al. 2008).

Factor analysis was carried out on data collected on a sample of Iranian adult using the principal components method with Varimax rotation, which was aimed at examining the dimensional structure of the WHOQOL-BREF questionnaire (Usefy et al., 2008). This rotation technique specifies that components must be orthogonal (uncorrelated). However, it is unlikely that constructs underlying the WHOQOL-BREF data are uncorrelated (WHOQOL, 1991). The result of the study provides a desirable facture structure of the instrument and four factors gave an initial Eigen value of at least 1.00 (Usefy et al., 2008).

2.3 Structural Equation Modelling (SEM)

Structural equation modelling (SEM) can be thought of as the marriage of two lines of methodological and statistical development in the social and behavioural science (Peter and Russell, 2009). The development of methods for the interpretation of data from widespread mental testing of adult populations in North America and Britain went hand in hand with the development of theories of mental ability. In order to test the efficacy of the various theories of mental ability proposed, the statistical model known as factor analysis today was developed. Since it was evident that a single test item could not tap the full extent of person's ability in any given area, several items were employed jointly to measure ability (Peter and Russell, 2009). The development of the methodology known as SEM was brought about by the recognition that many social and behavioural processes could be thought of as causal process operating among unobserved constructs.

Structural equation modelling (SEM) is used to estimate simultaneously a given system of hypothesized relationships among observable and latent variables to determine whether these associations are consistent with an obtained sample of data (Schumacker and Lomax, 2010). This multivariate analytical technique emerged from three separate lines of mathematical and statistical analysis: path analysis, factor analysis, and simultaneous equation modelling (Kline, 2011). The work of Karl Jöreskog provided bridge to earlier works in path and factors analysis (Cudeck et al., 2001) and his earliest contribution in the development of SEM, confirmatory factor analysis (CFA) can be linked to works by researchers on maximum likelihood and factor analysis to create the basic measurement tool that is common to all SEM softwares (Kaplan, 2000). However, modern day technique has evolved beyond the study of just measurement models to become mixture of factor analysis and path analysis (Kaplan, 2000). In the past two decades SEM has been seen the most important contribution of statistics to the social and behavioural sciences (Schumacker and Lomax, 2010).

There are two common components to a SEM: the measurement model and the structural model (Schumacker and Lomax, 2010). The measurement model analyses the relationships among a set of indicator variables and a predetemined number of latent variables. Indicator variables are those collected in the researcher's measurement instrument, while latent variables exist beyond human measurement. The association among the indicator variables and the latent variables in a model are established a priori and tested against a data set to determine if the hypothesized measurement relationships match the data set that have been collected. Aside the associations analysed by measurement model, the structural part of the model analyse a series of a priori relationships established between latent variables (Schumacker and Lomax, 2010).

One most important feature of software version of the SEM is the capability with which simple restrictions are imposed on the parameters which allow for test of the theoretical specification of the model (Peter and Russell, 2009). Any parameter in the model can be fixed either to zero or to another value, or can be fixed to be equal to another parameter or set of parameters. In particular, when parameters in the structural part of the model are constrained to zero it allows for a test of the hypothesis that latent constructs vary independently of one another (Peter and Russell, 2009).

Two or more indicators can be constrained to have same loadings on common latent construct or indicator-specific errors with equal variance. Also, in multiple group analysis, parameters can be constrained to be equal across groups in either the measurement or structural model, allowing tests of whether one or more parts of the model are equivalent across groups. The aim of such analyses is to determine the extent to which a model can be generalized across population groups (Peter and Russell, 2009; Kline, 2011).

The basic objective of SEM is to provide a means of estimating the relationships among the underlying constructs of a hypothesized substantive model. This methodology differs from others such as regression analysis and contingency table analysis in that it focuses not on the relationships among the observed variables but on those among the unobserved (latent) constructs of the substantive model (Kline, 2011; Schumacker and Lomax, 2010; Tacbachnick and Fidell, 2007).

Structural equation modelling can be conducted through five basic process as proposed by Schumacker and Lomax (2010) namely model specification, identification, estimation, testing and modification. A crucial step in SEM process is model identification. Identification

determines whether it is possible to find unique values for the parameters of the specified model (Kline, 2011). Models can be under-identified, just-identified or over-identified.

A model is said to be just-identified if it has only one unique solution that will be able to perfectly reproduce the correlation matrix (Kline, 2011). However, Hair et al., (1998) said the solution is not of interest because it has no generalizability.

An under-identified model is obtained when one or more parameters are not uniquely determined which means the number of unknowns exceeds the number of equations and there is no empirical information to allow its unique estimation (Kline, 2011; Schumacker and Lomax, 2010) and hence its estimation should not be relied upon (Kline, 2011).

Identified models are the only models that can be estimated (Kline, 2011). An over-identified model has a number of possible solutions, and the mission is to select the one that comes closest to explaining the observed data within some boundary of error (Peter and Russell, 2009).

2.3.1 Advantages of Structural Equation Modelling (SEM)

The desirability of SEM methodology stems from several advantages over different multivariate statistical techniques such as multiple regression or path analysis. These are:

I. Structural equation modelling analysis allows for issues related to prediction as well as measurement (Peter and Russell, 2009).
II. In SEM, multiple observed variables can be assessed compared to some other statistical methods that can only use a limited numbers of variables (Schumacker and Lomax, 2010).
III. Measurement error is taken into consideration during SEM analyses (Kline, 2011; Schumacker and Lomax, 2010).
IV. It is more powerful and provides more valid and reliable measures when compared to others statistical methods (Peter and Russell, 2009).
V. When compared with multiple regression, it is possible to have more than one dependent variable and a variable can be both a dependent and independent variable (Kline, 2011; Schumacker and Lomax, 2010; Peter and Russell, 2009).
VI. Direct and indirect effects of variables can be examined with SEM analysis (Kline, 2011).

VII. Compared to path analysis, SEM can have latent variables, which are theoretical constructs not directly observed (Kline, 2011; Schumacker and Lomax, 2010).

2.3.2 Disadvantages of Structural Equation Modelling (SEM)

Despite SEM's clear advantages over other analysis techniques and its continual increasing usage, it has some criticisms. These are:

I. It requires large samples (Kline, 2011; Schumacker and Lomax, 2010).
II. It is complex and difficult to use (Schumacker and Lomax, 2010); and
III. Its softwares are not user friendly as it is demanding than other multivariate techniques (Hair et al., 1998).

CHAPTER THREE

METHODOLOGY

3.0 Study Design

This is a secondary analysis of data from a State wide cross-sectional survey (among adolescents in Benue state, Nigeria) funded by Fogarty international through the Medical Education Partnership Initiative in Nigeria (MEPIN).

3.1 Study Area

The primary survey was a state wide study involving a Local Government Area (LGA) from each senatorial district in Benue state; Oju, Vandekeya, Wannune and the state capital.

Benue State has an estimated population of about 4 million people and is located in the middle-belt region of Nigeria with 23 local government areas. Youths within the age group of 15-35years makes up more than 50% of her population; 725,936 adolescents are within the ages of 15-19years, 63.9% of whom are males. About 37% of the youth are currently in school, most of who are in secondary level of education (63.1%), 71.4% and 3.9% of the youth has access to primary and tertiary health care facilities respectively (NBS, 2012).

3.2 Study Population

A total of 2,095 students participated in the study which was conducted among secondary school students located in different areas of the four local government Participants were selected from Girls-only school (GOS), Boys-only Schools (BOS) and Gender-mixed School (GMS) with a range of social backgrounds and of mixed academic ability using purposive sampling strategy (based on their gender composition and large number of students).

3.3 Data Extraction

Data for the present analyses were extracted from the State wide cross-sectional survey conducted among adolescents in Benue state, Nigeria. Specifically, in addition to the socio-demographic characteristics of respondents, data on the Strength and Difficulty Questionnaire and Quality of Life Questionnaire (Adapted WHO-QOL BREF) were extracted (for each respondent) from the database.

3.4 Measurements:

The two instruments used in this study were from a study supported by the Medical Education Partnership Initiative in Nigeria (MEPIN) project.

3.4.1 Socio-Demographic Characteristics of Respondents

Adolescent respondents completed demographic survey questionnaire which was divided into two parts: Personal Characteristics (Current Age, Gender Religion, Place of Residence and Tribe) and Family/Background Characteristics (Family Type, Family Status, Father's Level of Education, Father's Occupation, Mother's Level of Education, and Mother's Occupation) that could impact on their psychosocial functioning (PSF) and quality of life (QoL) state.

3.4.2 The Strength and Difficulty Questionnaire (SDQ)

The SDQ is a brief behavioural screening questionnaire used to assess children and adolescent psychosocial outcomes, it exist in several versions and languages to meet the needs of researchers, clinicians and educationists (Goodman, 1994). It consist of 25 items, each one of the items rated on a 3-point Likert scale (Not True, Somewhat True, and Certainly True) and are distributed on five subscales of five items each: Emotional Symptoms Scale (ESS), Conduct problems Scale (CPS), Hyperactivity Scale (HAS), Peer Problems Scale (PPS) and Prosocial Scale (PSS).

Ten questions are worded to reflect strength of the child, 14 are reflecting difficulties, and one (I get on better with adults than with people my own age) may be considered neutral but it's scored as a difficulty item on peer problems subscale (Wayne and Stephen, 2004).

3.4.3 Adapted WHO Quality of Life-BREF. (WHOQOL-BREF)

The WHOQOL is a quality of life assessment tool developed by WHOQOL Group which is applicable cross-culturally and have been widely field-tested (WHOQOL, 1991). It assesses the individual's perceptions in the background of their culture and value systems, and their personal goals, standards and concerns.

The adapted WHOQOL-BREF instrument is a 24-items, which measure the following broad domains of an adolescent: physical health domain (PHD), psychological health domain (PSD), social relationship domain (SRD), and environmental domain (END). The WHOQOL-BREF is a shorter version of the original instrument that may be more convenient for use in large research studies.

3.5 DATA MANAGEMENT AND STATISTICAL TECHNIQUES

3.5.1 Data Cleaning

Prior to any other data analysis, information for 132(6.3%) of the students who were more than 19 years old were removed from the database resulting in a sample size of 1,963 students (10 and 19years) used for the present analysis.

To confirm the accuracy of the data extracted, a confirmation procedure was followed during which data were examined using descriptive statistics and graphical representation of the variables (Tacbachnick and Fidell, 2007). Summary values for demographic variables were obtained in frequency tables. Descriptive methods were used to simplify and characterize the data using percentages.

3.5.2 Missing Data and Outliers

All the variables extracted were inspected for missing data. This inspection showed that few variables had missing information. In this study, missing data were handled using maximum likelihood estimation in AMOS program version 21 when CFA and SEM were conducted (Schumacker and Lomax, 2010).

In this study, there were no outliers in the items extracted and respondents that were not within the adolescent age range were not extracted during the data extraction.

3.5.3 Systematic Endorsement

Data obtained from self-report questionnaires are often likely to be systematically distorted by generalized response biases such as tendency to agree with items regardless of content; tendency to respond consistently at either end of the scale rather than in the centre or, conversely, the tendency to respond in the centre of the scale; tendency to respond in a socially desirable manner; defensiveness, or tendency to deny all psychological difficulties (Peter and Russell, 2009).This was verified and taken care off by computing the standard deviation of each construct and any respondents with standard deviation of zero were deleted.

3.5.4 Data screening and preliminary analysis

The Statistical Package for Social Sciences (SPSS) program version 20 and R Programming Software version 3.2.0 were employed for both descriptive and analytical techniques. Data screening and preliminary analyses, such as data cleaning, missing values/no-response, and systematic endorsement (e.g. endorsing the same response for the entire survey), the normality test and outliers test were performed so as to allow the results to be meaningfully interpreted. The screened dataset was then randomly divided into two for two separate

statistical analyses. Sample I was used for Exploratory Factor Analysis (EFA) and Sample II was used for Confirmatory Factor Analysis (CFA) and structural equation modelling (SEM) using Analysis of Moment Structure (AMOS) program version 21. In addition, independent sample T-test was conducted to compare the mean age difference in the two samples.

3.5.5 Normality and Sample Size

Sample size affects a study's finding where the outcome of smaller samples have too little statistical power for the test to realistically identify significant results according to Hair et al., (1998). In such a case, they can be easily 'over-fitting' to the data meaning the sample fit the sample very well but with no generalizability. Conversely large sample sizes have disadvantages due to making the statistical tests very sensitive as a result of the increased statistical power from the sample size (Hair et al., 1998) which the data can incur non-normality.

Therefore, the data extracted were analysed for normality to ensure its appropriateness using standard multivariate analysis. Normality of the dataset can be examined through statistical approaches like Skewness and Kurtosis, Mahalanodis distance (D) statistics (Schumacker and Lomax, 2010). In this study, skewness and kurtosis was used to assess the normality of variables in the dataset. Variables with estimates of Skewness and Kurtosis between ± 1.0 and ± 1.5 respectively were considered to be normally distributed.

3.6 Methods of data analysis of the instruments

Multivariate correlation data analysis was conducted after descriptive analysis was carried out on the screened dataset (Sample I & II). The multivariate correlation analysis was conducted in two main studies. Study I: Exploratory Factor Analysis (EFA) and Study II: Confirmatory Factor Analysis (CFA), Structural Equation Modelling (SEM) and Structural Model Testing.

3.6.1 Study I: Exploratory Factor Analysis (EFA) and Test of Reliability

Exploratory factor analysis (EFA) is a complex; multi-stage process widely used and broadly applied statistical technique in the social sciences and public health (Costello and Jason, 2005; Akpa et al., 2015). It is used to uncover and examine theoretically, the interrelationship of a large set of items and to identify clusters of items that share sufficient variation to classify them as a factor or construct to be measured by the instrument (Hair et al., 1998). In this study, exploratory factor analysis was conducted with sample I using SPSS

version 20 and R programming version 3.2.0 was used to perform parallel analysis and estimate the polychoric correlation.

Firstly, the factorability of the items in the two instruments used in this study were examined using KMO (Kaiser-Mayer-Olkin measure of sampling adequacy) correlation value of 0.70 and significant Bartlett's test of Sphericity Chi-square value ($p<0.01$) was considered adequate to undertake EFA (Burton and Mazerolle, 2011).

Secondly, principal axis factoring was used as the method of extraction with Oblique rotation which assumes factors are not independent of each other (uncorrelated) and any item with ± 0.3 factor loading are considered to be statistically significant load on a factor or a component on the pattern matrix based on the sample size (Hair et al., 1998). Eigen values greater than 1.0; Cattelle's Scree plot and Horn's parallel analysis were used to determine the number of factors or components to be retained (Ladesma and Pedro, 2007).

Finally, the internal consistencies of each factors or components were examined using polychoric alpha computed from the polychoric correlations of the items in each factors or components. This is an ideal reliability index for likert-type and ordinal item response dataset because Cronbach's alpha index deflates the reliability estimates of such dataset (Gadermann et al., 2012). This is also exemplified in this study; a recommended index value of at least 0.70 was used (Gadermann et al., 2012).

3.6.2 Study II: Confirmatory Factor Analysis (CFA)

After EFA which is a precursor to CFA a special case of what is known as SEM was then performed to test the hypothesized factor structure of the two instruments identified in study I using sample II (Jamie, 1998) and also to determine whether the hypothesized or the existing structure provides a good fit to the independent dataset. The global fit to the data was tested by Chi-square χ^2 setting level of significance alpha to 0.01, Relative χ^2 (χ^2/df) which adjust for sample size with an acceptable value of 3.0, Root Mean Square Error of Approximation (RMSEA) value less than 0.05 was considered a good fit (Kline, 2011). Also, Goodness-of-fit Index (GFI), Adjusted Goodness-of-fit Index (AGFI), Comparative Fit Index (CFI), Incremental Fit Index (NFI) which test if the variables are uncorrelated, Tucker-Lewis Index (TLI), with a threshold values greater than 0.90 or closer to 1.0 were used to assess the model fit. Also, Akaike Information Criterion (AIC), and Consistent AIC (CAIC) which assign greater penalty to model complexity was used for model comparison with smaller value indicating a better fit (Daire et al., 2008). The resulting models from CFA that

adequately fit the independent dataset were then modelled together using SEM. Structural equation modelling (SEM) is basically referred to as the union between two CFAs (Peter and Russell, 2009). It is an all-inclusive statistical technique for testing hypothesis about relationships about observed and latent variables then assess whether the implied covariance matrix is as close as possible to sample covariance matrix (Tacbachnick and Fidell, 2007; Peter and Russell, 2009; Kline, 2011).

3.6.3 Structural Equation Modelling (SEM)

In this study the procedure recommended by Schumacker and Lomax (2010) was adopted in fitting the final structural model which are: Model specification, Model identification, Model estimation, Model testing and Model modification.

To achieve the first procedure, SEM involves two main components; namely, the measurement equation and the structural equation. A mathematical expression of the measurement equation model is represented in the matrix form as follows:

$$\boldsymbol{y}_{(p\times 1)} = \boldsymbol{\Lambda}_{y(p\times m)} \times \boldsymbol{\eta}_{(m\times 1)} + \boldsymbol{\varepsilon}_{(p\times 1)}$$

$$\boldsymbol{x}_{(q\times 1)} = \boldsymbol{\Lambda}_{x(q\times n)} \times \boldsymbol{\xi}_{(n\times 1)} + \boldsymbol{\delta}_{(q\times 1)}$$

Where:

$y = vectors\ of\ observed\ scores\ of\ exogenous\ variables$

$\eta = vectors\ of\ exogenous\ latent\ constructs$

$x = vectors\ of\ observed\ scores\ of\ endogenous\ variables$

$\xi = vectors\ of\ endogenous\ latent\ constructs$

$\Lambda_y = matrix\ of\ construct\ loadings\ on\ exogenous\ latent\ construct$

$\Lambda_x = matrix\ of\ construct\ loadings\ on\ endogenous\ latent\ construct$

$\varepsilon = vectors\ of\ random\ measurement\ errors\ of\ exogenouse\ variables$

$\delta = vectors\ of\ random\ measurement\ errors\ of\ endogenous\ variables$

$p = number\ of\ exogenous\ indicator\ variables$

$q = number\ of\ endogenous\ indicator\ variables$

Given the observed data for describing the vectors y and x, the measurement equations appropriately group together the correlated indicator variables to form the latent variables in

η and ξ. This is done by assigning fixed parameters and defining unknown parameters in Λ_y and Λ_x.

