Structural Equation Modelling of Effect of Depression on Quality of Life of Adolescents

BY

Samson Bamidele OLORUNJU

B. Sc. (Hons.) Statistics (Ilorin)

Matric No: 183199

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ABSTRACT

Background

Childhood and adolescent depression is common and often persists into adulthood. It negatively influences the development of youths, their school performance and can significantly increase the risk of substance abuse and suicide. It is the fourth leading cause of disease burden. Although childhood and adolescent depression is common and persist to adulthood, less work has been done in this area. This study assessed the effect of child depression on quality of life of adolescents in a resource constrained setting using structural equation model.

Methods. Self-administered questionnaires, with questions assessing depression and quality of Life, were given to adolescents aged 10-19 years who consented to participate in the study. An Exploratory Factor analysis (EFA) was conducted to study the underlying factor structure in the instruments Child Depression inventory and World Health Organisation Quality of Life BREF (the CDI and QOL respectively). Subsequently, a Confirmatory Factor analysis (CFA) was done to assess adequacy of the factor structure in the EFA. The new model (from the CFA and EFA), referred to as the hypothesized model was compared with theoretical models to determine which was more adequate. A structural equation model was fitted using the AMOS (an extension of the SPSS) software to study the relationship between depression and Quality of Life. All hypothesis were tested at 5% level of significance.

Results. The CDI reported a 2-factor structure, while the adapted WHOQOL-BREF reported a 3 factor structure. The Root Square Mean Error of Approximation (RMSEA) for the 2 factor structure of the CDI was significant (0.044). In a similar way, the 3 factor structure of the WHOQOL-BREF had a significant RMSEA (0.047). Other fit indices also showed that the new hypothesized models had a better fit than the theoretical models in the CFA conducted. The overall reliability of both instruments were high (CDI:α= 0.84 and QOL:α= 0.847) , however, the Cronbach's alpha for one of the Sub scales of the WHOQOL-BREF was low (0.08). The regression coefficient for the effect of child depression on quality of life was negative (-0.048).

Conclusion: The Structural equation model fitted showed that Depression in non-clinical, general population of Adolescents is a poor predictor of quality of life. The CDI (used in assessing childhood depression) had a 2-factor structure in a non-clinical general population of adolescents. Similarly, the adapted WHOQoL BREF had a 3-factor structure. Theorectical models proposed by previous authors for the relationship between depression and quality of life were not identified by this study.

Keywords: Child depression, quality of Life, Structural Equation Modelling, Factor Analysis, Adolescents.

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A thousand tongues are grossly inadequate to appreciate the almighty God for His benevolence on me throughout the duration of this program. The challenges were enormous, undoubtedly, but His grace was more than enough.

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DEDICATION

To my immediate family, the J.O. Olorunjus, the sacrifice is enormous.

To all Children/ teenagers suffering from episodes of depression.

CERTIFICATION

I certify that this research work was duly carried out directly under our supervision and also meets the regulations governing the award of the degree of M.Sc. Biostatistics of the department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan.

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Dr O. M. Akpa.

B. Sc., M.Sc., Ph.D (Ilorin)

Department of Epidemiology and Medical Statistics,

Faculty of Public Health,

College of Medicine, University of Ibadan.

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Dr R. F. Afolabi.

B. Sc., M.Sc., Ph.D (Ilorin)

Department of Epidemiology and Medical Statistics,

Faculty of Public Health,

College of Medicine, University of Ibadan.

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LIST OF ABBREVIATIONS

Abbreviation	Full Meaning
AIC	Akaike Information Criterion
BOS	Boys-only Schools
CFI	Comparative Fit index
EFA	Exploratory Factor Analyses
CFA	Confirmatory Factor Analyses
GFI	Goodness of Fit Index
RSMEA	Root Square Means Error of Approximation
TLI	Tucker-Lewis Index
NFI	Normed Fit Index
GOS	Girls-only public School
IFI	Incremental Fit Index
GMS	Gender-mixed Schools

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Depression is a mood disorder consisting of a set of symptoms, which principally includes the affective type (anhedonia, despair, pathological sadness, irritability, lack of enthusiasm, and subjective feeling of anxiety), volitional, cognitive, and physical symptoms (Ariza and Merino, 2009). These disorders are largely attributable to the chronically disabling nature of depression and other common mental disorders (Prince et al., 2007). It presents with depressed mood, loss of interest or pleasure, decreased energy, feelings of guilt or low self-worth (Marcus et al., 2012).

Depression contributes significantly to the global burden of disease, and its effect transcends gender, educational backgrounds and all others areas of life endeavour. It is estimated that about 350 million people are affected with depression globally (Marcus et al., 2012). In a recent survey, it was found that 1 in 20 people had an episode of depression in the preceding year (Marcus et al., 2012). The Agency for Health Care Policy and Research report estimated that, in the United States alone, more than $8.9 billion is spent annually on childhood depression management and treatments (Soni, 2009) . This is besides significant personal costs, including impairments in multiple areas of functioning and higher mortality recorded annually (Marcus et al., 2012; Prince et al., 2007; Soni, 2009)

Childhood and adolescent depression, which in recent times has become an area of rapidly growing research focus, is common and often persists into adulthood. It can negatively influence the development of youths and their school and work performance. Depression in Childhood and adolescent can significantly increase the risk of substance abuse and suicide (Mihalopoulos et al., 2012) . It has been shown that childhood and adolescence depression is a significant risk factor for depression during adulthood (Aalto-Setälä et al., 2002). Some studies aimed at assessing the cost effectiveness of intervention studies have shown that up to 127,543 Disability Adjusted Life Years(DALYs) could be averted with appropriate depression intervention programs (Chisholm and Saxena, 2012; Gureje et al., 2007).

Several review (Stice et al., 2009; Stice et al., 2010; Merry et al., 2011; Horowitz & Garber, 2006) and intervention (Cuijpers et al., 2008; Adeniyi et al., 2011; Chisholm et al., 2004) studies aimed at the prevention of depression in children and adolescents have been published. In a very recent intervention study, conducted in Nigeria, there was a significant reduction in depression in those who received the "stepped care intervention package for depression" as against those who did not. The stepped care intervention package for depression included problem solving treatment, activity scheduling, medication for severe depression, and psychoeducation. (Oladeji et al., 2015).