The interrelationship among the latent factors or components is explained through a structural equation model. It is expressed mathematically in matrix form as follows:

$$\eta_{(m\times 1)} = \mathrm{B}_{(m\times m)} \times \eta_{(m\times 1)} + \Gamma_{(m\times n)} \times \xi_{(n\times l)} + \varsigma_{(m\times 1)}$$

Where:

η = *vectors of exogenous latent constructs*

$\mathbf{B}$ = *matrix of structural parameters relating the exogenous constructs together*

Γ = *matrix of structural parameters relating the endogenous constructs to the exogenous constructs*

ξ = *vectors of endogenous latent constructs*

ς = *vectors of disturbances representing the unexplained variation in the endogenous constructs*

m = *number of exogenous latent constructs*

n = *number of endogenous latent constructs*

It is assumed that B has zeros in the diagonal, and (I - B) is required to be non-singular, ξ and ς are uncorrelated.

After the model specification was performed, the model parameters are then estimated. The aim of estimation is to minimize the difference between the hypothesized matrix which is a function of parameter θ, a vector that includes all unknown parameters. denoted as $\Sigma(\theta)$ and sample covariance matrix, denoted as S. to measure the closeness between these two variance covariance matrices S and $\Sigma(\theta)$. In this study, maximum likelihood was applied to handle the slightly non-normal and non-interval dataset (Schumacker and Lomax, 2010).

Model evaluation of the parameters is the next process in SEM. The criteria for estimation of the solution, measure of overall fit, and detailed assessment of fit. Firstly, parameter estimates with the right sign and size, standard errors within reasonable ranges, correlations of parameter estimates are often used to check the relevance of each variable and R-squared (R^2) was computed for the measurement and the structural equations to account for the explained variation in the relationship. This was simply computed by squaring the standardized error associated with the latent variables and subtracting the value obtained from

1 (Weston and Gore, 2006). Then the overall model fit was evaluated to examine how well the specified model fit the dataset using same global fit indices employed in CFA as described above.

Lastly, to test the hypothesis (in theoretical work) and to improve the model fit most especially for exploratory purpose. AMOS software was used to modify each fixed parameter which indicate a minimum improvement that could be obtained in the chi-square value if the parameter were fixed for estimation (Schumacker and Lomax, 2010; Kline, 2011).

In this study, the structural model was not modified, but some of the measurements models were modified during CFA.

CHAPTER FOUR

RESULTS

4.1 Personal Characteristics of Respondents in Sample I & II

In Table 4.1, of the 1,963 adolescents that participated in the two studies: Sample I (n=980) and Sample II (n=983), slightly more than half 54.7% (53.8%) are males while 45.2% (46.0%) were females respectively. The mean age of respondents in sample I (14.72±2.05 years) was not significantly different from that of sample II (14.70±2.04) (t=0.123, p=0.90). The composition of the age categories in the two Samples were 10-12years 15.0% (14.5%), 13-17years 75.5% (76.0%) and 9.5% (9.5%) respectively. Majority of the adolescents in the two Samples were Christians 96.3% (95.4%) while 3.2% (3.9%) were Muslims in sample I and II respectively. Of these adolescents 45.7% (44.2%) lives in the Rural area while 49.0% (49.5%) lives in the Urban area respectively. The Ethnic composition of the adolescents in the two Samples TIV 57.3% (57.2%), Idoma 7.9% (6.6%), Igede 18.6% (19.6%) and others 15.5% (15.5%) respectively.

Table 4.1: Personal Characteristics of Respondents in Sample I & II

Variable		Sample01 (n=980) Frequency (%) Or Mean±SD	Sample02 (n=983) Frequency (%) Or Mean±SD	Test of equality of means Mean Diff (SE)	T test (p-value)
Current Age		14.72(2.054)	14.70(2.038)	0.011(0.092)	0.123(0.902)
	10-12years	147(15.0)	143(14.5)		
	13-17years	740(75.5)	747(76.0)		
	18-19years	93(9.5)	93(9.5)		
Gender					
	Male	536(54.7)	529(53.8)		
	Female	443(45.2)	452(46.0)		
	Not Reported	1(0.1)	2(0.2)		
Religion					
	Christianity	944(96.3)	938(95.4)		
	Islam	31(3.2)	38(3.9)		
	Not Reported	5(0.5)	7(0.7)		
Place of residence					
	Rural Area	448(45.7)	434(44.2)		
	Urban Area	480(49.0)	487(49.5)		
	Not Reported	52(5.3)	62(6.3)		
Tribe					
	TIV	562(57.3)	562(57.2)		
	Idoma	77(7.9)	65(6.6)		
	Igede	182(18.6)	193(19.6)		
	Others	152(15.5)	152(15.5)		
	Not Reported	7(0.7)	11(0.11)		

4.2 Family/Background Characteristics of Respondents in Sample I & II

Table 4.2 revealed that majority of the adolescents was from Monogamy family 66.4% (65.3%) while 31.0% (31.4%) were from Polygamy family background respectively. Among the adolescents in the two Samples, most of them have there parents living together 73.1% (72.3%), 4.3% (4.0%) have there parents divorced, 6.6% (7.2%) have there parents living apart and 13.6% (14.2%) have single parents respectively. Table 4.1 also shows that 12.2% (10.7%) of the adolescents' father has no formal education, 12.2% (11.0%) has primary education, 21.8% (23.7%) has secondary education, 35.3% (36.4%) tertiary education and 14.4%(15.3%) has other level of education respectively while 15.0% (14.4%) of the adolescents' mother has no formal education, 18.3% (19.1%) has primary education, 24.6% (24.9%) has secondary education, 26.7% (26.3%) tertiary education and 10.7% (11.9%) has other level of education respectively. Of their parents occupations, (32.4% and 32.9%) of the adolescents' father are Farmers, (8.1% and 7.1%) are Traders, 37.1% (38.5%) are Civil Servants, 7.7% (7.0%) are Employee of Private Organisations while 32.7% (30.4%) of the adolescents' mother are Farmers, 25.9% (28.3%) are Traders, 23.3% (21.8%) are Civil Servants, 5.8% (7.0%) are Employee of Private Organisations respectively.

Table 4.2: Family/Background Characteristics of Respondents in Sample I & II

	Sample01 (n=980)	Sample02 (n=983)
Variable	**Frequency (%)**	**Frequency (%)**
Family type		
Monogamy	651(66.4)	642(65.3)
Polygamy	304(31.0)	309(31.4)
Not Reported	25(2.6)	32(3.3)
Family status		
Parents are together	716(73.1)	711(72.3)
Parents are divorced	42(4.3)	39(4.0)
Parents live apart	65(6.6)	71(7.2)
Single parent	133(13.6)	140(14.2)
Not Reported	24(2.4)	22(2.2)
Father's level of education		
No formal education	120(12.2)	105(10.7)
Primary	119(12.2)	108(11.0)
Secondary	214(21.8)	233(23.7)
Tertiary	346(35.3)	358(36.4)
Others	141(14.4)	150(15.3)
Not Reported	40(4.1)	29(3.0)
Father's Occupation		
Farming	318(32.4)	323(32.9)
Trading	79(8.1)	70(7.1)
Civil servant	364(37.1)	378(38.5)
Employee of private organisation	75(7.7)	69(7.0)
Others	117(11.9)	125(12.7)
Not Reported	27(2.8)	18(1.8)
Mother's level of education		
No formal education	147(15.0)	142(14.4)
Primary	179(18.3)	188(19.1)
Secondary	241(24.6)	245(24.9)
Tertiary	262(26.7)	259(26.3)
Others	105(10.7)	117(11.9)
Not Reported	46(4.7)	32(3.3)
Mother's Occupation		
Farming	320(32.7)	299(30.4)
Trading	254(25.9)	278(28.3)
Civil servant	228(23.3)	214(21.8)
Employee of private organisation	57(5.8)	69(7.0)
Others	93(9.5)	96(9.8)
Not Reported	28(2.9)	27(2.7)

4.3 STUDY I: Exploratory Factor Analysis (EFA)

The purpose of study I was first to assess the factorability of the items on the two instruments used in this study and also examine the theoretical interrelationship of this items using Sample I.

Table 4.3, shows the descriptive statistics of the items on the Strength and Difficulty Questionnaire (SDQ) and it revealed that most of the items has means less than 1.0 except items loading on the Prosocial scale, it also shows that the items has small to moderate Skewness and Kurtosis values ranging between -1.11 to +1.44 which implies that the items are slightly non-normal.

Table 4.3: Descriptive Statistics for the 25-items on the Strength and Difficulty Questionnaire (SDQ) using Sample I

Items	Labels	Mean	SD	Skew	Kurtosis
SDQ03	I get a lot of headaches, stomach-aches or sickness	0.56	0.67	0.77	-0.52
SDQ08	I worry a lot	0.75	0.70	0.39	-0.91
SDQ13	I am often unhappy down-hearted, or tearful	0.59	0.65	0.67	-0.59
SDQ16	Am nervous in new situations. I easily lose confidence	0.75	0.69	0.36	-0.88
SDQ24	I have many fears, I am easily scared	0.82	0.70	0.27	-0.97
SDQ05	I get very angry and often lose my temper	0.84	0.71	0.24	-1.01
SDQ07	I usually do as I am told*	0.79	0.63	0.19	-0.61
SDQ12	I fight a lot. I can make other people do what I want	0.37	0.62	1.44	0.90
SDQ18	I am often accused of lying and cheating	0.58	0.71	0.81	-0.63
SDQ22	I take things that are not mine from home, school or elsewhere	0.44	0.65	1.18	0.20
SDQ02	I am restless, I can not stay still for long	0.65	0.71	0.60	-0.83
SDQ10	I am constantly fidgeting or squirming	0.65	0.66	0.52	-0.72
SDQ15	I am easily distracted, I find it difficult to concentrate	0.75	0.69	0.37	-0.88
SDQ21	I think before i do things*	0.61	0.67	0.64	-0.66
SDQ25	I finish the work am doing. My attention is good*	0.63	0.66	0.59	-0.69
SDQ06	I am usually on my own. I generally play alone or keep to myself	0.67	0.71	0.57	-0.85
SDQ11	I have one good friend or more*	0.70	0.70	0.49	-0.88
SDQ14	Other people of my age generally like me*	0.75	0.67	0.33	-0.82
SDQ19	Other children or young people pick on me or bully me	0.60	0.69	0.73	-0.66
SDQ23	I get on better with adults than with people my own age	0.85	0.73	0.24	-1.11
SDQ01	I try to be nice to people. I care about their feelings	1.38	0.66	-0.58	-0.67
SDQ04	I usually share with others (food, games, pens etc)	1.30	0.68	-0.45	-0.83
SDQ09	I am helpful if someone is hurt, upset or feeling ill	1.23	0.73	-0.39	-1.04
SDQ17	I am kind to younger children	1.34	0.71	-0.61	-0.84
SDQ20	I often volunteer to help others (parents, teachers, children)	1.26	0.70	-0.41	-0.93

Note SD= Standard Deviation

* Negatively worded item

4.4 Factorability of 5-Factors of the Strength and Difficulty Questionnaire (SDQ)

The pattern coefficients matrix of the theoretical 5-factors of SDQ presented in Table 4.4 which shows that not all the items correlated at least ± 0.3 with at least one other item and the items did not load on their theoretical factors except the Prosocial Scale (PSS), most of the Communalities (h^2) values were less than 0.3 where some were as low as 0.183 which show that the amount of common variance shared by this items with other items were very small. Also, the table shows that the Kaiser-Mayer-Oklin measure of sample adequacy was 0.866 which was above the recommended value of 0.70, and Bartlett's test of Sphericity was significant (χ^2 (300) =4351.574, $p<0.0001$) suggesting the inclusion of each items in the Exploratory Factor Analysis (EFA).

Principal Axis Factoring was used as the method of extraction with an Oblique rotation as it is expected that the factors are to be correlated fixing the number of factors to be extracted to five (5) based on the underlying theory of 5-factors as designed by Goodman, R (1994). The initial eigen values showed that the first factor explained 17.90% of the variance, the second, third and fourth factors had eigen values above 4.10, each factor explaining 4.10% of the variance, and the fifth factor explained 12.36% of the variance. This extraction further revealed that most of the items did not load on their theoretical factors except the items on the Prosocial Scale (PSS).

Table 4.4: Communality, Rotated 5-Factor Pattern Matrix of the Strength and Difficulty Questionnaire (SDQ)

Items	Labels	Factor					
		ESS	CPS	HAS	PPS	PSS	h^2
SDQ03	I get a lot of headaches, stomach-aches or sickness	**.365**	.200	-.105	-.022	-.077	.245
SDQ08	I worry a lot	**.521**	.023	.039	-.044	.000	.293
SDQ13	I am often unhappy down-hearted, or tearful	**.467**	.109	.087	-.057	.061	.323
SDQ16	Am nervous in new situations. I easily lose confidence	**.461**	.013	.139	.059	.087	.276
SDQ24	I have many fears, I am easily scared	**.563**	-.037	-.006	-.195	.031	.320
SDQ05	I get very angry and often lose my temper	**.454**	-.014	-.019	.286	.129	.321
SDQ07	I usually do as I am told*	-.066	.096	**.464**	.219	.025	.286
SDQ12	I fight a lot. I can make other people do what I want	.059	**.508**	.032	.058	-.058	.324
SDQ18	I am often accused of lying and cheating	.149	**.334**	.023	.183	-.077	.259
SDQ22	I take things that are not mine from home, school or elsewhere	.078	**.541**	.063	.022	-.032	.380
SDQ02	I am restless, I can not stay still for long	**.382**	.194	-.036	.116	-.092	.294
SDQ10	I am constantly fidgeting or squirming	**.334**	.176	-.094	-.014	-.010	.205
SDQ15	I am easily distracted, I find it difficult to concentrate	**.582**	-.008	.019	.065	-.031	.345
SDQ21	I think before i do things*	.085	-.007	**.434**	.141	-.219	.372
SDQ25	I finish the work am doing. My attention is good*	.134	-.082	**.489**	.039	-.203	.380
SDQ06	I am usually on my own. I generally play alone or keep to myself	.274	.179	.037	.057	.003	.184
SDQ11	I have one good friend or more*	-.039	.071	**.443**	-.097	-.025	.220
SDQ14	Other people of my age generally like me*	.066	.009	**.549**	-.125	-.033	.339
SDQ19	Other children or young people pick on me or bully me	.043	**.496**	.075	-.095	.040	.298
SDQ23	I get on better with adults than with people my own age	.104	.268	.040	-.134	.276	.213
SDQ01	I try to be nice to people. I care about their feelings	-.032	.070	-.109	-.003	**.508**	.313
SDQ04	I usually share with others (food, games, pens etc.)	-.038	.020	-.007	.118	**.569**	.318
SDQ09	I am helpful if someone is hurt, upset or feeling ill	.049	-.011	-.061	.064	**.393**	.183
SDQ17	I am kind to younger children	.048	-.218	-.025	-.047	**.549**	.379
SDQ20	I often volunteer to help others (parents, teachers, children)	.052	-.009	-.056	-.201	**.522**	.378
	Eigenvalues	4.476	1.083	1.234	1.028	3.090	
	% of Variance Explained	17.904	4.331	4.937	4.110	12.359	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.866			
	χ^2	df	$p-value$	
Bartlett's Test of Sphericity	4351.574	300	<0.0001	

Extraction Method: Principal Axis Factoring.

Rotation Method: Oblimin with Kaiser Normalization.

Pattern matrix coefficients with values of .30 or greater highlighted

* Negatively worded item

4.5 Factorability of 3-Components of the Strength and Difficulty Questionnaire (SDQ)

The four, three, two and one component solutions were examined, using Principal Axis Factoring extraction method with an Oblimin rotation of the factor loading matrix. The three factors solution was preferred explaining 35.2% of the variance.

Table 4.5, presents the pattern coefficients matrix of the hypothesized 3-Components of SDQ, it shows that all the items were significantly correlated above the recommended value of at least ± 0.3 with at least one other item and the theoretical items loading on the Prosocial Scale (PSS) was also retained, coefficients with absolute values less than 0.3 were omitted. Some of the Communalities (h^2) values were less than 0.3 where some where two of the items (I am helpful if some is hurt, upset or feeling ill and I get on better with adults than with people my own age) were as low as 0.170 and 0.173 which show that the amount of common variance shared by this items with other items were very small.

This extraction further revealed that fifteen (15) items loaded on the first component which consist all the items in the theoretical Emotional symptom Scale (ESS) and at least three (3) items on the Conduct Problem Scale (CPS), Hyperactivity Scale (HAS) and Peer Problem Scale (PPS) and five (5) items loaded on the remaining two components respectively and items on the theoretical Prosocial Scale (PSS) were also preserved.

Table 4.5: Communality, Rotated 3- Components Pattern Matrix of the Strength and Difficulty Questionnaire (SDQ)

Items	Labels	Component 1	2	3	h^2
SDQ03	I get a lot of headaches, stomach-aches or sickness	.518			.244
SDQ08	I worry a lot	.483			.267
SDQ13	I am often unhappy down-hearted, or tearful	.505			.316
SDQ16	Am nervous in new situations. I easily lose confidence	.432			.260
SDQ24	I have many fears, I am easily scared	.437			.239
SDQ05	I get very angry and often lose my temper	.446			.213
SDQ12	I fight a lot. I can make other people do what I want	.503			.267
SDQ18	I am often accused of lying and cheating	.462			.228
SDQ22	I take things that are not mine from home, school or elsewhere	.540			.311
SDQ02	I am restless, I can not stay still for long	.549			.290
SDQ10	I am constantly fidgeting or squirming	.468			.205
SDQ15	I am easily distracted, I find it difficult to concentrate	.531			.303
SDQ06	I am usually on my own. I generally play alone or keep to myself	.420			.185
SDQ19	Other children or young people pick on me or bully me	.446			.214
SDQ23	I get on better with adults than with people my own age	.303			.173
SDQ07	I usually do as I am told*		.418		.214
SDQ21	I think before i do things*		.458		.359
SDQ25	I finish the work am doing. My attention is good*		.535		.378
SDQ11	I have one good friend or more*		.456		.202
SDQ14	Other people of my age generally like me*		.573		.316
SDQ01	I try to be nice to people. I care about their feelings			.462	.297
SDQ04	I usually share with others (food, games, pens etc)			.473	.260
SDQ09	I am helpful if someone is hurt, upset or feeling ill			.359	.170
SDQ17	I am kind to younger children			.592	.383
SDQ20	I often volunteer to help others (parents, teachers, children)			.557	.353
	Eigenvalues	4.476	1.234	3.090	
	% of Variance Explained	17.904	4.937	12.359	

Extraction Method: Principal Axis Factoring.
Rotation Method: Oblimin with Kaiser Normalization.