Furthermore, though many psychological interventions aimed at reducing the burden of depression, has been done, only a few educational interventions has been carried out(Merry et al., 2004; Cuijpers et al., 2008). A review by Stice et al. (2009) showed that a significant reduction in depressive symptoms was observed in 41% of depression prevention programmes reviewed, and 13% of these interventions reduced the risk of having a depressive disorder later on in life.

In Nigeria, data on the epidemiology and the nature of depression in the general population is practically unavailable (Adeniyi et al., 2011). Nonetheless, few studies assessing depression in different population settings in Nigeria have been published (Peltzer et al., 2013; Yusuf and Adeoye, 2007; Amoran et al., 2007; Gbiri and Akingbohungbe, 2012; Adeniyi et al., 2011; Onwuekwe et al., 2012). In a recent study conducted among university undergraduate students in Nigeria, prevalence of severe depression was put at 7% (Peltzer et al., 2013). Amoran et al. (2007) showed that depression is more common in rural than urban centres.

The Quality of Life of an individual has been described as the individual's mental and material well-being, physical health, personal fulfilment and development, interpersonal relationships outside and within the family, work and other activities in the community (Gbiri and Akingbohungbe, 2012). Studies conducted in Nigeria have shown that depression is a pre-disposing factor to poor quality of life among adolescence with Epilepsy (Adewuya and Oseni, 2005; Gbiri and Akingbohungbe, 2012). Olisah et al.(2011) associated depression with poor quality of life among HIV patients. Onwuekwe et al. (2012) also reported that a significant proportion of epilepsy patients in Nigeria have depression, while it may be easily overlooked, the

far-reaching consequences on the quality of life of patients, morbidity, and mortality rates cannot be shrugged aside.

Undoubtedly, a lot of efforts has been made on studying the nature of depression in different population settings, (Peltzer et al., 2013; Yusuf and Adeoye, 2007; Amoran et al., 2007; Sehlo and Kamfar, 2015; Adeniyi et al., 2011) and associating it with quality of life (Gbiri and Akingbohungbe, 2012; Adewuya and Oseni, 2005; Olisah et al., 2011; Onwuekwe et al., 2012) in Nigeria. Gbiri and Akingbohungbe (2012), for instance, investigated the factors that could determine the Quality of Life (QoL) of epileptic children and adolescents. A similar study among Nigerian Adolescents also found depression to be a predictor of poor QoL. (Adewuya and Oseni, 2005). Studying a sample of HIV patients in Northern Nigeria, Olisah et al., (2011) made an effort at determining the prevalence of depressive disorder among Patients with HIV and its effect on their quality of life (QOL). A cross-sectional study in a cohort of epileptic patients in Enugu, South East Nigeria, which studied the pattern of depression and its relationship with the quality of life reported that a significant proportion of Nigerian epileptic patients have depression, and the consequences on patients' quality of life, mortality, and morbidity rates is far-reaching. (Onwuekwe et al., 2012). As laudable as these efforts at studying the nature of depression and associating it with quality of life are, there were all done among people with one form of illness or the other. This study however, aims to look at the inter play between depression and Quality of life in the general population of adolescents.

1.2 Problem Statement

Childhood and Adolescent depression, which is a form of Neuropsychiatric disorders, is a medical problem that is common and often persists to adulthood. If unidentified and not attended to early, it can have dire consequences (Sehlo and Kamfar, 2015; Mihalopoulos et al., 2012).The necessity of studying the nature of depression cannot be over emphasized. Globally, neuropsychiatric disorders contributes about 14% of the global burden of disease (Prince et al. 2007) .The situation is not too different in the developing world . For instance, prevalence of depression in Oyo state, Nigeria has been put at 5.2% among adults and 9.6% among adolescents, (Amoran et al., 2007). Also, in a study conducted among undergraduate students, in Nigeria, prevalence of severe depression was 7%, while that of moderate to severe depression was 25.2% (Peltzer et al., 2013). While studying depression and physical activities among

Nigerian Adolescents, Adeniyi et al (2011), reported that mild to moderate depression had a prevalence of 23.8%, 5.7% for definite depression. In a similar study among epileptic adolescents aged 12 to 18 years, Gbiri and Akingbohungbe (2012), puts the prevelance of depression at 32.8%. They also further showed that depression was a major predictor of poor Quality of life among the study population. (Gbiri and Akingbohungbe, 2012)

The cost of treating depression is also alarming. In their report, the Agency for healthcare research and quality puts the average cost of treating depression in children in the US at $1,931. This accounts for 35.2% of the total cost of medical care for children (Soni, 2009). Gureje et al. (2007b) reported that at a coverage rate of 40%, an intervention package combining older antidepressants with proactive and psychotherapy management is most cost-effective means of managing depression in Nigeria, because it saves more DALYs (120,357) and at a lower cost (₦9,233,000,000) than other interventions having the same coverage.

As grave as depression is, its effect on the quality of life of affected individuals cannot be over emphasized. The Quality of life of the respondents, which has been defined as 'an individual's perception 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' (WHO, 2012), cannot be separated from the mental health status. Depression accounts for 4.4% of Disability Adjusted life Years (DALYs) in 2000, making it the fourth leading cause of disease burden. Globally, it accounts for about 12% of total years lived with disability (Olisah et al., 2011; Ustün et al., 2004). Studies by Kristjánsson et al., (2010); Prince et al., (2007); Richardson et al., (2003) showed that depression is a risk factor for obesity. In fact, adolescence depression has been associated with obesity in adulthood (Richardson et al., 2003). Studies conducted in Nigeria, have also shown that depression correlates significantly with poorer QOL among diseased populations (Olisah et al., 2011; Gbiri and Akingbohungbe, 2012; Adewuya and Oseni, 2005; Adewuya et al., 2008) . Among an epileptic adolescent population, depression has been identified as an indicator of poor QoL. (Adewuya and Oseni, 2005).

1.3. Justification of the study

During adolescence, the most common form of emotional problems experienced is Depression (Aalto-Setälä et al., 2002) and it has been shown that most adults who experience recurrent episodes of depression had an initial depressive episode as teenagers (Adeniyi et al., 2011; Aalto-Setälä et al., 2002) . This suggests that adolescence is an important developmental period in which to intervene. Early intervention will, among other things, prevent the development of other adverse long-term disorders in psychosocial and health outcomes (Adeniyi et al., 2011).

Although childhood and adolescent depression is common and persist to adulthood, less work has been done in this area. Past studies in Nigeria have given more attention to adult depression (Amoran et al., 2007; Olisah et al., 2011; Peltzer et al., 2013; Yusuf and Adeoye, 2007) with very scanty reports on child and adolescents depression. Apart from that, most of the studies conducted on childhood and adolescent depression in Nigeria and other sub-Saharan Africa countries have focused on orphans and vulnerable children or children with specific diseases (Bakare et al., 2011; Shittu et al., 2014). In Nigeria to be specific, most depression related studies among children and adolescents have been conducted among individuals with specific disease (Adewuya and Oseni, 2005; Adewuya and Ola, 2005; Onwuekwe et al., 2012; Bakare et al., 2011). Nevertheless, a study on depression among the general population of adolescents will provide better bases for large scale policy and intervention activities.

Furthermore, there is no study providing information on the interjection between depression and quality of life in the general population of adolescents in Nigeria. Although Gbiri and Akingbohungbe (2012) found that depression was a determinant of quality of life in children with Epilepsy in Lagos -South West Nigeria, it is difficult to generalize this finding on the population of adolescents in Lagos State let alone Nigeria. In the present study, we intend to look at the relationship between depression and Quality of life of Adolescents in a general, and school (community) based population.

1.4. Objective

1.4.1. Broad Objective

To study the effect of child depression on quality of life of adolescents in a resource constrained setting using structural equation model.

1.4.2. Specific objectives

- To assess the psychometric properties of the Child depression Inventory and the adapted WHOQOL-BREF among a sample of adolescents in resources constrained setting.
- To investigate which of the hypothesized and the theoretical factor models (for the Children Depression Inventory and WHOQOL-BREF) best fits the nature of depression (measured by the CDI) and quality of life (measured by WHOQOL-BREF) among adolescents.
- To investigate the causal relationship between depression (measured by the Child depression Inventory) and quality of life (measured by the adapted WHOQOL-BREF) among adolescents in Nigeria.

CHAPTER TWO

LITERATURE REVIEW

2.1. Global burden of depression

One of the major contributors to the burden of diseases globally is depression and it has been shown to be the leading cause of disability globally, in terms of total years lost due to disability (Marcus et al., 2012). Depressive symptoms do not only start at a young age, often it extends to adulthood and are more intense and difficult to manage than normal sadness feelings. (Aalto-Setälä et al., 2002; Marcus et al., 2012). Globally, measured by years lived with disability (YLDs), depression was the most disabling disorder and the fourth, measured by disability adjusted life years (DALYs), leading cause of overall disease burden. (Whiteford et al., 2013; Marcus et al., 2012).

2.2. Childhood and adolescent depression

Prior to 1960, little or close to nothing was mentioned about childhood depression in the literature. It was only about five decades ago that the clinical consensus about childhood depression's nonexistence (that is, that it did not or could not exist) was changed (Thompson, 2012; Robertson et al., 2010). The existence of childhood depression is now widely accepted (Tisher, 2007). Consequently, assessment tools have been developed over the years to access the nature of childhood depression. Some of these assessment tools include:

1. The Centre for epidemiological study depression Scale for children (CES-DC) which is a 20-item self-report scale developed to assess depression symptomatology in epidemiological studies (Olino et al., 2013).
2. The Children's Depressive Rating Scale (CDRS), developed for Clinicians use.
3. The Children's Depression Scale (CDS), a parent or self-report Scale (Tisher, 2007).
4. Reynold's Child depression scale (RCDS), a 30-item self- report measure. It was developed to assess depression in children in grades 2 through 6. (Reynolds and Graves, 1989).
5. The Child Depression Inventory (CDI), a 27 item self-report depression assessment measure (Reynolds and Graves, 1989; Thompson, 2012) are some of the developed depression assessment tools.

Of these scales, the most widely used is the CDI, which is a downward extension of the Beck Depression Inventory, a well-known test for adults.

2.3. Childhood depression and quality of life in the developed countries

An individual's Quality Of Life has been described as the individual's mental and material well-being. It also entails the individual's physical health, personal fulfilment and development, interpersonal relationships outside and within the family, work and other activities in the community (Tong et al., 2010; Kessler and Üstün, 2008). Depression has been shown to be related to an individual's quality of life (Pyle et al., 2009; Boylan et al., 2004). This is the case for either diseased children (Boylan et al., 2004; Sehlo and Kamfar, 2015) or adults (Aalto-Setälä et al., 2002) . Depression accounts for the highest total number of years lost to disability(Marcus et al., 2012)

A lot of studies on the nature (Pyle et al., 2009; Kanter et al., 2008), cost implications (Soni, 2009; Berto et al., 2000) and effectiveness of treatment therapies (Cuijpers et al., 2008; Mihalopoulos et al., 2012) have been carried out on depression all over the world, especially, in the developed world (Horowitz and Garber, 2006; Stice et al., 2010; Merry et al., 2011). Some of these studies have specifically looked at the relationship between Depression and the quality of life among children and young adults (Pyle et al., 2009; Boylan et al., 2004) while Depression was a high predictor of Quality of Life among treatment resistant epileptic patients in the USA (Boylan et al., 2004).

In a matched case control study among children with Sickle Cell Disease (SCD) in Saudi Arabia, (Sehlo and Kamfar, 2015) looked at the effect of social support on the association between depression and quality of life in children with Sickle Cell Disease. In their study, they found out that higher levels of parent support was significantly associated with decreased depressive symptoms and better quality of life in children with SCD (Sehlo and Kamfar, 2015).

The effect of childhood depression on quality of life is not only high, the financial implications is also prohibitive. For instance, Soni (2009) puts the average annual cost of treating depression in children in the US at $1,931, which accounts for 35.2% of the total cost of medical care for children.

2.4. Childhood depression and quality of life in Nigeria.

Studies on depression in Nigeria have been mainly among adult or diseased adolescent populations. Most of these studies, however, only assessed the prevalence of Depression (Amoran et al., 2007; Yusuf and Adeoye, 2007; Adewuya and Ola, 2005; Adewuya and Oseni, 2005; Amoran et al., 2012), with only few studying the causal relationship between depression and quality of life (Olisah et al., 2011; Adewuya et al., 2008; Gbiri and Akingbohungbe, 2012). One of such studies reported the overall prevalence of depression in Oyo State, South west Nigeria as 5.2%, and more prevalent among men, adolescent and the rural area (Amoran et al. 2007). A cross-sectional survey conducted among undergraduate students in Ile-Ife, South West Nigeria, puts the prevalence of moderate to severe depression at 25.2%. Lack of social support and comorbidity were identified as risk factors (Peltzer et al., 2013). Using the Prevalence and Causes of Depression Questionnaire (PCDQ), Yusuf and Adeoye (2007) showed that most of the civil servants in Osun State, South West Nigeria are suffering from depression.