Pattern matrix coefficients with values of .30 or greater highlighted

* Negatively worded item

4.6 Factor Selection Using Scree Plot

In Figure 4.1, is the scree plot, a plot of the eigenvalues along an x-y axis. The point at which the curve decreases and straightens out after the elbow of the graph indicate the number of factors to be retained before and at the elbow. This conforms to the three (3) factors extracted in the EFA.

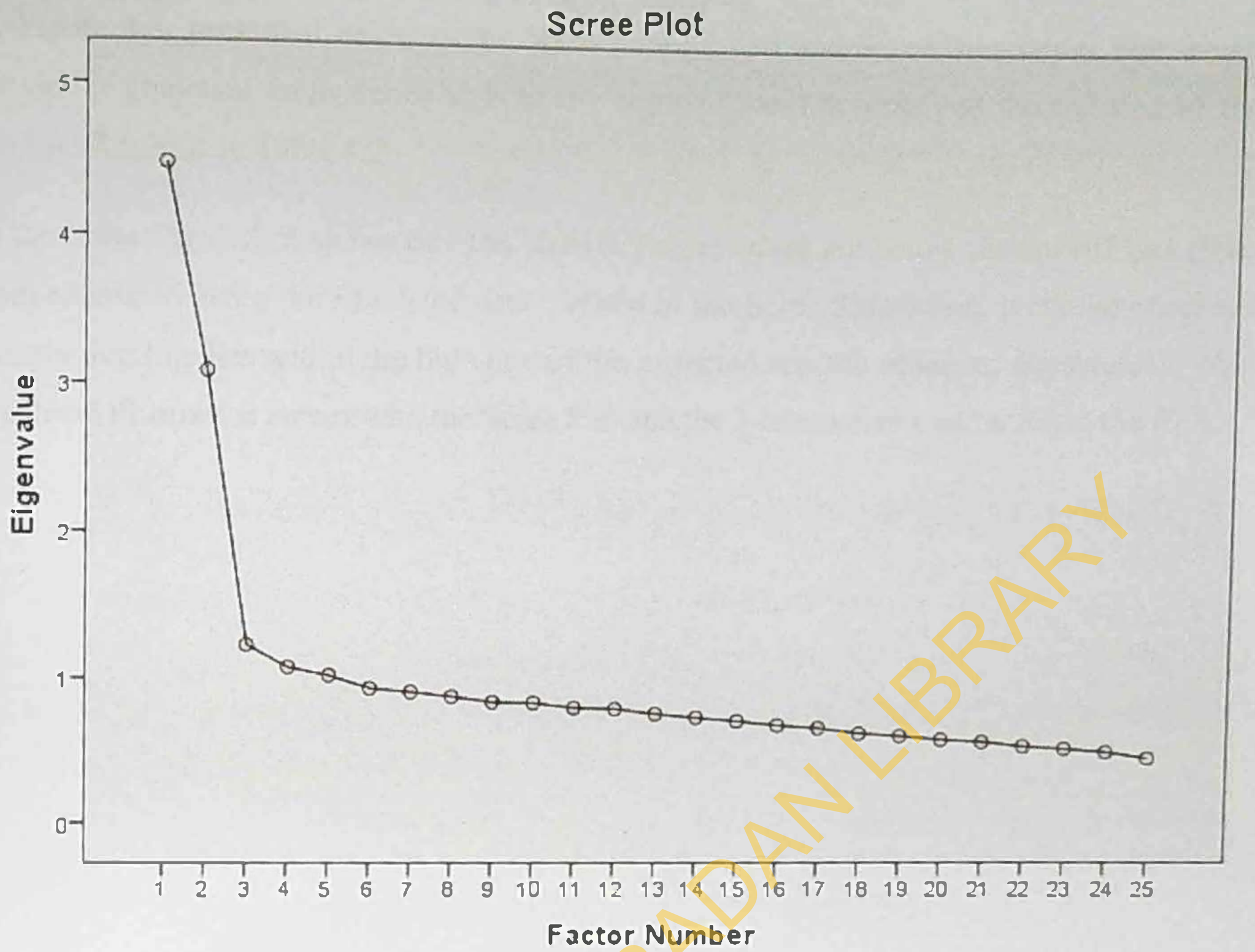

Figure 4.1: Factor Retention Using a Scree Plot.

4.7 Component Retention Using Parallel Analysis

In Figure 4.2, presented below is the Scree Parallel Plot and Scree Simulation Plot which provide a graphical equivalence to both the computational process and the solution of the Parallel Analysis in Table 4.7.

In the Scree Parallel, it shows that the observed eigenvalues are below the cut-off line (blue line) estimated using the simulated data. While in the Scree Simulation, it can be observed that the red line lies within the blue line of the expected and the observed eigenvalues. This graphical illustration agrees with the Scree Plot and the 3-components extracted in the EFA.

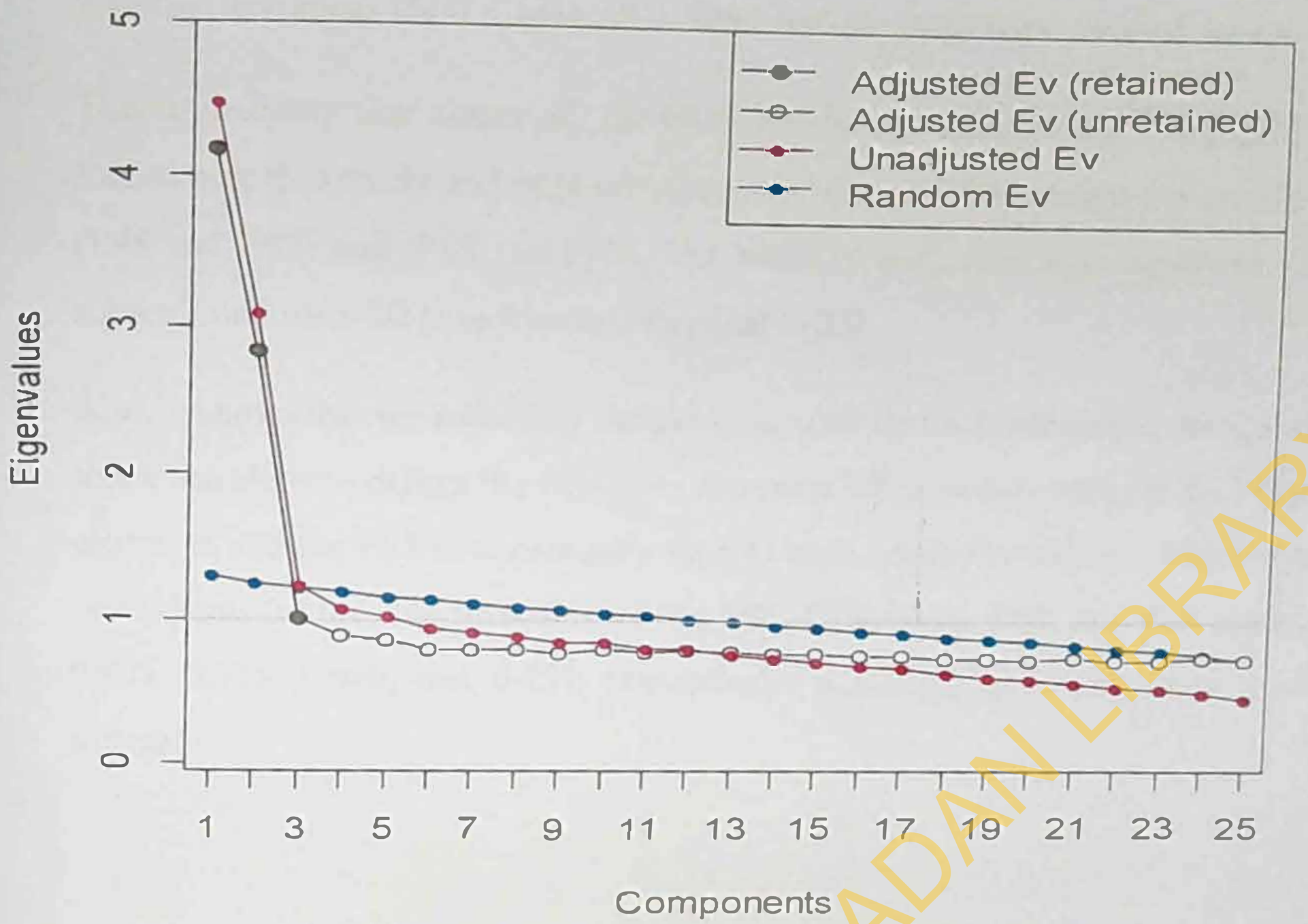

Figure 4.2: Scree Parallel Plot and Scree Simulation Plot

Table 4.7: Results of Horn's Parallel Analysis for component retention

Component	Adjusted Eigenvalue	Unadjusted Eigenvalue	Estimated Bias
1	4.176	4.476	0.300
2	2.835	3.090	0.254
3	1.014	1.234	0.221

Adjusted eigenvalues > 1 indicate dimensions to retain.
(3 components retained)

4.8 Correlation, Descriptive statistics and Reliability estimates for the 5-Factors of the SDQ

Table 4.8, present the theoretical 5-factors of SDQ subscales inter-correlations, means, standard deviations (SD), Cronbach's Alpha and the Polychoric Ordinal Alpha.

The table shows that almost all the inter-correlations between the theoretical subscales are statistically (positively and negatively) correlated at $p<0.001$ except the correlations between (PSS and ESS) and (PSS and PPS). The mean of each subscales are about 3.0 except PSS subscale and their SD is approximately equal to 2.0.

Also, it shows the two reliability indices computed for each subscales; the Cronbach's Alpha index has show to deflate the reliability estimates when compared with the Polychoric Alpha estimates and the PSS is consistently high in both reliability indices. The Polychoric Alpha coefficients for the five subscales for the ESS, CPS, HAS, PPS, and PSS scales were 0.841, 0.803, 0.755, 0.680, and 0.857, respectively, indicating good reliability except the PPS subscale.

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Table 4.8: Factor Correlations, Means, Standard Deviations, and Reliabilities for the Subscales of 5-Factors of Strength and Difficulty Questionnaire (SDQ)

	ESS	CPS	HAS	PPS	M	SD	α	α_p
ESS					3.47	2.187	.643	.841
CPS	.788*				3.03	2.015	.568	.803
HAS	.917*	.904*			3.29	1.991	.527	.755
PPS	.858*	.889*	.799*		3.57	1.933	.429	.680
PSS	.089	-.217*	-.274*	-.125	6.52	2.278	.667	.857

Note: * significant correlations at the $p < .001$ level, α=Cronbach Alpha, α_p=Polychoric Ordinal Alpha

4.9 Correlation, Descriptive statistics and Reliability estimates for the 3-Factors of the SDQ

Table 4.9, present the hypothesized 3-components of SDQ subscales inter-correlations, means, standard deviations (SD), Cronbach's Alpha and the Polychoric Ordinal Alpha.

The table shows that two of the three inter-correlations between the hypothesized subscales are statistically (positively and negatively) correlated at $p<0.001$ except the correlation between component 1 and 3. The mean of each subscales are approximately between 3.0 and 10.0 with the first component having the highest mean of 9.84.

Also, it shows the two reliability indices computed for each subscales; the Cronbach's Alpha index has show to deflate the reliability estimates when compared with the Polychoric Alpha estimates and the first component is consistently high in both reliability indices. The Polychoric Alpha coefficients for the three subscales for the Component 1, Component 2 and Component 3 (PSS) scales were 0.978, 0.857 and 0.852, respectively, indicating good reliability.

Table 4.9 Component Correlations, Means, Standard Deviations, and Reliabilities for the Subscales of 3 Components Strength and Difficulty Questionnaire (SDQ)

	1	2	M	SD	α	α_p
1			9.87	5.419	.814	.978
2	.305*		6.52	2.278	.667	.857
3	.003	-.653*	3.48	2.176	.663	.852

Note: * significant correlations at the $p < .001$ level, α=Cronbach Alpha, α_p=Polychoric Ordinal Alpha

4.10 Descriptive Statistics of the (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL) items

Table 4.10, shows the descriptive statistics of the items on the (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL) and it revealed that most of the items has means of about 1.0, it also shows that the items has small to moderate Skewness and Kurtosis values ranging between -1.20 to +1.40 which implies that the items are slightly non-normal.

Table 4.10: Descriptive Statistics for the 24-items on the (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL) using Sample I

Items	Labels	Mean	SD	Skew	Kurtosis
QoL01	You feel that physical pain prevents you from doing what you need to do*	1.21	0.63	-0.20	-0.62
QoL05	You need some medical treatments to function in your daily life*	1.28	0.70	-0.44	-0.90
QoL09	You have enough energy for everyday life	1.21	0.69	-0.31	-0.89
QoL12	You are satisfied with your sleep	1.10	0.66	-0.11	-0.73
QoL15	You are able to get around well	1.06	0.65	-0.05	-0.63
QoL18	You are satisfied with your capacity to work	1.03	0.70	-0.04	-0.97
QoL22	You are satisfied with your ability to perform your daily living activities	1.08	0.72	-0.13	-1.07
QoL02	You do enjoy life	1.16	0.62	-0.12	-0.52
QoL04	You feel your life is meaningless	0.38	0.62	1.38	0.76
QoL10	You are able to concentrate	1.23	0.64	-0.24	-0.68
QoL13	You have negative feelings such as blue mood, despair, anxiety, depression*	1.40	0.64	-0.59	-0.62
QoL20	You are able to accept your bodily appearance	1.13	0.69	-0.17	-0.92
QoL24	You are satisfied with yourself	1.21	0.78	-0.38	-1.27
QoL03	You are satisfied with you with your personal relationships	1.17	0.69	-0.24	-0.93
QoL14	You are satisfied with the support you get from your friends	0.93	0.69	0.09	-0.90
QoL16	You are satisfied with your relationship with people of opposite sex	0.88	0.71	0.17	-1.03
QoL06	You feel safe in your daily life	1.17	0.71	-0.25	-1.00
QoL07	You live in a healthy physical environment	1.28	0.76	-0.51	-1.12
QoL08	You are satisfied with your access to health services	1.16	0.75	-0.27	-1.21
QoL11	You have enough money to meet your needs	0.82	0.68	0.24	-0.86
QoL17	You have available information that you need in your day-to-day life	0.97	0.70	0.04	-0.99
QoL19	You have enough opportunity for leisure activities	1.03	0.66	-0.03	-0.71
QoL21	You are satisfied with the condition of your living place	1.07	0.75	-0.12	-1.22
QoL23	You are satisfied with your transport	0.97	0.75	0.05	-1.21

Note: SD= Standard Deviation

* Negatively worded item

4.11 Factorability of 4-Factors of the (Adapted WHO-QOL BREF) Quality of Life Questionnaire

The pattern coefficients matrix of the theoretical 4-factors of SDQ presented in Table 11 which shows that not all the items correlated at least ± 0.3 with at least one other item and the items did not load on their theoretical factors, most of the Communalities (h^2) values were greater than 0.3 where some were as low as 0.134 which show that the amount of common variance shared by this items with other items were very small. Also, the table shows that the Kaiser-Mayer-Oklin measure of sample adequacy was 0.934 which was above the recommended value of 0.70, and Bartlett's test of Sphericity was significant (χ^2 (276) =6142.006, $p<0.0001$) suggesting the inclusion of each items in the Exploratory Factor Analysis (EFA).

Principal Axis Factoring was used as the method of extraction with an Oblique rotation as it is expected that the factors are to be correlated fixing the number of factors to be extracted to four (4) based on the underlying theory of 4-factors as designed by WHO (1991). The initial eigen values showed that the first factor explained 28.71% of the variance, the second factor explained 7.38% of the variance, the third explained 4.88% of the variance and the fourth factor explained 4.40% of the variance. This extraction further revealed that most of the items did not load on their theoretical factors.

4.11 Factorability of 4-Factors of the (Adapted WHO-QOL BREF) Quality of Life Questionnaire

The pattern coefficients matrix of the theoretical 4-factors of SDQ presented in Table 11 which shows that not all the items correlated at least ± 0.3 with at least one other item and the items did not load on their theoretical factors, most of the Communalities (h^2) values were greater than 0.3 where some were as low as 0.134 which show that the amount of common variance shared by this items with other items were very small. Also, the table shows that the Kaiser-Mayer-Oklin measure of sample adequacy was 0.934 which was above the recommended value of 0.70, and Bartlett's test of Sphericity was significant (χ^2 (276) =6142.006, $p<0.0001$) suggesting the inclusion of each items in the Exploratory Factor Analysis (EFA).