Studying the cost implication of depression in Nigeria, Gureje et al (2007b) reported that at a coverage rate of 40%, an intervention package combining older antidepressants with proactive and psychotherapy management is most cost-effective means of managing depression in Nigeria, because it saves more DALYs (120,357) and at a lower cost (₦9,233,000,000) than other interventions having the same coverage.

Some researchers in Nigeria (Olisah et al., 2011; Gbiri and Akingbohungbe, 2012; Adewuya et al., 2008; Adewuya and Ola, 2005), however, have studied the causal relationship between childhood depression and quality of life in Nigeria. These Studies cut across different socio-demographic population settings. However, the majority of these studies has been on diseased population, that is among adolescents with various disease conditions. A study among epileptic adolescents in Nigeria puts the prevalence of depression at 28.43%, identifying factors such as uncontrolled seizures, felt stigma and polytherapy as predictors of anxiety and depressive disorders. The study also showed that emotional disorders among epileptic adolescents cut across cultures and ethnic groupings. (Adewuya and Ola, 2005). Adewuya et al., (2008) reported that depression correlated significantly with poorer Quality of Life in all domains except the "social relationship" domain.

Gbiri and Akingbohungbe, (2012) using the Centre for Epidemiology Study Depression Scale (CES-D) to assess depression, and the Comprehensive QoL Scale (ComQol-S) to assess Quality of Life among epileptic adolescents aged 11 to 18 years reported a high prevalence of Depression among the study population, which is similar to other reports in the study area.(Gbiri and Akingbohungbe, 2012; Peltzer et al., 2013). They further identified depression as a predictor of poor Quality of Life among adolescents with Epilepsy. (Gbiri and Akingbohungbe, 2012). Adewuya et al. (2008) reported a high prevalence of depression among people living with HIV/AIDS. This is similar to what Olisah et al.(2011) found among the same population setting. The study used The World Health Organization Quality of Life assessment short version (WHOQOL-BREF) to assess the respondents' Quality of life and the CES-D to assess depression. Their aim was to study the frequency of depression in a sample of HIV patients and the level of under diagnosis by attending physicians and they found that although depression is common, it is seldom clinically recognised in HIV patients, and it's associated with a reduction in their quality of life (Olisah et al. 2011).

2.5. Methods of Assessment of Childhood Depression and Quality of life.

Different methods have been used for assessing the relationship between childhood/adolescent depression and Quality of life. Using the Multiple linear regression analysis approach, (Sehlo and Kamfar, 2015) assessed the relationship between Childhood /adolescent Depression and Quality of life. Depression was included as both an independent and a dependent variable. Their aim was to determine the predictive value of depression on Health Related Quality of Life, and assess the predictive value of social support and disease severity on depression. (Sehlo and Kamfar, 2015). Gbiri and Akingbohungbe (2011), used the Comprehensive QoL Scale (ComQol-S) and the Centre for Epidemiology Study Depression Scale (CES-D) to study QoL and Depression respectively, they used the Spearman's Correlation and linear regression to assess the relationship.

This study used the Structural Equation Modelling approach (SEM) to assess the relationship between Childhood depression and Quality of Life. The SEM technique is an established Statistical technique for representing and estimating a network of relationships between latent constructs and manifest variables (Schumacker and Lomax, 2010; Suhr, 2006) and has been used

by many reasearchers in Studying the Quality of Life and nature of depression among adolescents (Lee et al., 2007; Logan et al., 2013; Villalonga-Olives et al., 2014).

In studying the factor Structure of the Child depression Inventory (CDI) among a clinical population of adolescents with Chronic Pain, Logan et al. (2013) conducted a Confirmatory Factor Analysis in a Structural Equation Modelling (SEM) Framework. Having conducted an Exploratory Factor analysis (EFA) that yielded 4 and 5 factor structures for the CDI, the models (from the EFA) were subjected to a CFA using a structural equation framework. The results of the fit indices favoured the 5-factor structure of the CDI. Although the study had the same number of factor structure with the original CDI scale, more items (9 as against 6 in the original CDI) loaded on the negative mood subscale. (Logan et al., 2013).

Using the Structural equation modelling approach to test an adaptation of the Lewinsohn et al.,'s (1985) integrative model of depression for people with chronic musculoskeletal pain, Lee et al (2007) found that the comparative fit index, normed fit index, and parsimony ratio gave an indication of an adequate fit for the model which suggested that perceived severity of pain, stress, catastrophizing, and activity interferences contributed to increased depression (vulnerabilities), whereas social and family support and pain coping skills contributed to decreased depression (immunities) (Lee et. al., 2007).

Villalonga-Olives et al (2014) used the Wilson and Cleary framework, which is one of the most referenced frameworks to measure Health Related Quality of Life (HRQoL) in a German population of Children and reported that HRQOL was affected by the area of residence and development status. The Structural equation model fitted showed a good fit and the overall variance explained was also good (Villalonga-Olives et al., 2014).

CHAPTER THREE

Methodology

3.1. Study design

The data used is a secondary data from the Medical Education Partnership Initiative in Nigeria (MEPIN) cross sectional survey conducted in 2012 in Benue state, North Central Nigeria.

3.2. Study area

The study was conducted in Benue State. Benue State is located in the North central geo political zone of Nigeria. It has an area of 34,059Km², and a 2006 population estimate of 4.3 million people, it is the 11th largest and 7th most populous state in Nigeria (Wikipedia, 2015)

Benue state has a youth population of 5,187,665, which constitutes 3% of the national youth population. With about 57.9% of its population being male, it has the second highest proportion of male youths (age 15-39) in the country. The state has about 96% of its youth population having formal education and 3% having informal education (NBS, 2010).

3.3. Study population

The study population consisted of Adolescents aged 10-19 years who were given a self-administered questionnaire to fill, after consenting to participate in the study.

3.4. Data collection

The data used for this work was extracted from a cross-sectional survey database. The survey was conducted in Benue State Nigeria. The questionnaire used for data collection consisted of a lot of questions ranging from those measuring socio demographics, the strength and difficulty Questionnaire, adapted WHOQOL-BREF, and the child depression inventory (CDI). Questions measuring items on the CDI and adapted WHOQOL-BREF was used for this research work.