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Table 4.11: Communality, Rotated Factor Pattern Matrix of the (Adapted WHO-QOL BREF) Quality of Life Questionnaire

Items	Label	Factor				
		PHD	PSD	SRD	END	h^2
QoL01	You feel that physical pain prevents you from doing what you need to do*	-.013	**.562**	.063	.097	.335
QoL05	You need some medical treatments to function in your daily life*	.008	**.484**	.049	-.036	.237
QoL09	You have enough energy for everyday life	.038	-.032	-.035	**-.657**	.480
QoL12	You are satisfied with your sleep	-.028	.044	.116	**-.540**	.268
QoL15	You are able to get around well	**.340**	-.093	-.263	-.150	.365
QoL18	You are satisfied with your capacity to work	**.435**	-.018	.028	-.246	.401
QoL22	You are satisfied with your ability to perform your daily living activities	**.645**	.028	.008	-.072	.482
QoL02	You do enjoy life	.035	-.051	-.136	**-.457**	.278
QoL04	You feel your life is meaningless	-.018	**-.468**	**.309**	-.069	.307
QoL10	You are able to concentrate	.130	.042	-.122	-.327	.223
QoL13	You have negative feelings such as blue mood, despair, anxiety, depression*	-.027	**.392**	.016	-.073	.161
QoL20	You are able to accept your bodily appearance	**.424**	-.041	-.295	.012	.338
QoL24	You are satisfied with yourself	**.671**	.155	-.052	-.022	.490
QoL03	You are satisfied with you with your personal relationships	.198	.100	.029	-.252	.176
QoL14	You are satisfied with the support you get from your friends	**.569**	-.068	.064	-.048	.363
QoL16	You are satisfied with your relationship with people of opposite sex	**.390**	-.087	-.004	.073	.134
QoL06	You feel safe in your daily life	.040	-.080	**-.453**	**-.433**	.501
QoL07	You live in a healthy physical environment	.154	.041	-.188	**-.466**	.427
QoL08	You are satisfied with your access to health services	.130	.028	.019	**-.546**	.416
QoL11	You have enough money to meet your needs	.222	-.124	.144	**-.432**	.380
QoL17	You have available information that you need in your day-to-day life	**.386**	-.112	-.095	-.147	.314
QoL19	You have enough opportunity for leisure activities	**.420**	-.062	-.122	-.097	.306
QoL21	You are satisfied with the condition of your living place	**.574**	.133	.052	-.123	.428
QoL23	You are satisfied with your transport	**.628**	.058	.097	-.078	.437
	Eigenvalues	6.890	1.771	1.172	1.055	
	% Variance Explained	28.708	7.381	4.883	4.397	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.934		
	χ^2	df	$p-value$
Bartlett's Test of Sphericity	6142.006	276	<0. 0001

Extraction Method: Principal Axis Factoring.
Rotation Method: Oblimin with Kaiser Normalization.

Pattern matrix coefficients with values of .30 or greater highlighted

* Negatively worded item

4.12 Factorability of 2-Components of the (Adapted WHO-QOL BREF) Quality of Life Questionnaire

The four, three, two and one component solutions were examined, using Principal Axis Factoring extraction method with an Oblimin rotation of the factor loading matrix. The two (2) components solution was preferred explaining 36.09% of the variance.

Table 4.12, presents the pattern coefficients matrix of the hypothesized 2-Components of (Adapted WHO-QOL BREF) Quality of Life Questionnaire, it shows that all the items were significantly correlated above the recommended value of at least ± 0.3 with at least one other item and none of the items loading on the theoretical factors was retained, coefficients with absolute values less than 0.3 were omitted. The negative correlation coefficient on item QoL04 (You feel your life is meaningless) in the second component implies that the question is negatively worded. Most of the Communalities (h^2) values were greater than 0.3 where few were as low as 0.115 which show that the amount of common variance shared by these items with other items was very small.

This extraction further revealed that twenty (20) items loaded on the first component which consist most of the items in the theoretical Physical Health Domain (PHD), Psychological Domain (PSD), Social Relationship Domain (SRD), and Environmental Domain (END) and the remaining four (4) items loaded on the second component.

Table 4.12: Communality, Rotated Factor Pattern Matrix of the Adapted WHO Quality of Life-BREF Questionnaire

Items	Label	Component 1	Component 2	h^2
QoL09	You have enough energy for everyday life	.639		.407
QoL12	You are satisfied with your sleep	.415		.178
QoL15	You are able to get around well	.551		.319
QoL18	You are satisfied with your capacity to work	.626		.394
QoL22	You are satisfied with your ability to perform your daily living activities	.670		.451
QoL02	You do enjoy life	.496		.246
QoL10	You are able to concentrate	.462		.214
QoL20	You are able to accept your bodily appearance	.491		.249
QoL24	You are satisfied with yourself	.665		.444
QoL03	You are satisfied with you with your personal relationships	.403		.170
QoL14	You are satisfied with the support you get from your friends	.560		.331
QoL16	You are satisfied with your relationship with people of opposite sex	.307		.115
QoL06	You feel safe in your daily life	.580		.339
QoL07	You live in a healthy physical environment	.632		.401
QoL08	You are satisfied with your access to health services	.608		.370
QoL11	You have enough money to meet your needs	.549		.314
QoL17	You have available information that you need in your day-to-day life	.537		.311
QoL19	You have enough opportunity for leisure activities	.531		.294
QoL21	You are satisfied with the condition of your living place	.630		.400
QoL23	You are satisfied with your transport	.625		.391
QoL01	You feel that physical pain prevents you from doing what you need to do*		.560	.341
QoL05	You need some medical treatments to function in your daily life*		.492	.242
QoL04	You feel your life is meaningless		-.410	.168
QoL13	You have negative feelings such as blue mood, despair, anxiety, depression*		.408	.166
	Eigenvalues	6.890	1.771	
	% Variance Explained	28.708	7.381	

Extraction Method: Principal Axis Factoring.
Rotation Method: Oblimin with Kaiser Normalization.

Pattern matrix coefficients with values of .30 or greater highlighted

* Negatively worded item

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	% Variance Explained	28.708	7.381	

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Rotation Method: Oblimin with Kaiser Normalization.
Pattern matrix coefficients with values of .30 or greater highlighted
* Negatively worded item

4.12 Factor Selection Using Scree Plot

In Figure 4.3, is the scree plot, a plot of the eigenvalues along an x-y axis. The point at which the curve decreases and straightens out after the elbow of the graph indicate the number of factors to be retained before and at the elbow. In this plot it appears there are two elbows but two (2) factors were extracted in the EFA.

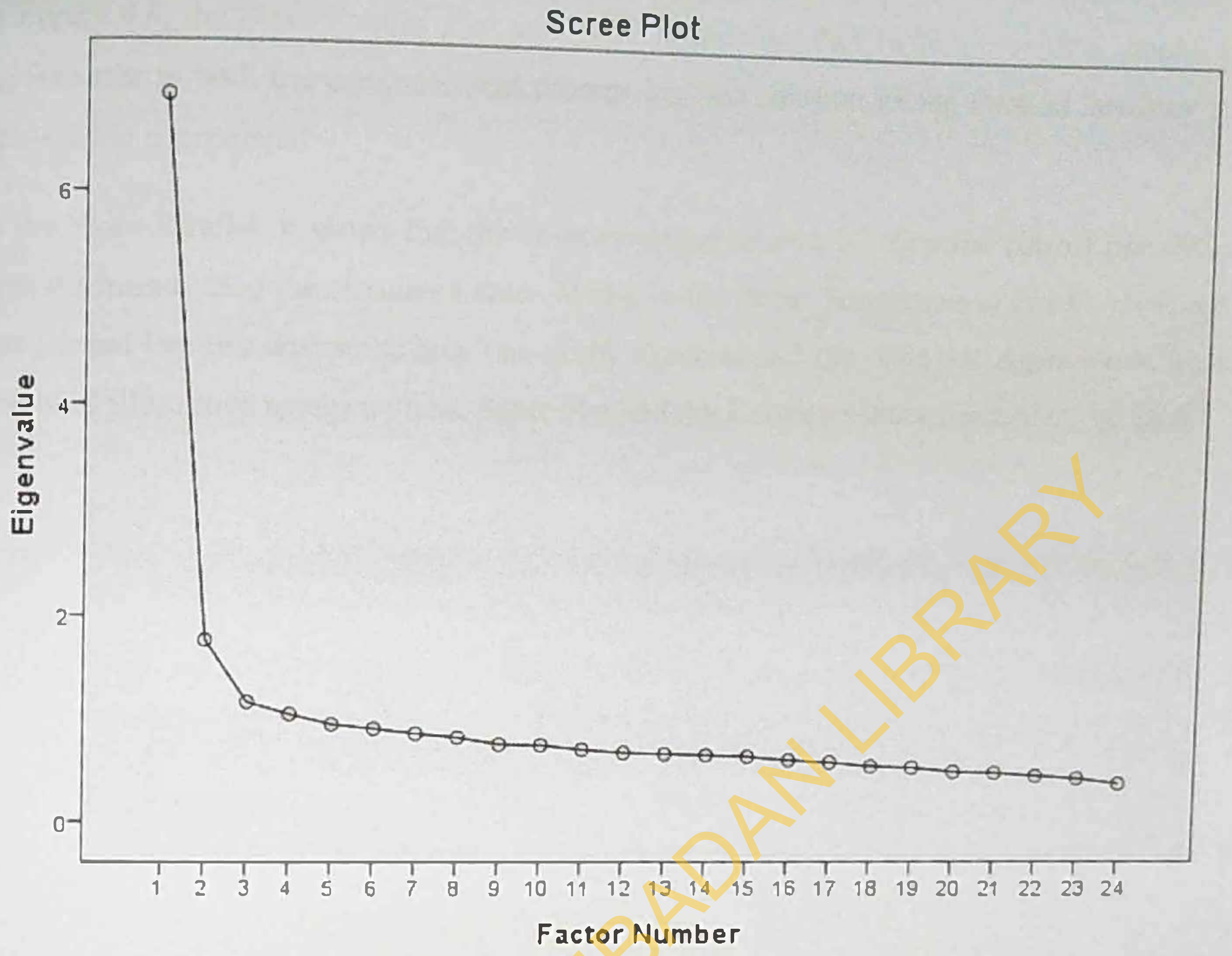

Figure 4.3: Factor Retention Using a Scree Plot.

4.14 Component Retention Using Parallel Analysis

In Figure 4.4, the Scree Parallel Plot and Scree Simulation Plot (which provide a graphical equivalence to both the computational process and the solution of the Parallel Analysis in Table 4.14) is presented.

In the Scree Parallel, it shows that the observed eigenvalues are below the cut-off line (blue line) estimated using the simulated data. While in the Scree Simulation, it can be observed that the red line lies within the blue line of the expected and the observed eigenvalues. This graphical illustration agrees with the Scree Plot and the 2-components extracted in the EFA.

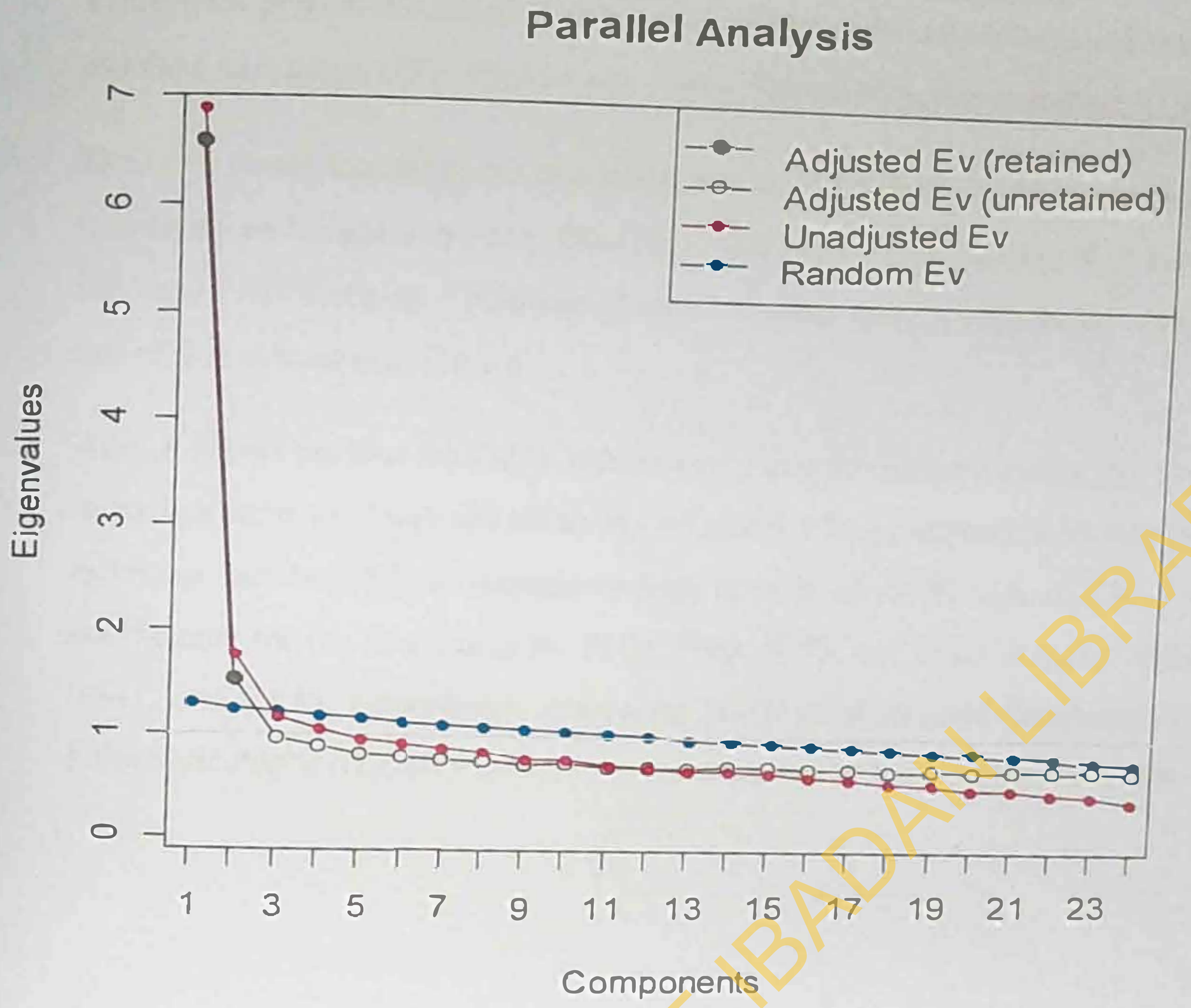

Figure 4.4: Scree Parallel Plot and Scree Simulation Plot

Table 4.14: Results of Horn's Parallel Analysis for component retention

Component	Adjusted Eigenvalue	Unadjusted Eigenvalue	Estimated Bias
1	6.598	6.89	0.292
2	1.524	1.771	0.248

Adjusted eigenvalues > 1 indicate dimensions to retain.
(2 components retained)

4.15 Correlation, Descriptive statistics and Reliability estimates for the 4-Factors of the (Adapted WHO-QOL BREF) Quality of Life Questionnaire

Table 4.15, present the theoretical 4-factors of QoL subscales inter-correlations, means, standard deviations (SD), Cronbach's Alpha and the Polychoric Ordinal Alpha.

The table shows that all the inter-correlations between the theoretical domains are statistically (positively and negatively) correlated at $p<0.001$ and there exist a perfect correlation between PSD and PHD domains. The mean of each subscales were approximately greater than 3.0 and their SD is at least equal to 1.5.

Also, it shows the two reliability indices computed for each subscales: the Cronbach's Alpha index has show to shrink the reliability estimates when compared with the Polychoric Alpha estimates and the END is consistently high in both reliability indices. The Polychoric Alpha coefficients for the four domains; PHD, PSD, SRD, and END domains were 0.829, 0.601, 0.641, and 0.945, respectively, indicating fairly good to good reliability. The fairly good Polychoric Alpha reliability estimates were worst under the Cronbach's Alpha index.

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Table 4.15: Factor Correlations, Means, Standard Deviations, and Reliabilities for the Domains of 4 Factors (Adapted WHO-BREF) Quality of Life Questionnaire

	PHD	PSD	SRD	M	SD	α	α_p
PHD				7.98	2.493	.561	.829
PSD	-1.000*			6.51	1.954	.358	.601
SRD	-.864*	.886*		2.99	1.464	.475	.641
END	-.1.000*	1.000*	.860*	8.46	3.766	.807	.954

Note: * significant correlations at the $p < .001$ level, α=Cronbach Alpha, α_p=Polychoric Ordinal Alpha

4.16 Correlation, Descriptive statistics and Reliability estimates for the 2-Components of the (Adapted WHO-QOL BREF) Quality of Life Questionnaire

Table 4.16, present the hypothesized 2-components of QoL domains inter-correlations, means, standard deviations (SD), Cronbach's Alpha and the Polychoric Ordinal Alpha.

The table shows that the inter-correlation between the two hypothesized domains is negatively statistically correlated at $p<0.001$. The mean and standard deviation of the domains are 21.66± 8.16 and 3.89±1.38 with the first component having a very high mean due to the number of items that loaded on it.

Also, it shows the two reliability indices computed for each subscales; the Cronbach's Alpha index has show to shrink the reliability estimates when compared with the Polychoric Alpha estimates and the first component is consistently high in both reliability indices. The Polychoric Alpha coefficients for the two domains; Component 1, Component 2 are 0.991 and 0.084 respectively, indicating good and very poor reliabilities. However, when the item (You feel your life is meaningless) with the negative factor loading and negative item total correlation was dropped the Polychoric Alpha coefficients for the two domains are 0.991 and 0.732 respectively raised substantially showing a considerable rise in internal consistency of the adopted WHO-QOL BREF Quality of Life Questionnaire.

Table 4.16: Factor Correlations, Means, Standard Deviations, and Reliabilities for the Domains of 4 Factors (Adapted WHO-BREF) Quality of Life Questionnaire

	1	M	SD	α	α_p	α	α_p
1		21.66	8.156	.897	.991	.897	.991
2	-.177*	3.89	1.383	.095	.084	.486	.732

Note: * significant correlations at the p < .001 level, α=Cronbach Alpha, α_p=Polychoric Ordinal Alpha

*The yellow mark indicate index value before dropping the QoL04

Table 4.16: Factor Correlations, Means, Standard Deviations, and Reliabilities for the Domains of 4 Factors (Adapted WHO-BREF) Quality of Life Questionnaire

	1	M	SD	α	α_p	α	α_p
1		21.66	8.156	.897	.991	.897	.991
2	-.177*	3.89	1.383	.095	.084	.486	.732

Note: * significant correlations at the p < .001 level, α=Cronbach Alpha, α_p=Polychoric Ordinal Alpha

*The yellow mark indicate index value before dropping the QoL04

4.17 STUDY II: Confirmatory Factor Analysis (CFA) and Structural Equation Modelling (SEM)

The purpose of study II was to confirm the theoretical and the hypothesized factors of the two instruments used in this study using CFA. The resulting models from CFA were then modelled together with the independent sample using SEM.

Table 4.17 shows the descriptive statistics of the items on the Strength and Difficulty Questionnaire (SDQ). Most items have means less than 1.0 except items loading on the Prosocial scale. Also, items have small to moderate estimates of Skewness and Kurtosis (values ranging between -1.09 to +1.33), implying that the items are slightly non-normal.

Table 4.17: Descriptive Statistics for the 25-items on the Strength and Difficulty Questionnaire (SDQ) using Sample II

Items	Labels	Mean	SD	Skew	Kurtosis
SDQ03	I get a lot of headaches, stomach-aches or sickness	0.60	0.69	0.72	-0.67
SDQ08	I worry a lot	0.78	0.71	0.34	-0.98
SDQ13	I am often unhappy down-hearted, or tearful	0.60	0.68	0.70	-0.65
SDQ16	Am nervous in new situations. I easily lose confidence	0.82	0.73	0.29	-1.09
SDQ24	I have many fears, I am easily scared	0.84	0.72	0.24	-1.04
SDQ05	I get very angry and often lose my temper	0.84	0.72	0.25	-1.06
SDQ07	I usually do as I am told*	0.73	0.65	0.32	-0.72
SDQ12	I fight a lot. I can make other people do what I want	0.41	0.65	1.33	0.50
SDQ18	I am often accused of lying and cheating	0.63	0.74	0.70	-0.87
SDQ22	I take things that are not mine from home, school or elsewhere	0.48	0.69	1.09	-0.14
SDQ02	I am restless, I can not stay still for long	0.70	0.73	0.53	-0.99
SDQ10	I am constantly fidgeting or squirming	0.67	0.70	0.55	-0.85
SDQ15	I am easily distracted, I find it difficult to concentrate	0.78	0.68	0.32	-0.87
SDQ21	I think before i do things*	0.64	0.71	0.64	-0.83
SDQ25	I finish the work am doing. My attention is good*	0.62	0.65	0.56	-0.67
SDQ06	I am usually on my own. I generally play alone or keep to myself	0.70	0.71	0.50	-0.93
SDQ11	I have one good friend or more*	0.68	0.71	0.56	-0.88
SDQ14	Other people of my age generally like me*	0.72	0.68	0.41	-0.85
SDQ19	Other children or young people pick on me or bully me	0.65	0.71	0.62	-0.85
SDQ23	I get on better with adults than with people my own age	0.88	0.72	0.18	-1.06
SDQ01	I try to be nice to people. I care about their feelings	1.41	0.64	-0.61	-0.60
SDQ04	I usually share with others (food, games, pens etc)	1.32	0.69	-0.52	-0.84
SDQ09	I am helpful if someone is hurt, upset or feeling ill	1.24	0.70	-0.38	-0.94
SDQ17	I am kind to younger children	1.40	0.70	-0.75	-0.68
SDQ20	I often volunteer to help others (parents, teachers, children)	1.29	0.72	-0.49	-0.97

Note: SD= Standard Deviation

* Negatively worded item

Table 4.17: Descriptive Statistics for the 25-items on the Strength and Difficulty Questionnaire (SDQ) using Sample II

Items	Labels	Mean	SD	Skew	Kurtosis
SDQ03	I get a lot of headaches, stomach-aches or sickness	0.60	0.69	0.72	-0.67
SDQ08	I worry a lot	0.78	0.71	0.34	-0.98
SDQ13	I am often unhappy down-hearted, or tearful	0.60	0.68	0.70	-0.65
SDQ16	Am nervous in new situations. I easily lose confidence	0.82	0.73	0.29	-1.09
SDQ24	I have many fears, I am easily scared	0.84	0.72	0.24	-1.04
SDQ05	I get very angry and often lose my temper	0.84	0.72	0.25	-1.06
SDQ07	I usually do as I am told*	0.73	0.65	0.32	-0.72
SDQ12	I fight a lot. I can make other people do what I want	0.41	0.65	1.33	0.50
SDQ18	I am often accused of lying and cheating	0.63	0.74	0.70	-0.87
SDQ22	I take things that are not mine from home, school or elsewhere	0.48	0.69	1.09	-0.14
SDQ02	I am restless, I can not stay still for long	0.70	0.73	0.53	-0.99
SDQ10	I am constantly fidgeting or squirming	0.67	0.70	0.55	-0.85
SDQ15	I am easily distracted, I find it difficultto concentrate	0.78	0.68	0.32	-0.87
SDQ21	I think before i do things*	0.64	0.71	0.64	-0.83
SDQ25	I finish the work am doing. My attention is good*	0.62	0.65	0.56	-0.67
SDQ06	I am usually on my own. I generally play alone or keep to myself	0.70	0.71	0.50	-0.93
SDQ11	I have one good friend or more*	0.68	0.71	0.56	-0.88
SDQ14	Other people of my age generally like me*	0.72	0.68	0.41	-0.85
SDQ19	Other children or young people pick on me or bully me	0.65	0.71	0.62	-0.85
SDQ23	I get on better with adults than with people my own age	0.88	0.72	0.18	-1.06
SDQ01	I try to be nice to people. I care about their feelings	1.41	0.64	-0.61	-0.60
SDQ04	I usually share with others (food, games, pens etc)	1.32	0.69	-0.52	-0.84
SDQ09	I am helpful if someone is hurt, upset or feeling ill	1.24	0.70	-0.38	-0.94
SDQ17	I am kind to younger children	1.40	0.70	-0.75	-0.68
SDQ20	I often volunteer to help others (parents, teachers, children)	1.29	0.72	-0.49	-0.97

Note: SD= Standard Deviation

* Negatively worded item

4.18 Descriptive Statistics of the (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL) items

Table 4.18, shows the descriptive statistics of the items on the (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL) and it revealed that most of the items has means of about 1.0, it also shows that the items has small to moderate Skewness and Kurtosis values ranging between -1.13 to +1.21 which implies that the items are slightly non-normal.

Table 4.18: Descriptive Statistics for the 24-items on the (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL) using Sample II

Items	Labels	Mean	SD	Skew	Kurtosis
QoL01	You feel that physical pain prevents you from doing what you need to do*	1.21	0.64	-0.22	-0.67
QoL05	You need some medical treatments to function in your daily life*	1.21	0.73	-0.35	-1.08
QoL09	You have enough energy for everyday life	1.21	0.69	-0.29	-0.90
QoL12	You are satisfied with your sleep	1.14	0.65	-0.15	-0.71
QoL15	You are able to get around well	1.09	0.64	-0.08	-0.60
QoL18	You are satisfied with your capacity to work	1.08	0.71	-0.11	-1.02
QoL22	You are satisfied with your ability to perform your daily living activities	1.16	0.72	-0.24	-1.04
QoL02	You do enjoy life	1.17	0.61	-0.11	-0.47
QoL04	You feel your life is meaningless	0.45	0.67	1.21	0.16
QoL10	You are able to concentrate	1.24	0.64	-0.27	-0.70
QoL13	You have negative feelings such as blue mood, despair, anxiety, depression*	1.38	0.65	-0.58	-0.66
QoL20	You are able to accept your bodily appearance	1.17	0.71	-0.25	-0.99
QoL24	You are satisfied with yourself	1.26	0.74	-0.46	-1.07
QoL03	You are satisfied with you with your personal relationships	1.13	0.71	-0.18	-0.99
QoL14	You are satisfied with the support you get from your friends	0.99	0.69	0.02	-0.88
QoL16	You are satisfied with your relationship with people of opposite sex	0.95	0.73	0.07	-1.13
QoL06	You feel safe in your daily life	1.17	0.70	-0.26	-0.97
QoL07	You live in a healthy physical environment	1.29	0.76	-0.54	-1.08
QoL08	You are satisfied with your access to health services	1.12	0.73	-0.18	-1.13
QoL11	You have enough money to meet your needs	0.77	0.70	0.35	-0.95
QoL17	You have available information that you need in your day-to-day life	1.01	0.68	-0.01	-0.87
QoL19	You have enough opportunity for leisure activities	1.08	0.65	-0.08	-0.68
QoL21	You are satisfied with the condition of your living place	1.11	0.74	-0.19	-1.16
QoL23	You are satisfied with your transport	1.02	0.74	-0.03	-1.17

Note: SD= Standard Deviation
* Negatively worded item

4.19 Factor loading fitting chart of the theoretical 5-Factor Strength and Difficulty Questionnaire (SIX)

The estimated path diagram with the standardized path coefficients, as well as the coefficients between the latent variables for the theoretical 5-factor Strength and Difficulty Questionnaire (SIX) Model A1 as presented in Figure 4.5. The Standardized error terms of each indicator variables are not reported because the solution was not admissible, an indication that there are some variance estimates that are negative. This suggests that the model does not provide a good fit to the independent dataset.

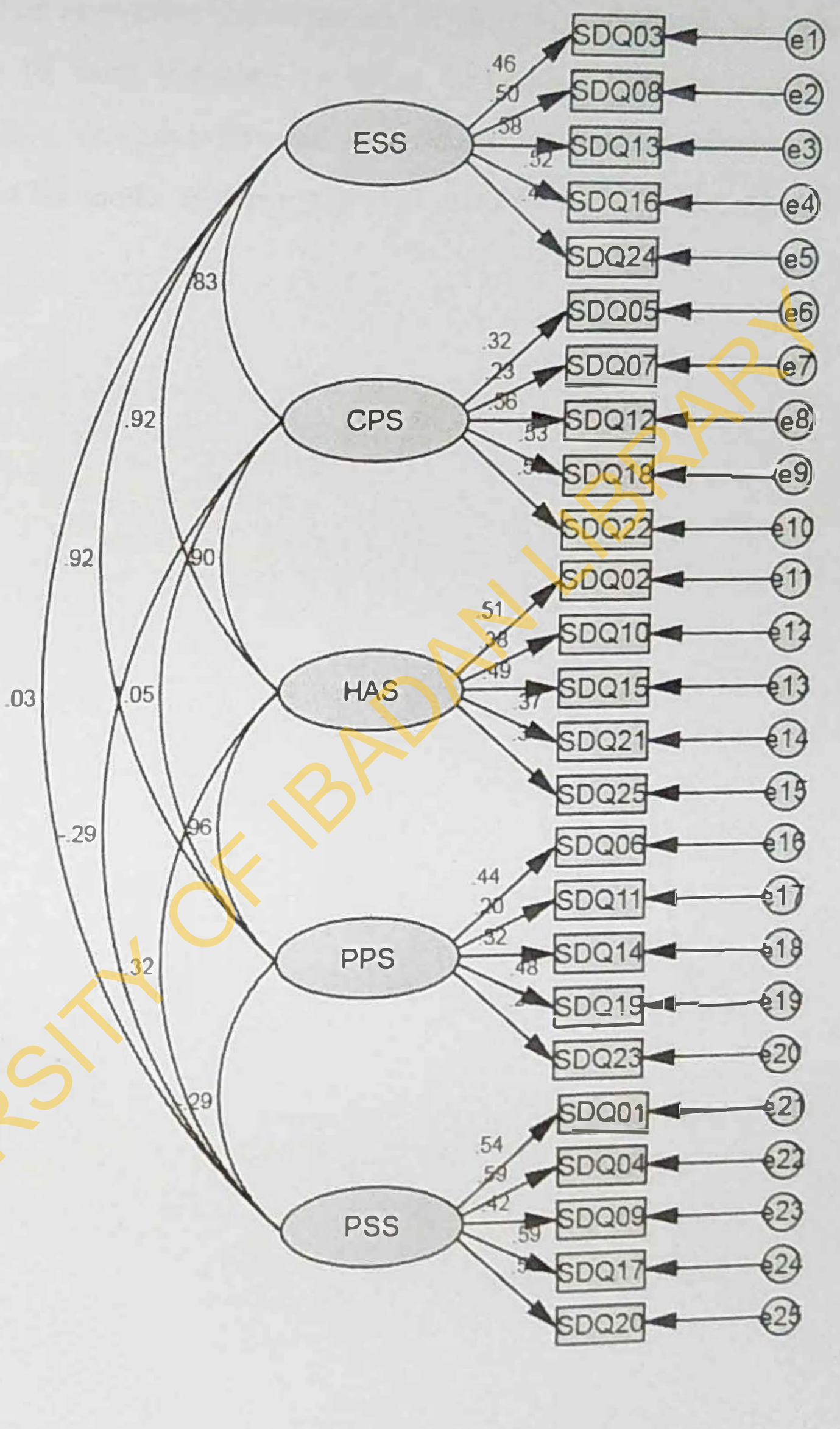

Figure 4.5: Model A1: Standardized estimates for the 5-factors, 25-items Strength and Difficulty Questionnaire (SDQ)

4.20 CFA Parameter Estimates of the theoretical 5-Factor Strength and Difficulty Questionnaire (SDQ)

The values of the standardized coefficient of factor loading, the associated standard error and z-value of each indicator variable are presented in Table 4.20. All the indicator variables were significantly related to their respective latent factors at 1% level of significant, except the standardized error terms of each indicator variables which are unreported because the solution was not admissible, an indication that there is some variance estimates that are negative, an indication that the model does not provide a good fit to the independent dataset.

Table 4.20: CFA Parameter Estimates, standard error estimates (S.E), Z-values and P-values

			Estimate	S.E.	Z-value	P-value
SDQ03	<---	ESS	1.000			
SDQ08	<---	ESS	1.114	0.106	10.492	<0.001
SDQ13	<---	ESS	1.234	0.109	11.301	<0.001
SDQ16	<---	ESS	1.200	0.112	10.759	<0.001
SDQ24	<---	ESS	1.015	0.103	9.869	<0.001
SDQ05	<---	CPS	1.000			
SDQ07	<---	CPS	0.659	0.122	5.413	<0.001
SDQ12	<---	CPS	1.601	0.194	8.253	<0.001
SDQ18	<---	CPS	1.706	0.210	8.115	<0.001
SDQ22	<---	CPS	1.644	0.201	8.185	<0.001
SDQ02	<---	HAS	1.000			
SDQ10	<---	HAS	0.714	0.075	9.460	<0.001
SDQ15	<---	HAS	0.894	0.079	11.325	<0.001
SDQ21	<---	HAS	0.698	0.076	9.155	<0.001
SDQ25	<---	HAS	0.580	0.068	8.537	<0.001
SDQ06	<---	PPS	1.000			
SDQ11	<---	PPS	0.461	0.083	5.535	<0.001
SDQ14	<---	PPS	0.697	0.087	8.032	<0.001
SDQ19	<---	PPS	1.104	0.104	10.575	<0.001
SDQ23	<---	PPS	0.592	0.087	6.788	<0.001
SDQ01	<---	PSS	1.000			
SDQ04	<---	PSS	1.187	0.102	11.686	<0.001
SDQ09	<---	PSS	0.859	0.090	9.536	<0.001
SDQ17	<---	PSS	1.198	0.103	11.652	<0.001
SDQ20	<---	PSS	1.206	0.104	11.555	<0.001

Note: Level of significance is 1%
S.E= Standard Error

4.21 CFA Covariances among latent variables of the theoretical 5-Factor Strength and Difficulty Questionnaire (SDQ)

The covariance among the five (5) latent exogenous variables of the theoretical 5-Factor Strength and Difficulty Questionnaire (SDQ) are shown in Table 4.21. The Z-statistics shown are all greater than 1.65 which implies that the covariances are significantly different from zero at the 0.01 level, except the covariance between ESS and PSS with it Z-value=0.536. Also, the latent constructs are moderately and highly correlated between -0.29 and 0.96.

Table 4.21: CFA Covariance among latent variables of the theoretical 5-Factor Strength and Difficulty Questionnaire (SDQ)

			Estimate	S.E.	Z-value	P-value
ESS	<-->	CPS	0.06	0.009	7.061	<0.001
ESS	<-->	HAS	0.111	0.012	9.385	<0.001
ESS	<-->	PPS	0.092	0.011	8.743	<0.001
ESS	<-->	PSS	0.003	0.005	0.536	0.592
CPS	<-->	HAS	0.077	0.01	7.379	<0.001
CPS	<-->	PPS	0.075	0.01	7.273	<0.001
CPS	<-->	PSS	-0.023	0.005	-4.686	<0.001
HAS	<-->	PPS	0.113	0.012	9.209	<0.001
HAS	<-->	PSS	-0.042	0.008	-5.466	<0.001
PPS	<-->	PSS	-0.031	0.007	-4.517	<0.001

Note: Level of significance is 1%
S.E= Standard Error

4.22 Factor loading fitting chart of the hypothesized 3-Components Strength and Difficulty Questionnaire (SDQ)

The estimated path diagram with the standardized path coefficients, as well as the coefficients between the latent variables for the hypothesized 3-components Strength and Difficulty Questionnaire (SDQ) Model A2 as presented in Figure 4.6. The Standardized error terms of each indicator variables were also reported because the solution was admissible. This suggests that the model provide a good fit to the independent dataset.