Data was collected from secondary schools from adolescents aged 10-19 years. The study was a cross sectional study conducted among adolescents in four local government areas (LGAs) purposively selected from Benue state, Nigeria. Participants were drawn from secondary schools purposively selected (for their characteristics and large number of students). The selected schools

includes Gender-mixed School (GMS), Boys-only School (BOS) and Girls-only School (GOS). The feature of the selected schools makes it possible to evaluate adolescents from diverse backgrounds. This was aimed at the capability of describing differences in the quality of life of adolescents in the study area. Consenting students in a randomly selected class in any chosen school was given a self-administered questionnaire to fill in English language.

3.5. Measures.

3.5.1. The Child Depression Inventory (CDI)

The Child depression inventory (CDI) is one of the most established and widely used measure of depressive symptoms in children and adolescents (Sehlo and Kamfar, 2015). The CDI is a 27 item self-report questionnaire, a downward extension of the Beck Depression Inventory (BDI). It is divided into five subscales namely: Negative Mood, Interpersonal Difficulties, Ineffectiveness, Anhedonia (not deriving pleasure from normally pleasurable activities), and Negative Self Esteem., (Logan et al., 2013). The CDI covers the consequences of depression as they relate to children and their functioning in school and with peers (Sehlo and Kamfar, 2015; Cole and Martin, 2005) . The scale has a reliability coefficient of 0.86 and found to be a valid measuring device when compared with other instruments (Rivera et al., 2005). There were three possible answers for the participants for each of the 27 questionnaire items; 2 indicating definite symptoms, 1 indicating mild symptoms, and 0 indicating an absence of symptoms. The total score ranged from 0 to 54, with higher scores representing severe depressive symptomatology (Sehlo and Kamfar, 2015). Adeniyi et al. (2011) reported using a classification of scores between 1 and 19 to indicate 'mild to moderate' depression and scores of at least 20 indicating 'definite caseness'. Their classification was based on the fact that there was no specific cut-off point for CDI based on studies carried out on Nigerian adolescents.

3.5.2. The adapted WHO-QOL BREF.

Quality of life has been defined by the WHO as 'an individual's perception 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'(The WHOQOL Group, 1997; Olisah et al., 2011). The quality of life of the respondents was assessed using an adaptation of the World Health organization Quality of life-BREF (WHO-BREF). The WHOQOL-BREF is a cross-culturally

valid and sound assessment of QOL. It is an indispensable evaluation tool that has been widely used in various fields (Tong, 2010; Skevington et al., 2004). This instrument has four domains namely: Physical Health (PHD), Social Relationships (SRD), Psychological (PSD) and Environment (END) domains. Studies conducted have shown that the WHOQOL-BREF is reliable and has a high measure of validity. Thus, it is a good cross-cultural valid assessment of the Quality of life (QOL) (Skevington et al., 2004) .

The Adapted WHO-QOL BREF used for this study is a 24 item questionnaire with four domains, namely: the Physical Health Domain (PHD) with seven items, Social Relationships domain (SRD) with three items, Psychological Domain (PSD) with six items and Environment domain (END) with eight items.

3.6. Data management and Statistical techniques

Only observations for students aged between 10 and 19 years was extracted for this study from the data base. Consequentially, the data of 132 (6.3%) of the students who were more than 19 years old was excluded resulting in a sample size of 1,963 adolescents.

The extracted variables were inspected for missing data. This 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.

Preliminary analysis was done using The Statistical Package for Social Sciences (SPSS) program version 20 and R Programming Software version 3.2.0. Specifically, SPSS was used for data cleaning, descriptive statistics, and exploratory factor analysis (EFA), while The R programming Software was used to compute the Polychoric /ordinal alpha and scree plot. The sample of 1963 was randomly divided into two, of sizes 980 and 983 respectively. The smaller sample (980) was used for Exploratory Factor Analysis (EFA), while the larger sample (983) was used for the Confirmatory factor analysis (CFA). The second sample that was used for the CFA was also used for the structural equation modelling (SEM).

The Horn's parallel analysis was carried out and Factors with eigen values greater than 1.0 were retained. The scree plot from R was used to corroborate the results of the parallel analysis, and Factors that were not on the steep line were not retained. The items in the instruments were subjected to a factor analysis retaining only the number of factors suggested in the Parallel

analysis. Factor loadings were obtained, and items with factor loadings of at least 0.30 were retained (Tabachnick and Fidell, 2011; Yong and Pearce, 2013). Subsequently, Polychoric and Cronbach's Alphas were obtained for both the original structure of the measurement instruments (the CDI and QOL). This is aimed at testing for the reliability of the instruments and their respective subscales.

The data was analysed using Structural Equation Modelling (SEM) approach. SEM is now a commonly used method for representing causal relations in multivariate data in the behavioural and social sciences. It is a robust statistical approach for testing hypotheses about relations among observed and latent variables, that is, variables that were measured and unmeasured constructs (McDonald and Ho, 2002; Ullman, 2006; Rahman et al., 2015).

The IBM SPSS (version 20) was used for preliminary analysis (Descriptives and Exploratory Factor Analysis and scale reliability), the R software package was used to estimate the polychoric correlations. The Analysis of Moment Structures (AMOS) software (version 21) was used to do a Confirmatory factor Analysis (CFA), which is aimed at confirming the factor structure of the Child depression Inventory in the present population setting. Path diagrams were drawn using the software, and fit indices were obtained. The Fit Indices included the Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Goodness of Fit Index (GFI), among others. The Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) were also obtained to compare the theorectical and hypothesized models.

The software was also used to fit a Structural Equation model, aimed at studying the extent to which the theoretical (Logan et al., 2013; Cole and Martin, 2005; Agnihotri et al., 2010) and hypothesized models (from the EFA) fits the relationship between the child depression inventory and quality of life among adolescents. The factor structure derived from the EFA was tested and using appropriate fit indices, it was compared with the theoretical 5 factor structure for the CDI (Logan et al., 2013; Cole and Martin, 2005) and the 4 factor of the adapted WHOQOL_BREF (Agnihotri et al., 2010).

3.7. Structural Equation Modelling.

3.7.1 Overview

Structural Equation Modelling (SEM) is a fast-growing statistical technique with extensive usage in the fields of sociology, psychology, psychiatry etc. It is a family of methodologies which include Path Analysis, Confirmatory Factor analysis, and SEM. Apart from studying the causal relationship among latent variables; SEM also studies the interior relationship among various factors. Psychological and physiological factors, (including depression), whose values cannot be measured directly, influences the Quality of Life (QOL) of adolescents (Tong, 2010; Gbiri and Akingbohungbe 2012). Statistically, it is an extension of the general linear modeling (GLM) methods (e.g. multiple regression analysis and ANOVA).The primary advantage of the SEM technique (vs. other applications of GLM) is in its capability to study the relationships among latent constructs. It is also applicable to both longitudinal and cross-sectional data as well as non-experimental and experimental data (Lei and Wu, 2007).

Structural Equation Model has two main parts, the measurement model and the structural model.

The **MEASUREMENT MODEL**, which is evaluated through confirmatory factor analysis (CFA) is given as:

$$X=\Lambda_x \xi + \delta$$

$$Y= \Lambda_y \eta + \varepsilon$$

Where,

X—Vectors of indicators of exogenous construct

Y—Vectors of indicators of endogenous construct

Λ_x—relationship between exogenous constructs and the indicators variables of the exogenous construct, i.e. factor loading matrix of exogenous indicators.

Λ_y—relationship between endogenous indicators and endogenous variables, i.e. factor loading matrix of endogenous indicators

δ—variance of exogenous indicators

ε —variance of endogenous indicators

The **STRUCTURAL MODEL,** which specifies a directional relationship between the dependent variable and a set of regressor variables (Ecob and Cuttance,2009) is given as:

$$\eta = B\eta + \Gamma\xi + \zeta$$

Where,

η-Endogenous Latent variables

ξ-Exogenous Latent variables

B-relationship between endogenous latent variables

Γ- Influence from exogenous latent variables on endogenous latent variable

ζ- residual of model.

These regressor variables are assumed to be linearly related to the dependent variable and measured without error. The structural model is also known as the regression model (Ecob and Cuttance, 2009).

3.7.2 Data Considerations

SEM is a technique that basically requires a large sample size. Thus, model estimation and inference regarding the specified model and individual parameters are only tenable if the sample size is large enough for the estimation method chosen. The appropriate sample size required for unbiased parameter estimates and accurate model fit for SEM models depends on the characteristics of the model, and those of the measured variables (Lei and Wu, 2007). Generally, a rule of thumb is that the minimum sample size should not be less than 200, with multivariate or normally distributed data, (or not less than 400 when observed variables are not multivariate or normally distributed), and about 5–20 times the number of parameters to be estimated (Kline, 2011).

3.7.3 Estimation methods

Different methods abound in literature on methods of estimation of structural equation models. These methods include the Maximum Likelihood (ML), the Asymptotically Distribution Free

(ADF), the ordinary least square (OLS), and the Generalized Least square (GLS) method. The OLS method is also known as the Unweighted least Squares (ULS) method.

The OLS and GLS are based on the basic principle of minimizing the discrepancy between the estimated population variances derived from the data (S) and the estimates of variances and covariances implied by the parameter estimates ($\sum$). The OLS and GLS minimizes the function $|S-\sum|$ (Ecob and Cuttance, 2009). While the ML method requires the sample to follow a multivariate normal distribution, the ADF method does not assume Multivariate Normality. However, the ML method uses an approach that is quite different from that of the OLS and GLS. It finds the best combination of the parameter values that maximizes the likelihood of the sample covariances. For the ML method to achieve this, it assumes the probability density function for these variables is unknown (Ecob and Cuttance, 2009). Ullman (2006) reports that the ML method is a good choice with non-normal sample or dependence among factors is suspected and for sample sizes of over 120, while the ADF estimator looks like a poor choice unless the sample size is very large (>2,500).

3.7.4 Assessing Model Fit.

In SEM, Model fit is assessed by approximate fit indices. These indices can be classified into four non-mutually exclusive categories (Kline, 2011). Kline (2011) grouped them into

1. Absolute Fit indices, which gives the proportion of the sample covariances explained by the model.
2. Incremental Fit indices, sometimes referred to as Comparative fit indices, they indicate the relative improvement in model fit of the researcher's model compared with an "independence" model. The independence model is a statistical baseline model which assumes there are no population covariances among the manifest variables.
3. Predictive fit indices, which estimates model adequacy in randomly selected samples of the same size and from the same population as the original sample.
4. The Parsimony adjusted index.

Some of the approximate fit indices are discussed below.

The RMSEA is scaled as a badness of fit index with values closer to zero indicating better fits, specifically, zero signifies the best fit. It theoretically follows a non-central chi square distribution a value of at most 0.05 may indicate good fit. (Kline, 2011). It is expressed by :

$$RMSEA=\sqrt{\frac{x^2{}_M-df_M}{df_M(N-1)}}$$

Where

$x^2{}_M$= Chi square value for the model

df_M = degree of freedom for the model and

N= sample size.

The CFI and GFI have an acceptable value of at least 0.9 to indicate good fit. While the GFI estimates how much better does the proposed model fits than when there's no model at all, the CFI measures the relative improvement in model fit over that of a baseline model, usually the independence model. The CFI is expressed as

$$CFI=1-\frac{x^2{}_M-df_M}{x^2{}_B-df_B}$$

Where

$x^2{}_M$=Chi square value for hypothesized model

df_M= degrees of freedom for the hypothesized model

$x^2{}_B$= Chi square value for baseline model

df_B= degrees of freedom for the baseline model

And the GFI is expressed as

$$GFI=1\frac{C_{res}}{C_{tot}}$$

Where

C_{res}= Residual variability in the sample covariance matrix

C_{tot}= Total variability in the sample covariance matrix

While SEM is not an entirely new statistical technique, however, it has not been well explored for use in studying the relationship between depression and quality of Life. However, Lee et al. (2007) and Villalonga-Olives et al. (2014) are some researchers who have explored this method in studying the relationship between depression and quality of Life in children.

CHAPTER FOUR

RESULTS

4.1 Socio-Demographics Characteristics of Respondents.

Data was extracted for a total of 1963 participants with complete data. Participants were 14.71±2.05 years and Males were older (14.82±2.19 years) than female (14.58±1.86 years). Table 4.1 also shows that majority of the respondents were in their mid-adolescence (63.5%) and only very few were in late adolescence (9.5%).

Male respondents constitute 54% of the total population while the female respondents were 46%. The adolescents living in urban areas were more than half (52.2%) of the sample. Most respondents were from Monogamous families (67.9%) with parents staying together (74.8%).