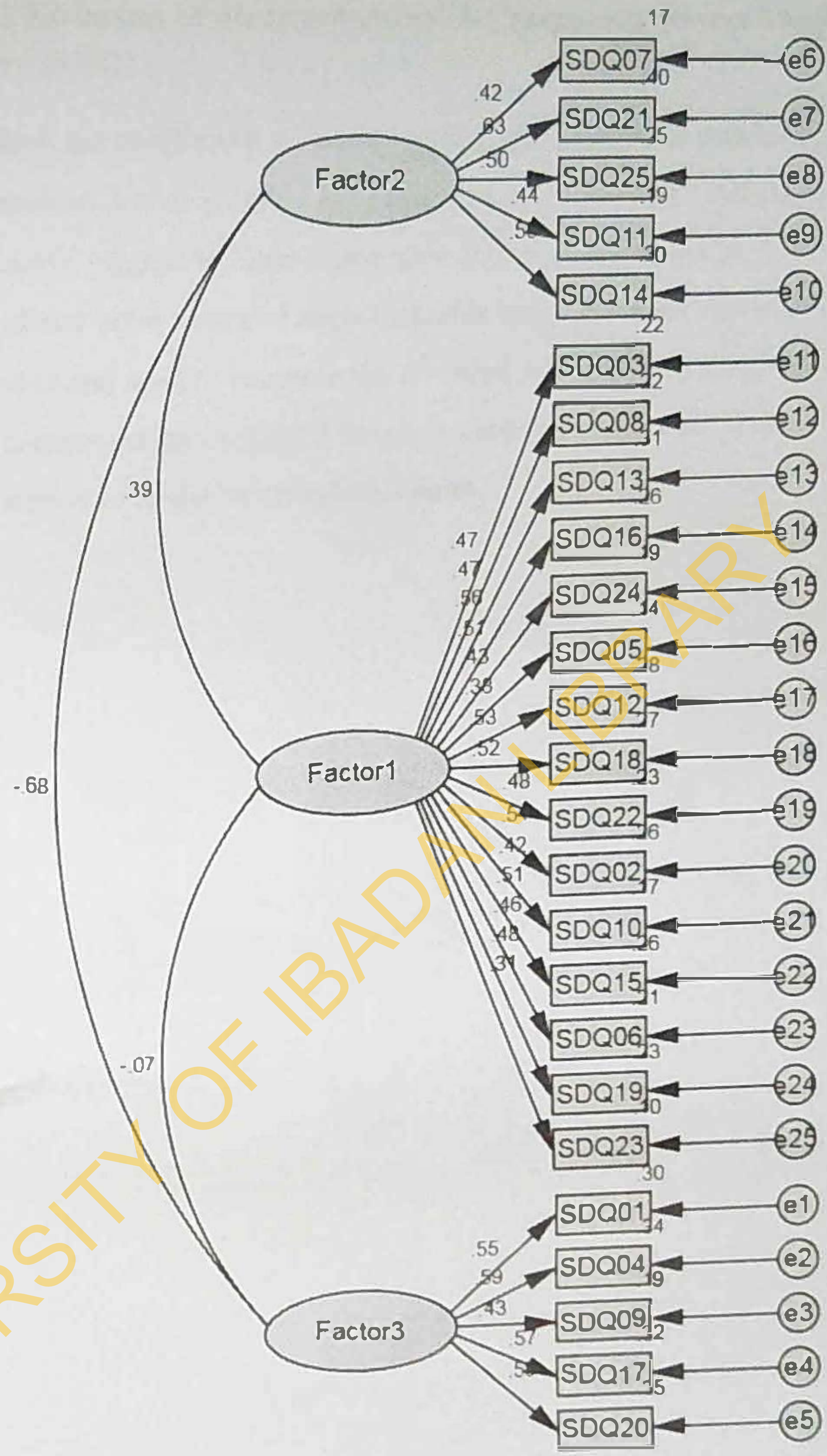

Figure 4.6: Model A2: Standardized estimates for the 3-factors, 20-items Strength and Difficulty Questionnaire (SDQ)

4.23 CFA Parameter Estimates of the hypothesized 3-Component Strength and Difficulty Questionnaire (SDQ)

The values of the standardized coefficient of factor loading, the associated standard error, Z-value and R^2 value of each indicator variable are presented in Table 4.23 . All the indicator variables were significantly related to their respective latent components at 1% level of significant. The standardized error terms of each indicator variables were reported because the solution was admissible and used to compute the R^2 value, indicates that the proportion of variation in the latent component as explained by each particular indicator. These indicate that the model provide a good fit to the independent dataset.

Table 4.23: CFA Parameter estimates, standard error estimates (S.E), and R^2 for each indicator variables in the hypothesized 3-components SDQ

Indicators Variable		Latent Variable	Estimate	S.E	P-value	R^2
SDQ01	<---	Factor3	1.000			0.91
SDQ04	<---	Factor3	1.158	0.095	<0.001	0.88
SDQ09	<---	Factor3	0.864	0.087	<0.001	0.96
SDQ17	<---	Factor3	1.143	0.096	<0.001	0.90
SDQ20	<---	Factor3	1.223	0.100	<0.001	0.88
SDQ07	<---	Factor2	1.000			0.97
SDQ21	<---	Factor2	1.678	0.166	<0.001	0.84
SDQ25	<---	Factor2	1.195	0.130	<0.001	0.94
SDQ11	<---	Factor2	1.157	0.134	<0.001	0.96
SDQ14	<---	Factor2	1.391	0.145	<0.001	0.91
SDQ03	<---	Factor1	1.000			0.95
SDQ08	<---	Factor1	1.030	0.098	<0.001	0.95
SDQ13	<---	Factor1	1.171	0.102	<0.001	0.90
SDQ16	<---	Factor1	1.151	0.105	<0.001	0.93
SDQ24	<---	Factor1	0.964	0.097	<0.001	0.96
SDQ05	<---	Factor1	0.847	0.093	<0.001	0.98
SDQ12	<---	Factor1	1.068	0.095	<0.001	0.92
SDQ18	<---	Factor1	1.179	0.107	<0.001	0.93
SDQ22	<---	Factor1	1.033	0.097	<0.001	0.95
SDQ02	<---	Factor1	1.167	0.106	<0.001	0.93
SDQ10	<---	Factor1	0.901	0.093	<0.001	0.97
SDQ15	<---	Factor1	1.083	0.098	<0.001	0.93
SDQ06	<---	Factor1	1.007	0.098	<0.001	0.96
SDQ19	<---	Factor1	1.059	0.100	<0.001	0.95
SDQ23	<---	Factor1	0.693	0.088	<0.001	0.99

Note: Level of significance is 1%
S.E= Standard Error

4.24 CFA Covariances among latent variables of the hypothesized 3-Components Strength and Difficulty Questionnaire (SDQ)

The covariance among the three (3) latent exogenous variables of the hypothesized 3-Components Strength and Difficulty Questionnaire (SDQ) are shown in Table 4.24. The absolute Z-statistics shown are all greater than 1.65 which implies that the covariances are significantly different from zero at the 0.01 level, except the covariance between Factor3 and Factor1 with it Z-value=1.593. The correlations between the latent constructs are -0.678, -0.069 and 0.391 which are moderately and highly correlated.

Table 4.24: CFA Covariance among latent variables of the hypothesized 3-Component Strength and Difficulty Questionnaire (SDQ)

			Estimate	S.E.	Z-valuc	P-valuc
Factor3	<-->	Factor2	-0.064	0.008	-8.101	<0.001
Factor3	<-->	Factor1	-0.008	0.005	-1.593	0.111
Factor2	<-->	Factor1	0.034	0.005	6.424	<0.001

Note: Level of significance is 1%

S.E= Standard Error

4.25 Summary of Fit Indices of the two Models from Confirmatory Factor Analyses of Strength and Difficulty Questionnaire (SDQ)

The Chi-square goodness-of-fit test of the two models were significant, which shown by there p-values in Table 4.24. This is indicative of the large differences between the observed and expected covariance matrices. However, the Chi-square indicator is highly dependent on sample size, so relative Chi-square χ^2 $(\chi^2/df < 3 = 2.67)$ which adjusted for sample size shows that Model A2 fits the independent dataset. The fit indices (GFI=0.941, AGFI=0929, CFI=0.885, NFI=0.830, TLI=0.874, and the RMSEA=0.041) and the information criteria (AIC=833.25 and CAIC=1145.45) confirmed that Model A2 fits the independent dataset better than Model A1 (Table 4.19).

Table 4.25: Summary of Fit Indices from Confirmatory Factor Analyses of Strength and Difficulty Questionnaire (SDQ)

	Models	
Fit Indices	**Model A1**	**Model A2**
χ^2	1210.58*	727.25*
df	265	272
CGF	4.57	2.67
RMR	0.035	0.023
GFI	0.89	0.941
AGFI	0.865	0.929
PGFI	0.725	0.787
NFI	0.717	0.83
RFI	0.679	0.812
IFI	0.764	0.886
TLI	0.73	0.874
CFI	0.762	0.885
PRATIO	0.883	0.907
PNFI	0.633	0.752
PCFI	0.673	0.803
NCP	945.58	455.25
RMSEA	0.06	0.041
AIC	1330.58	833.25
BIC	1624.02	1092.45
CAIC	1684.02	1145.45

Note: x^2 =Chi-square statistics; df=degree of freedom; CGF=Chi-square Goodness-of-Fit; RMR=Root mean square residual; GFI=Goodness-of-Fit index; AGFI= Adjusted Goodness-of-Fit index; PGFI=Parsimony Goodness-of-Fit Index; NFI=Normed-fit index; RFI=Relative fit index; IFI=Incremental fit indices; TLI=Tucker-Lewis index; CFI=Comparative fit index; PRATIO=Parsimony ratio; PNFI=Parsimonious Normed-fit index; PCFI= Parsimonious Comparative fit index; NPC=Noncentrality parameter; RMSEA=; AIC=Akaike's information criterion; BCC=Browne-Cudeck criterion; BIC=Bayesian information criterion; CAIC=Consistent AIC

*Significant at 1% level of significance

4.26 Factor loading fitting chart of the theoretical 4-Factor (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL)

The path diagram for the theoretical 4-factor (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL) Model B1 as presented in Figure 4.7 without the estimated standardized path coefficients, as well as the coefficients between the latent variables unreported. Also, the Standardized error terms of each indicator variables are not reported because the solution was not admissible, an indication that there is some variance estimates that are negative. This suggests that the model poorly fit the independent dataset.

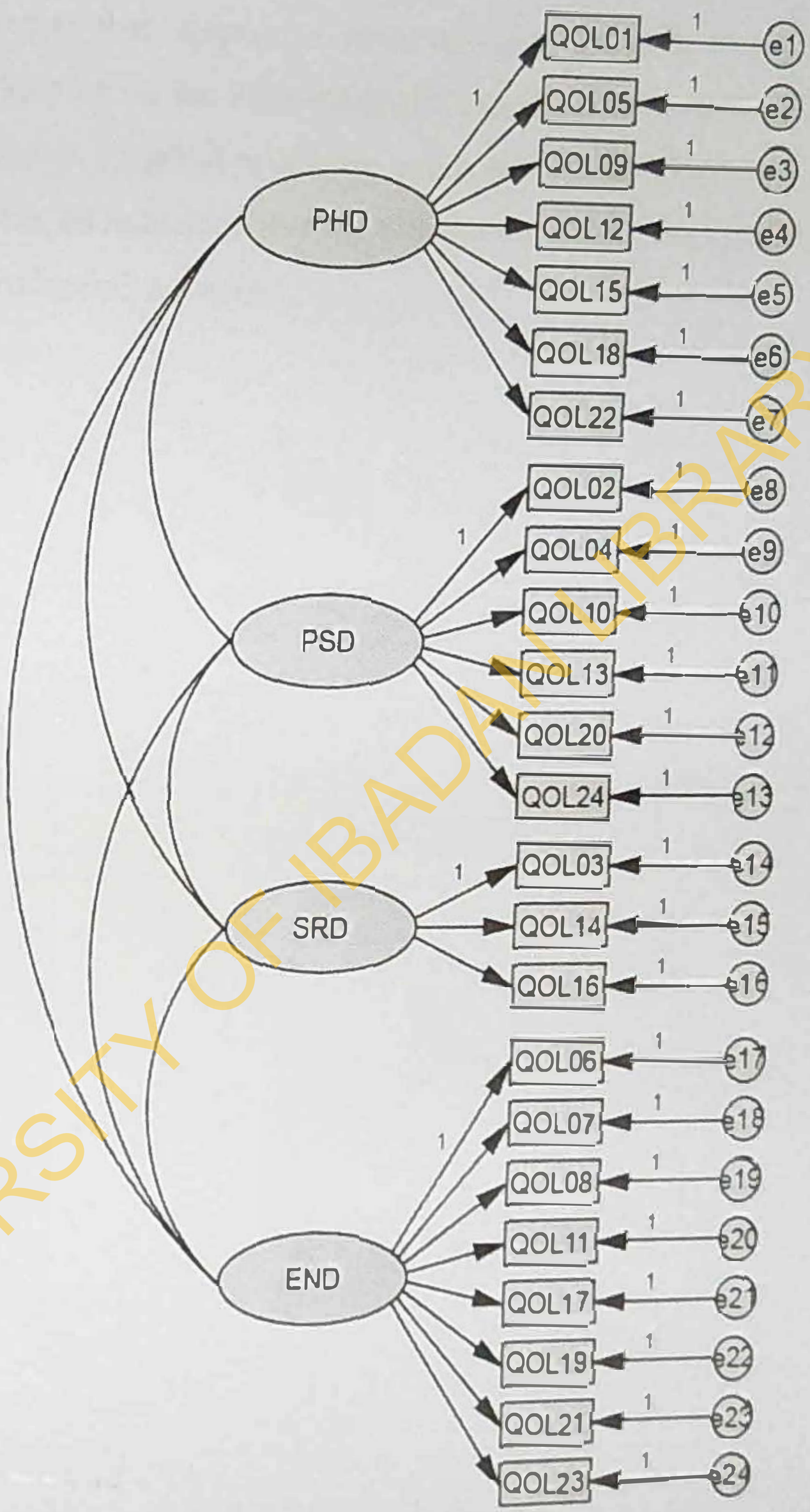

Figure 4.7. Model B1: Standardized estimates for the 4-factors, 24-items (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL)

4.27 CFA Parameter Estimates of the theoretical 4-Factor (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL)

The values of the standardized coefficient of factor loading, the associated standard error and Z-value of each indicator variable are presented in Table 4.27. All the indicator variables were significantly related to their respective latent factors at 1% level of significant, except the indicator variables loading on the Physical health Domain (PHD). Also, the standardized error terms of each indicator variables which are unreported because the minimization of the solution was unsuccessful, an indication that the estimates are therefore incorrect and that the model poorly fit to the independent dataset.

Table 4.27: CFA Parameter Estimates, Standard error estimates (S.E), Z-values and P-values

Indicators Variable		Latent Variable	Estimate	S.E.	Z-value	P-value
QOL01	<---	PHD	1.000			
QOL05	<---	PHD	99.356	2322.784	0.043	0.966
QOL09	<---	PHD	419.224	9800.188	0.043	0.966
QOL12	<---	PHD	308.651	7215.351	0.043	0.966
QOL15	<---	PHD	327.049	7645.426	0.043	0.966
QOL18	<---	PHD	442.940	10354.603	0.043	0.966
QOL22	<---	PHD	502.491	11746.722	0.043	0.966
QOL02	<---	PSD	1.000			
QOL04	<---	PSD	-0.278	0.107	-2.594	0.009
QOL10	<---	PSD	1.274	0.146	8.737	<0.001
QOL13	<---	PSD	0.331	0.106	3.135	0.002
QOL20	<---	PSD	1.724	0.181	9.535	<0.001
QOL24	<---	PSD	2.174	0.215	10.127	<0.001
QOL03	<---	SRD	1.000			
QOL14	<---	SRD	1.404	0.133	10.550	<0.001
QOL16	<---	SRD	0.824	0.108	7.645	<0.001
QOL06	<---	END	1.000			
QOL07	<---	END	1.394	0.118	11.819	<0.001
QOL08	<---	END	1.401	0.116	12.026	<0.001
QOL11	<---	END	1.229	0.107	11.520	<0.001
QOL17	<---	END	1.111	0.100	11.068	<0.001
QOL19	<---	END	0.985	0.093	10.597	<0.001
QOL21	<---	END	1.397	0.117	11.962	<0.001
QOL23	<---	END	1.407	0.117	12.015	<0.001

*S.E.=Standard Error

4.28 Factor loading fitting chart of the hypothesized 2-Components (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL)

The estimated path diagram with the standardized path coefficients, as well as the coefficients between the latent variables for the hypothesized 2-components (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL) Model B2 as presented in Figure 4.8. The Standardized error terms of each indicator variables were also reported because the solution was admissible. This suggests that the model provide a good fit to the independent dataset.