Table 4.1: Distribution of Socio demographics of Respondents (N=1963)

Variable	Frequency	Percentage (%)
Gender		
Male	1065	54.3
Female	895	45.7
Age		
Early Adolescents(<13years)	541	27.6
Mid-adolescents(13-17years)	1236	63.0
Late Adolescents(18-19years)	186	9.5
Religion		
Christianity	1880	96.3
Islam	69	3.5
Others	3	0.2
Tribe		
TIV	1124	57.8
Idonia	142	7.3
Igede	375	19.3
Others	304	15.6
Family Type		
Monogamy	1289	67.9
Polygamy	608	32.1
Area of Residence		
Rural Area	882	47.8
Urban Area	965	52.2
Family Status		
Parents are together	1427	74.8
Parents are divorced	81	4.2
Parents live apart	136	7.1
Single parent	265	13.9
Father's highest level of education		
No formal education	225	11.9
Primary	227	12.0
Secondary	447	23.7
Tertiary	704	37.2
Others	287	15.2
Father's occupation		
Farming	641	33.4
Trading	149	7.8
Civil servant	742	38.7
Employee of private organisation	144	7.5
Others	242	12.6
Mother's highest level of education		
No formal education	289	15.3
Primary	367	19.5
Secondary	486	25.8
Tertiary	521	27.6
Others	222	11.8
Mother's occupation		
Farming	619	32.5
Trading	532	27.9
Civil servant	442	23.2
Employee of private organisation	126	6.6
Others	188	9.9

4.2 Exploratory Factor Analysis

4.2.1. Reliability of the measures

4.2.1.1 Reliability of the CDI instrument and its theoretical subscales.

Table 4.2 below shows the reliability of the CDI instrument and its theoretical subscales. While the Negative self-esteem subscale has a Cronbach alpha of 0.608, the Anhedonia sub scale's reliability is 0.356. The Negative mood subscale has a higher reliability (0.623) than the Ineffective subscale (0.411) and Interpersonal Subscale (0.617). The polychoric alpha for each subscale is also shown. Interestingly, all the values of the polychoric alphas are higher than the Cronbach alphas

Table 4.2 Reliability of the CDI instrument and its subscales

	Subscales and item statement	Mean	SD	Scale Reliability	
				α	αp
	Negative Self Esteem Scale	**2.45**	**2.041**	**0.608**	**0.71**
CD03	I do everything wrong	0.42	0.580		
CD14	I look ugly	0.44	0.649		
CD25	Nobody really loves me	0.51	0.660		
CD24	I can never be as good as other kids	0.62	0.712		
CD07	I like myself	0.46	0.662		
	Anhedonia Scale	**2.84**	**1.622**	**0.356**	**0.44**
CD04	Nothing is fun at all	0.63	0.644		
CD12	I like being with people	0.66	0.671		
CD21	I never have fun at school	0.69	0.692		
CD22	I have plenty of friends	0.86	0.772		
	Interpersonal Scale	**1.71**	**1.642**	**0.617**	**0.78**
CD05	I am bad all the time	0.34	0.546		
CD08	All bad things are my fault	0.43	0.628		
CD26	I never do what I am told	0.60	0.634		
CD27	I get into fights all the time	0.34	0.60		
	Ineffectiveness Scale	**4.00**	**1.821**	**0.411**	**0.48**
CD15	Doing school work is not a big problem	0.94	0.743		
CD16	I sleep pretty well	0.78	0.667		
CD17	I am tired all the time	0.72	0.625		
CD18	Most days I don't feel like eating	0.76	0.608		
CD23	My school work is alright	0.79	0.691		
	Negative Mood Scale	**5.88**	**2.731**	**0.623**	**0.71**
CD01	I am sad all the time	0.61	0.608		
CD02	Nothing will ever work for me	0.41	0.631		
CD06	I am sure that terrible things will happen to me	0.42	0.63		
CD09	I want to kill myself	0.21	0.485		
CD10	I feel like crying everyday	0.45	0.615		
CD11	Things bother me all the time	0.74	0.636		
CD13	I cannot make up my mind about things	0.80	0.597		
CD19	I don't worry about aches and pains	1.21	0.659		
CD20	I do not feel alone	1.04	0.683		

4.2.1.2 Reliability of the WHOQOL instrument and its subscales

The Mean, SD of the WHOQOL BREF instrument and its respective subscales is presented in Table 4.3. The table also shows the reliability (measured by Cronbach alpha(α)) of the instrument and its subscales. The WHOQOL-BREF has an overall reliability of 0.853, which is higher than that of its subscales. For instance, the environment Domain (END) has a reliability of 0.79 as against that of 0.60 for the physical health Domain (PHD). The psychological domain (PSD) and Social relationship domain (SRD) had low reliabilities. However, the Cronbach alpha was higher for the SRD (0.426), than the PSD (0.324). The polychoric alpha (αp) is also shown on the table. However, values of the polychoric alpha were consistentently higher than those of Crobach's alpha.

Table 4.3 Reliability of the WHOQOL_BREF instrument and its subscales

	Subscales and item statement	Mean	SD	Scale Reliability	
				A	αp
	Quality Of life	**25.93**	**7.956**	**0.853**	**0.88**
	Physical Health domain (PHD)	**7.95**	**2.605**	**0.60**	**0.67**
QOL01	You feel that physical pain prevents you from doing what you need to do*	1.21	0.630		
QOL05	You need some medical treatments to function in your daily life*	1.26	0.716		
QOL09	You have enough energy for everyday life	1.19	0.692		
QOL12	You are satisfied with your sleep	1.09	0.662		
QOL15	You are able to get around well	1.04	0.647		
QOL18	You are satisfied with your capacity to work	1.06	0.706		
QOL22	You are satisfied with your ability to perform your daily living activities	1.11	0.722		
	Psychological Domain (PSD)	**6.58**	**1.935**	**0.324**	**0.37**
QOL02	You do enjoy life	1.15	0.612		
QOL04	You feel your life is meaningless	0.42	0.644		
QOL10	You are able to concentrate	1.23	0.640		
QOL13	You have negative feelings such as blue mood, despair, anxiety, depression*	1.39	0.642		
QOL20	You are able to accept your bodily appearance	1.15	0.690		
QOL24	You are satisfied with yourself	1.25	0.771		
	Social Relationship Domain (SRD)	**3.02**	**1.44**	**0.426**	**0.5**
QOL03	You are satisfied with your personal relationships	1.14	0.707		
QOL14	You are satisfied with the support you get from your friends	0.96	0.688		
QOL16	You are satisfied with your relationship with people of opposite sex	0.92	0.716		
	Environment Domain (END)	**8.37**	**3.662**	**0.79**	**0.84**
QOL06	You feel safe in your daily life	1.14	0.717		
QOL07	You live in a healthy physical environment	1.26	0.768		
QOL08	You are satisfied with your access to health services	1.11	0.742		
QOL11	You have enough money to meet your needs	0.79	0.697		
QOL17	You have available information that you need in your day-to-day life	0.96	0.688		
QOL19	You have enough opportunity for leisure activities	1.03	0.665		
QOL21	You are satisfied with the condition of your living place	1.09	0.740		
QOL23	You are satisfied with your transport	0.99	0.735		