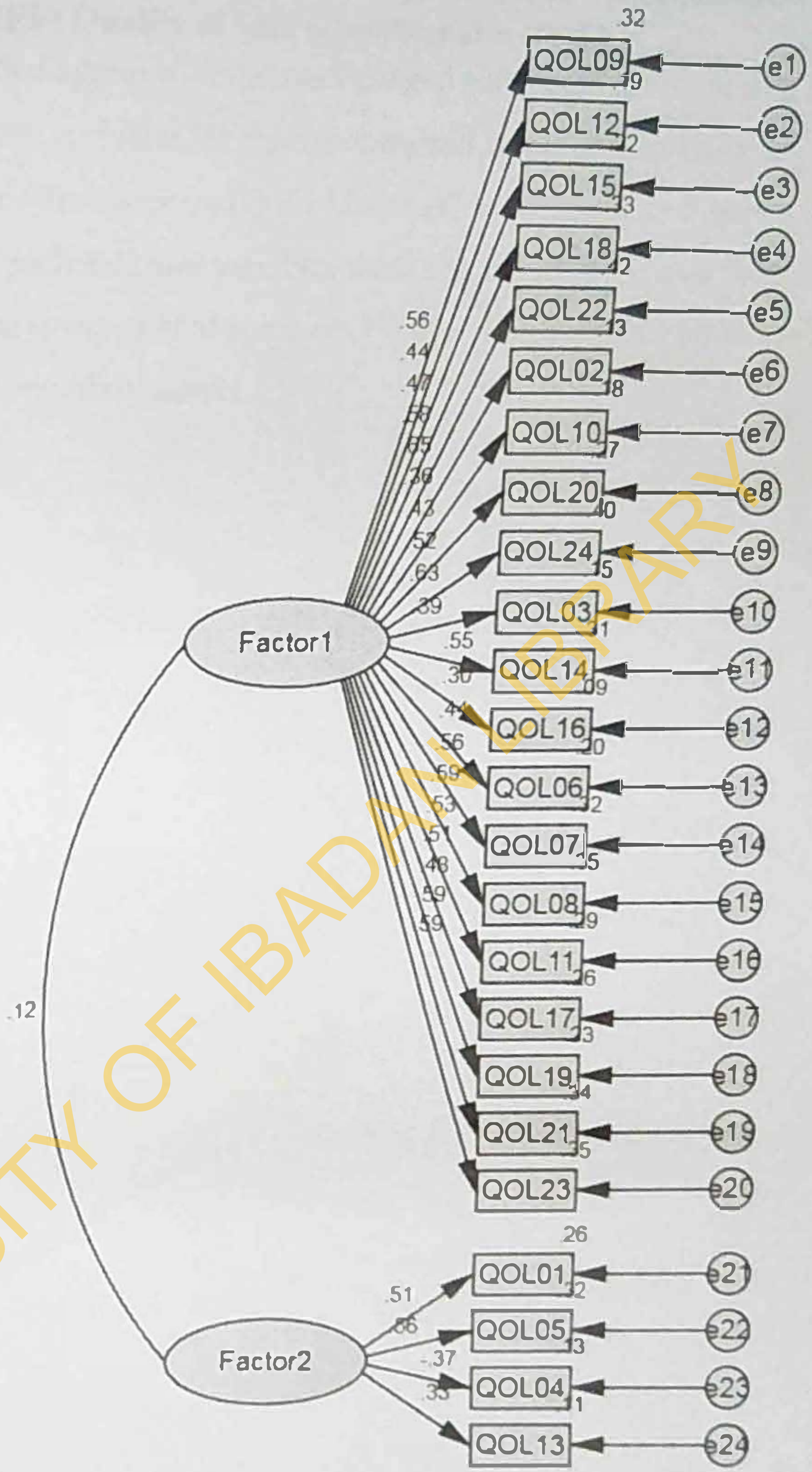

Figure 4.8: Model B2: Standardized estimates for the 2-factors, 24-items (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL)

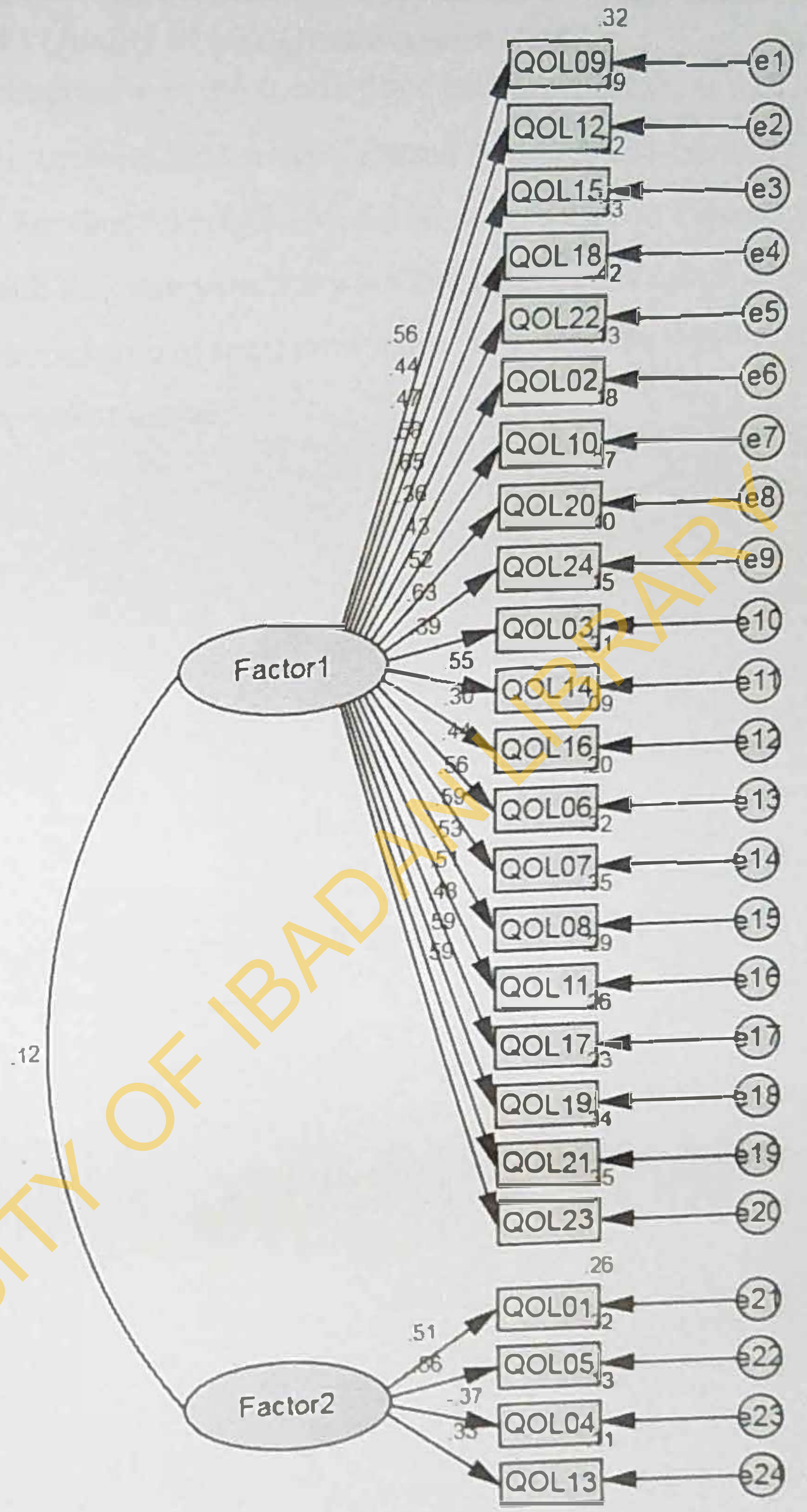

Figure 4.8: Model B2: Standardized estimates for the 2-factors, 24-items (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL)

4.29 Factor loading fitting chart of the modified hypothesized 2-Components (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL)

The modified estimated path diagram with the standardized path coefficients, as well as the coefficients between the latent variables for the hypothesized 2-components (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL) Model B3 as presented in Figure 4.9. The Standardized error terms of each indicator variables were also reported because the solution was admissible as well as the correlation of some error terms. This suggests that the model provide a better fit to the independent dataset.

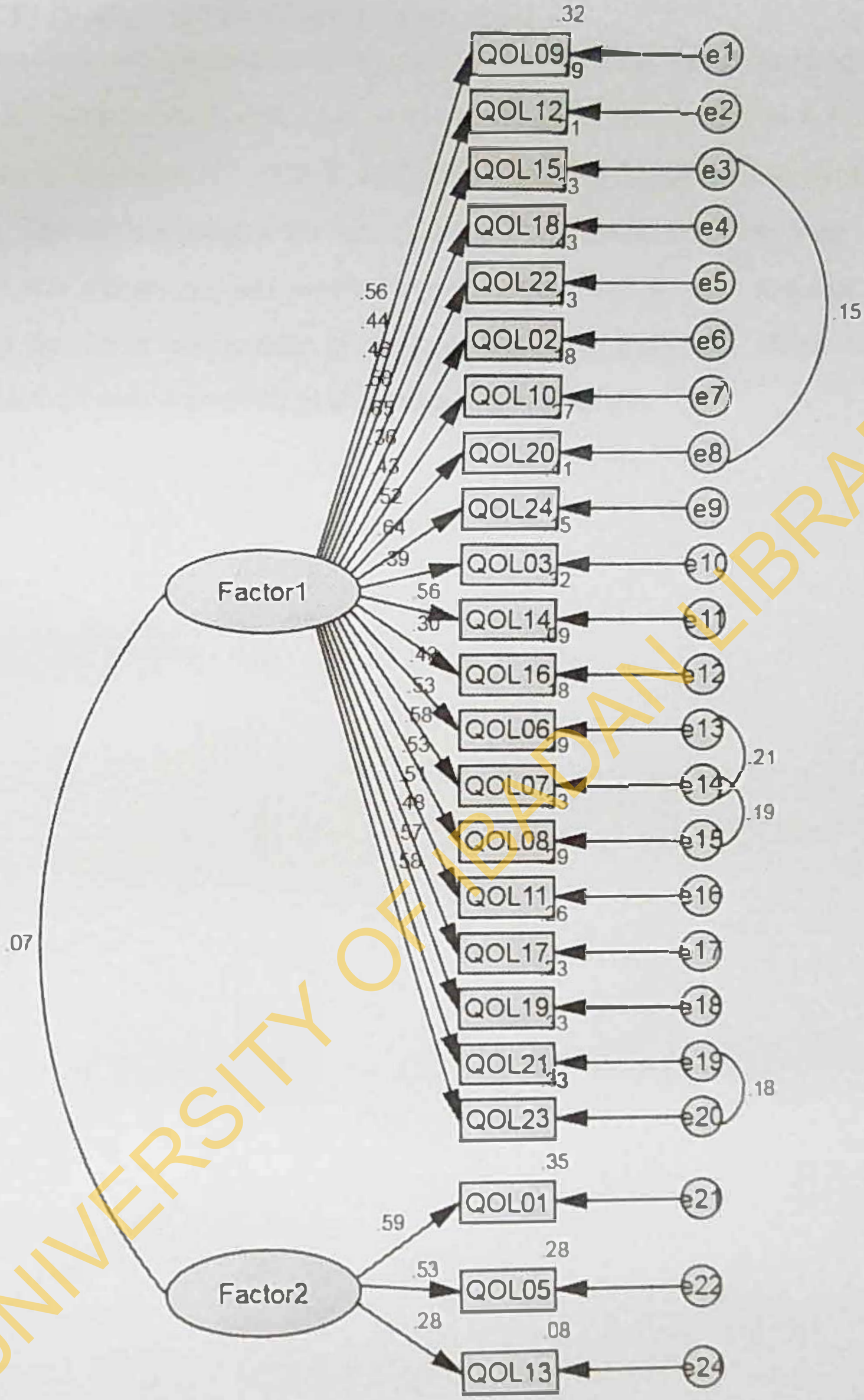

Figure 4.9. Model B3: Modified Standardized estimates for the 2-factors, 24-items (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL)

4.30 CFA Parameter Estimates of the hypothesized 2-Component (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL)

The values of the standardized coefficient of factor loading, the associated standard error, Z-value and R^2 value of each indicator variable are presented in Table 4.30. All the indicator variables were significantly related to their respective latent components at 1% level of significant. The standardized error terms of each indicator variables were reported because the solution was admissible and used to compute the R^2 value, indicates that the proportion of variation in the latent component as explained by each particular indicator. These indicate that the model provide a good fit to the independent dataset.

Table 4.30: Parameter estimates, standard error estimates (S.E), and R^2 for each indicator variables

Indicators Variable		Latent Variable	Estimate	S.E	P-value	R^2
QOL09	<---	Factor1	1.000			0.68
QOL12	<---	Factor1	0.742	0.064	<0.001	0.81
QOL15	<---	Factor1	0.763	0.063	<0.001	0.79
QOL18	<---	Factor1	1.058	0.074	<0.001	0.67
QOL22	<---	Factor1	1.206	0.078	<0.001	0.57
QOL02	<---	Factor1	0.564	0.058	<0.001	0.87
QOL10	<---	Factor1	0.706	0.062	<0.001	0.82
QOL20	<---	Factor1	0.941	0.072	<0.001	0.73
QOL24	<---	Factor1	1.217	0.080	<0.001	0.60
QOL03	<---	Factor1	0.716	0.068	<0.001	0.85
QOL14	<---	Factor1	0.993	0.071	<0.001	0.69
QOL16	<---	Factor1	0.571	0.068	<0.001	0.91
QOL06	<---	Factor1	0.771	0.071	<0.001	0.82
QOL07	<---	Factor1	1.042	0.068	<0.001	0.71
QOL08	<---	Factor1	1.089	0.077	<0.001	0.67
QOL11	<---	Factor1	0.968	0.077	<0.001	0.71
QOL17	<---	Factor1	0.902	0.072	<0.001	0.74
QOL19	<---	Factor1	0.807	0.069	<0.001	0.77
QOL21	<---	Factor1	1.094	0.077	<0.001	0.67
QOL23	<---	Factor1	1.101	0.077	<0.001	0.65
QOL01	<---	Factor2	1.000			0.72
QOL05	<---	Factor2	1.018	0.237	<0.001	0.92
QOL13	<---	Factor2	0.490	0.107	<0.001	

Note: Level of significance is 1%
S.E= Standard Error

4.31 CFA Covariances among latent variables of the hypothesized 2-Component (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL)

The covariances between the two (2) latent exogenous variables of the 2-Component (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL) are shown in Table 4.31a and Table 4.31b for the modified model. The absolute Z-statistics in Table 4.31a is less than 1.65 which implies that the covariance is not significantly different from zero at the 0.01 level. Also, the modified covariance between the two (2) identified components and the covariances between some selected error terms as shown in Table 4.31b reveals that there absolute Z-statistics is greater than 1.65, an indication that the modification provides a better fit.

Table 4.31a: CFA Covariance among latent variables of the hypothesized 2-Components (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL)

			Estimate	S.E.	Z-value	P-value
Factor1	<-->	Factor2	0.010	0.007	1.481	0.139

Table 4.31b: CFA Modified Covariance among latent variables of the hypothesized 2-Components (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL)

			Estimate	S.E.	Z-value	P-value
Factor1	<-->	Factor2	0.010	0.007	1.429	<0.001
e13	<-->	e14	0.085	0.014	6.259	<0.001
e19	<-->	e20	0.067	0.013	5.691	<0.001
e14	<-->	e15	0.074	0.013	5.675	<0.001
e3	<-->	e8	0.051	0.012	4.309	<0.001

Note: Level of significance is 1%

S.E= Standard Error

4.32 Summary of Fit Indices of the two Models from Confirmatory Factor Analyses of the (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL)

The Chi-square goodness-of-fit test of the three models were significant, which shown by there p-values in Table 4.32 even though the first model estimates are incorrect. This is indicative of the large differences between the observed and expected covariance matrices. However, the Chi-square indicator is highly dependent on sample size, so relative Chi-square χ^2 $(\chi^2/df < 3 = 2.98)$ which adjusted for sample size shows that Model B3 best fits the independent dataset. The fit indices (GFI=0.941, AGFI=0928, CFI=0.907, NFI=0.867, TLI=0.895, and the RMSEA=0.045) and the information criteria (AIC=773.20 and CAIC=1073.62) confirmed that Model B3 fits the independent dataset better than the other competing models (Table 4.23).

Table 4.32 Summary of Fit Indices from Confirmatory Factor Analyses of the (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL)

	Models		
Fit Indices	**Model B1**	**Model B2**	**Model B3**
χ^2	1031.43*	798.90*	671.20*
df	246	229	225
CGF	4.19	3.45	2.98
RMR	0.024	0.023	0.021
GFI	0.91	0.929	0.941
AGFI	0.89	0.914	0.928
PGFI	0.726	0.771	0.768
NFI	0.801	0.842	0.867
RFI	0.777	0.825	0.85
IFI	0.841	0.882	0.907
TLI	0.821	0.869	0.895
CFI	0.84	0.881	0.907
PRATIO	0.891	0.905	0.889
PNFI	0.714	0.76	0.771
PCFI	0.749	0.797	0.807
NCP	785.43	567.9	446.2
RMSEA	0.057	0.05	0.045
AIC	1139.43	892.9	773.2
BIC	1403.52	1901.76	1022.62
CAIC	1457.52	1169.76	1073.62

Note: x^2 =Chi-square statistics; df=degree of freedom; CGF=Chi-square Goodness-of-Fit; RMR=Root mean square residual; GFI=Goodness-of-Fit index; AGFI= Adjusted Goodness-of-Fit index; PGFI=Parsimony Goodness-of-Fit Index; NFI=Normed-fit index; RFI=Relative fit index; IFI=Incremental fit indices; TLI=Tucker-Lewis index; CFI=Comparative fit index; PRATIO=Parsimony ratio; PNFI=Parsimonious Normed-fit index; PCFI= Parsimonious Comparative fit index; NPC=Noncentrality parameter; RMSEA=; AIC=Akaike's information criterion; BCC=Browne-Cudeck criterion; BIC=Bayesian information criterion; CAIC=Consistent AIC

*Significant at 1% level of significance

4.33 Structural Equation Modelling (SEM) of the hypothesized SDQ and the Adapted WHO-QOL BREF

The estimated path diagram with the standardized path coefficients, as well as the coefficients between the latent variables for the hypothesized 3-components Strength and Difficulty Questionnaire (SDQ) and 2-components (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL) as presented in Figure 4.10. The Standardized error terms of each indicator variables were also reported because the solution was admissible. This suggests that the fitted structural model provide a good fit to the dataset.

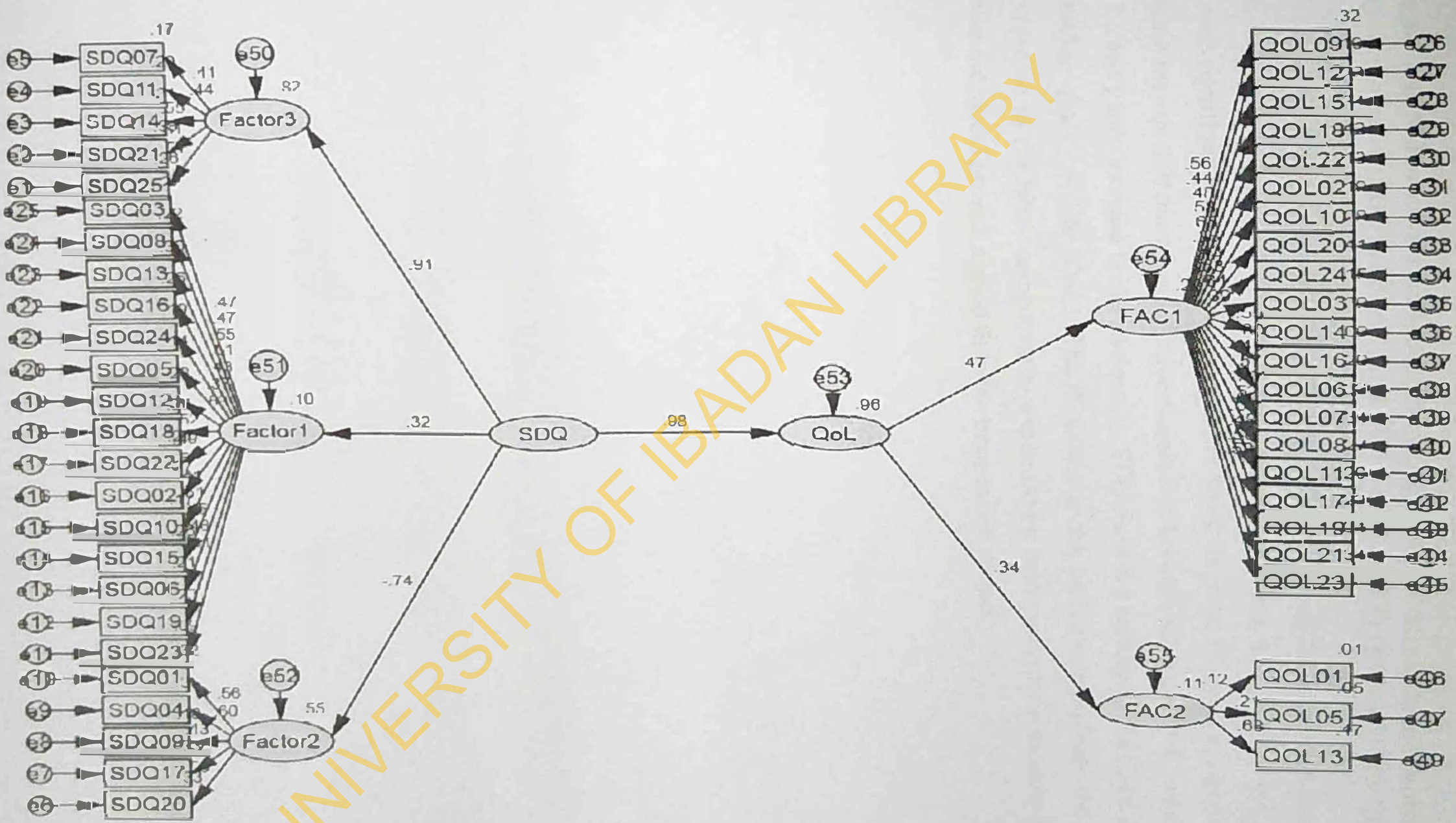

Figure 4.10. Model B: The fitted model for the hypothesized Strength and Difficulty Questionnaire (SDQ) and (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL)

4.34 SEM Parameter Estimates of the hypothesized Strength and Difficulty Questionnaire (SDQ) and (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL)

The values of the standardized coefficient of factor loading, the associated standard error and Z-value of each indicator variable are presented in Table 4.34. All the indicator variables were significantly related to their respective latent factors at 1% level of significant. Also, the table reveals that there is a negative relationship between SDQ and QoL, which implies that for every unit increase in the adolescents SDQ there is a corresponding reduction of 0.60 in his/her quality of life (QoL). The R^2 values in the last column indicate the proportion of variation in the latent component as explained by each particular indicator. These indicate that the model provide a good fit to the independent dataset.

Table 4.34: SEM Parameter Estimates, Standard error estimates (S.E), Z-values and P-values

			Estimate	S.E.	P-value	R^2
QoL	<---	SDQ	-0.600	0.080	<0.001	0.045
Factor1	<---	SDQ	0.238	0.045	<0.001	0.896
Factor3	<---	SDQ	1.000			0.180
Factor2	<---	SDQ	-1.038	0.129	<0.001	0.448
FAC1	<---	QoL	1.000			0.778
FAC2	<---	QoL	0.227	0.126	0.070	0.886
SDQ25	<---	Factor3	1.000			0.744
SDQ21	<---	Factor3	1.338	0.116	<0.001	0.622
SDQ14	<---	Factor3	1.152	0.105	<0.001	0.694
SDQ11	<---	Factor3	0.964	0.100	<0.001	0.802
SDQ07	<---	Factor3	0.815	0.088	<0.001	0.828
SDQ20	<---	Factor2	1.000			0.669
SDQ17	<---	Factor2	0.974	0.079	<0.001	0.671
SDQ09	<---	Factor2	0.720	0.071	<0.001	0.818
SDQ04	<---	Factor2	0.995	0.079	<0.001	0.646
SDQ01	<---	Factor2	0.861	0.070	<0.001	0.686
SDQ23	<---	Factor1	1.000			0.907
SDQ19	<---	Factor1	1.566	0.201	<0.001	0.768
SDQ06	<---	Factor1	1.475	0.193	<0.001	0.793
SDQ15	<---	Factor1	1.588	0.200	<0.001	0.740
SDQ10	<---	Factor1	1.324	0.179	<0.001	0.828
SDQ02	<---	Factor1	1.728	0.217	<0.001	0.732
SDQ22	<---	Factor1	1.539	0.197	<0.001	0.761
SDQ18	<---	Factor1	1.749	0.219	<0.001	0.730
SDQ12	<---	Factor1	1.582	0.197	<0.001	0.718
SDQ05	<---	Factor1	1.228	0.174	<0.001	0.860
SDQ24	<---	Factor1	1.414	0.188	<0.001	0.812
SDQ16	<---	Factor1	1.694	0.214	<0.001	0.740
SDQ13	<---	Factor1	1.701	0.210	<0.001	0.700
SDQ08	<---	Factor1	1.504	0.195	<0.001	0.783
SDQ03	<---	Factor1	1.483	0.192	<0.001	0.780
QOL09	<---	FAC1	1.000			0.683
QOL12	<---	FAC1	0.736	0.063	<0.001	0.810
QOL15	<---	FAC1	0.787	0.063	<0.001	0.774
QOL18	<---	FAC1	1.063	0.074	<0.001	0.664
QOL22	<---	FAC1	1.193	0.077	<0.001	0.583
QOL02	<---	FAC1	0.565	0.058	<0.001	0.872
QOL10	<---	FAC1	0.714	0.062	<0.001	0.815
QOL20	<---	FAC1	0.963	0.072	<0.001	0.721
QOL24	<---	FAC1	1.220	0.079	<0.001	0.594
QOL03	<---	FAC1	0.714	0.067	<0.001	0.846
QOL14	<---	FAC1	0.972	0.070	<0.001	0.699
QOL16	<---	FAC1	0.559	0.067	<0.001	0.912
QOL06	<---	FAC1	0.813	0.069	<0.001	0.799
QOL07	<---	FAC1	1.105	0.078	<0.001	0.680
QOL08	<---	FAC1	1.110	0.076	<0.001	0.657
QOL11	<---	FAC1	0.947	0.071	<0.001	0.727
QOL17	<---	FAC1	0.894	0.069	<0.001	0.744
QOL19	<---	FAC1	0.806	0.065	<0.001	0.772
QOL21	<---	FAC1	1.112	0.077	<0.001	0.661
QOL23	<---	FAC1	1.113	0.077	<0.001	0.659
QOL01	<---	FAC2	1.000			0.985
QOL05	<---	FAC2	1.265	0.535	0.018	0.955
QOL13	<---	FAC2	0.976	1.976	0.065	0.531

4.35 Summary of Fit Indices from Structural Equation Modelling (SEM) of the hypothesized SDQ and the Adapted WHO-QOL BREF

The Chi-square goodness-of-fit test of the fitted model was significant, which is shown by its p-value in Table 4.35 this indicative of there is difference between the observed and expected covariance matrices. However, the Chi-square indicator is highly dependent on sample size, so relative Chi-square χ^2 $(\chi^2/df < 3 = 2.91)$ which adjusted for sample size shows that model best fits the dataset. The fit indices (GFI=0.882, AGFI=0.871, CFI=0.784, NFI=0.705, TLI=0.773, and the RMSEA=0.044) confirmed that model B fits the independent dataset better than model A which contains the item QoL04.

Table 4.35 Summary of Fit Indices from Structural Equation Modelling (SEM) of the hypothesized SDQ and the Adapted WHO-QOL BREF

	Models	
Fit Indices	**Model A**	**Model B**
χ^2	2950.64*	3132.66*
df	1121	1075
CGF	3.11	2.91
RMR	0.085	0.034
GFI	0.875	0.882
AGFI	0.864	0.871
PGFI	0.803	0.807
NFI	0.679	0.705
RFI	0.665	0.691
IFI	0.757	0.785
TLI	0.745	0.773
CFI	0.756	0.784
PRATIO	0.956	0.953
PNFI	0.649	0.671
PCFI	0.723	0.747
NCP	2375.6	2057.66
RMSEA	0.046	0.044
AIC	3701.6	3334.66
BIC	4195.55	3828.61
CAIC	4296.55	3929.61

Note: x^2 =Chi-square statistics; df=degree of freedom; CGF=Chi-square Goodness-of-Fit; RMR=Root mean square residual; GFI=Goodness-of-Fit index; AGFI= Adjusted Goodness-of-Fit index; PGFI=Parsimony Goodness-of-Fit Index; NFI=Normed-fit index; RFI=Relative fit index; IFI=Incremental fit indices; TLI=Tucker-Lewis index; CFI=Comparative fit index; PRATIO=Parsimony ratio; PNFI=Parsimonious Normed-fit index; PCFI= Parsimonious Comparative fit index; NPC=Noncentrality parameter, RMSEA=; AIC=Akaike's information criterion; BCC=Browne-Cudeck criterion; BIC=Bayesian information criterion; CAIC=Consistent AIC

*Significant at 1% level of significance

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND LIMITATIONS

5.1 DISCUSSION

Generally, the use of questionnaires is a cost-effect way of collecting infomiation from different informants. Information collected from the usage of these instruments might be a good starting point for screening and intervention purposes. However, the efficacy of these instruments is dependent on their psychometric properties.

The aim of this study was to assess the psychometric properties of Strength and Difficulty Questionnaire (SDQ) and (Adapted WHO-QOL BREF) Quality of Life Questionnaire (QoL) using EFA and CFA among adolescents with no known health problems. The resulting models were then fitted together using SEM to find appropriate model for assessing the relations among observed items in the two questionnaires and the underlying endogenous and exogenous latent constructs. This statistical technique is the only analysis that could be used to study the complete and simultaneous tests of such relationships (Ullman, 2006).

The psychometric properties of the SDQ in previous research such as the one conducted in Britain, Sweden, and Germany have confirmed the five components based on the reports of these adolescents and their parents (Goodman, 2001; Smedje et al., 1999; Woerner et al., 2002; Palmieri and Smith, 2007; Sanne et al., 2009; Van et al., 2008). The child and adolescent sample in U.S.A also revealed five components; however most of the items did not load on their theoretical components. This result was implicated on the fact that some of these items differ in meaning to the American parents (Wayne and Stephen; 2004).

In the present study, the EFAs using Principal Axis Factoring on a representative sample of adolescents did not reveal the theoretical five factors but three components which differ from previous studies. Most of the items that theoretically loaded on the Emotional Symptom Scale (ESS) and at least three items on the Conduct Problem Scale (CPS), Hyperactivity Scale (HAS) and Peer Problem Scale (PPS) were better suited to measures the first component, items on the theoretical Prosocial Scale (PSS) was also confirmed in this present study. Specifically, "I am helpful if someone is hurt, upset or feeling ill" and "I get on better with adults than with people of my own age" which are items on the PPS and PSS share low common variance with other items.

These results suggest that Nigerian adolescents do not conceptualize these items same way with the Europeans and the Americans even though they share some similarities in terms of their age and education. However, in the American study (Wayne, and Stephen; 2004) it was suggested that the parents are likely reporting their children's behaviours using the 25-items SDQ on three different but correlated, underlying components which is similar to what was found in this study as reported by the Nigerian adolescents. Similarly, this finding is similar to a study conducted by Goodman et al., (2010) which found a three-factor model (internalising/externalising/prosocial) that fit a low risk epidemiological sample of 5–16-year-olds, but their factor model was superior in high risk samples.

Internal consistency was measured using Cronbach's alpha and Polychoric coefficients. The study findings indicated unsatisfactory alpha coefficients of at most 0.643 in the 5-factors SDQ domains and the Peer Problem Scale (PPS) has the lowest alpha of 0.429 and their Polychoric coefficients was between 0.680-0.857. Similarly, the reliability estimates 3-components SDQ were 0.663, 0.667 and 0.814 for its Cronbach's alpha and 0.852, 0.857 and 0.978 for it Polychoric coefficient shows that the Cronbach's alpha deflates the reliability estimates of each domain. This validation results is similar to the American study (Wayne, and Stephen; 2004).

Confirmatory Factor Analysis CFAs were further conducted to explore the dimensions that underlie the Nigerian adolescent response to the SDQ items. These analyses further suggests that the adolescents are likely to be reporting their behaviour based on three separate but correlated underlying components this similar to the three-factor model tested by Cathal and Richard (2012) among Irish adolescents, but did not give a good fit when subjected to CFA. The Irish study was based on extensive literatures which had used the parent version of SDQ. The difference in this result might be due to the construal bias as mention by Wayne and Stephen (2004) implicated on parent's willingness to attribute desirable or undesirable qualities to a child.

Also, the psychometric properties of the Adapted WHO-QOL BREF Quality of Life Questionnaire (QoL) in previous research such as the one conducted in Indian, and Hong Kong (using data obtained from the United Kingdom which is a sample of the adolescents that was studied during the design of the QoL instrument) have confirmed the four components based on the reports of the adolescents (Shally Awasthi et al., 2010; Sik-Yum Lee et al., 2005).

The current study performed EFAs using Principal Axis Factoring on a representative sample of healthy adolescents did not reveal the established four factors but two components which differ from the studies mentioned above. The three negatively worded questions (You feel that physical pain prevents you from doing what you need to do, You need some medical treatments to function in your daily life, and You have negatives such as blue mood, despair, anxiety, depression) loaded on the second component with the fourth item that was positively worded. However, when this positively worded item (You feel your life is meaningless) was dropped there was a considerable rise in internal consistency of the adopted WHO-QOL BREF Quality of Life Questionnaire. Since the study was carried out among healthy adolescents; hence the subjects might not be living a meaningless life. It will be a good idea to drop this item when the instrument is being used in a healthy adolescent population.

Internal consistency was measured using Cronbach's alpha and Polychoric coefficients. The study findings indicated unsatisfactory alpha coefficients of at 0.561, 0.358, and 0.475 in the 4-factors WHO-QOL BREF domains and the Environmental Domain (END) has the highest alpha of 0.807 and there Polychoric coefficients was between 0.601-0.954. Similarly, the reliability estimates 2-components WHO-QOL BREF were 0.897 and 0.486 for its Cronbach's alpha and 0.991 and 0.732 respectively an indication that the Cronbach's alpha deflates the reliability estimates of each domain. This validation results is different from other studies by Saharnaz et. al, (2008) and Ping et. al, (2012).

Furthermore, CFAs were conducted to explore the dimensions that underlie response of adolescents to the adopted WHO-QOL BREF. These analyses further suggests that this adolescents are likely to be reporting their perceived quality of life based on two separate but uncorrelated underlying components; the first been the positively worded questions and the second the negatively worded questions since they are unaware of experiences related to illness and the model gave a good fit to the independent dataset. This result is different from the models tested among Indian (Shally Awasthi et al., 2010) and English (Sik-Yum Lee et al., 2005) adolescents. These studies used adopted WHO-QOL BREF instrument with 24 items plus two items for overall QOL and general health measured on a 5-points likert scale. To be more specific, the study by Sik-Yum Lee et al., 2005 used a sample of the dataset that was used in the initial design of the adopted WHO-QOL BREF instrument. This is similar to model testing and not instrument validation as explained by Cathal and Richard (2012) and Jamie (1998). Also, the methodology used in the instrument validation in the Indian

adolescents' population was not scientific as stated by Hengqing et al., (2010) and Gadermann et al., (2012).

Finally, this study applied SEM to model the psychosocial functioning (SDQ) and QOL of healthy Nigerian adolescents in a resource constrained setting. Although previous studies exist on the psychosocial functioning and quality of life of Nigerian adolescents (irrespective of their health status) (Ayuk et al., 2013; David et al., 2004; Dejan et al., 2011), there are limited number of studies on the application of SEM for this purpose. In particular, studies (in this settings) examining the psychometric properties of these instruments and using SEM to study the interrelationship between the domains are practically unavailable in the literature.

In the present study, a slightly different approach was employed using a hierarchical model that is simply a second-order factor analysis model, since there are no literatures showing the direct link between each of the SDQ domains to the QOL domains. This approach allows for the complete and simultaneous tests of the relationships between the domains of these two instruments (Ullman, 2006) the result of the analysis shows that the poor psychosocial functioning of these adolescents has a negative impact on their quality of life.

The strength of this study was the evaluation of the psychometric properties of these instruments among healthy Nigerian adolescents in a resource constrained using EFA and using polychoric ordinal alpha to test the internal reliability of the domains of each instrument. CFA was used to confirm the model identified by EFA using an independent dataset and thereafter compares the resulting models using structural equation modelling.

5.2 CONCLUSION

In behavioural, education, medical, and social psychological research, screening tools are becoming more popular simply because they are very helpful in resolving complex situation. The present results, however suggest that the psychometric properties of the Adopted WHO-QOL BREF and the Strength and Difficulty Questionnaire published and validated in other countries may not be appropriate in a sample of healthy Nigerian adolescents.

The observed data give a strong evidence to support the interrelationships of the domains of the hypothesized latent constructs. The components identified and confirmed in this study will provide a better measure of the underlying structure of these instruments.

My passion for SEM is based on its ability to model the complex psychosocial function and quality of life among healthy Nigerian adolescents. However, the hypothesized model using the observed data fits the relationship compared to the theoretical model.

5.3 LIMITATIONS

Despite efforts to ensure collection of viable data and reliable results, the present study suffers a number of limitations. First of all, the cross-sectional nature of the parent study does not permit assessment of any causal effect of the independent variables. Also, in the present analysis, data were extracted only for adolescents enrolled and attending a school. Hence, out of school adolescents were not captured in the present analyses. In addition to that, it is difficult to correctly assess the non-response rate in the present study as the original database does not contain any such information.

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