4.2.2. Exploratory Factor Analysis for the adapted Quality Of life Instrument (WHOQOL-BREF)

4.2.2.1 Scree plot for the Parallel Analysis for the adjusted WHO QOL-BREF

The scree plot showing the number of factors to retain in the adjusted WHO QOL_BREF is shown in Figure 4.1 below. Three factors with Eigen values > 1 are shown to be retained. These two factors are the ones on the steep straight line just before the curve.

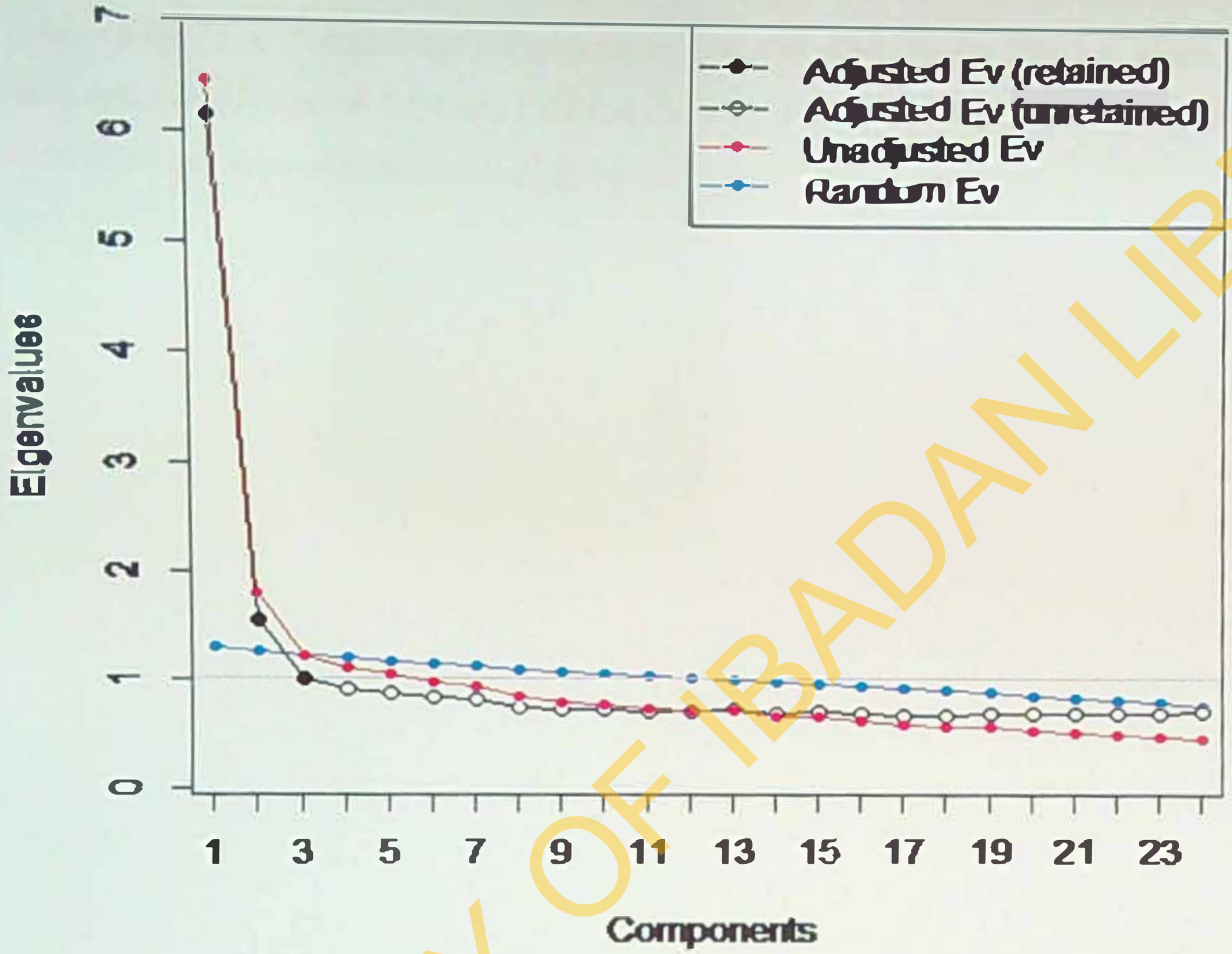

Figure 4.1: Scree plot for the Parallel Analysis for the adjusted WHO QOL-BREF

4.2.2.2 Horn's Parallel Analysis for Factor retention (for the adjusted WHO QOL-BREF)

Table 4.4 shows the result of the Parallel analysis in which three Factors were retained. Factors with eigenvalues larger than the average random eigenvalue from the parallel analysis were retained for EFA. Factor 1 had a Eigen value of 6.204, while factor 2 had an eigen value of 1.48 with estimated biases of 0.29 and 0.25 respectively. Factor 3 had an adjusted eigenvalue of 1.003838 and estimated bias of 0.212574.

Table 4.4 Results of Horn's Parallel Analysis for Factor retention (for the adjusted WHO QOL-BREF)

Component	Adjusted Eigenvalue	Unadjusted Eigenvalue	Estimated Bias
1	6.142825	6.432931	0.290105
2	1.549253	1.79586	0.246607
3	1.003838	1.216412	0.212574

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

4.2.2.3 Factor loadings on each of the three Factors retained in the parallel analysis of the Adapted WHOQOL-BREF

Factor loadings on each of the three factors retained in the parallel analysis of the adapted WHOQOL-BREF instrument are shown in Table 4.3. Twelve items loaded on the first, seven items on the second and four items loaded on the third Factors respectively. A Variable is said to load on a particular Factor if the absolute value of its factor loading is >0.30 and it's the highest for that variable. The items that loaded on each of the factors are shown in the table, where the loadings are highlighted. None of the Factor loadings of QOL16 (You are satisfied with your relationship with people of opposite sex) meets the criteria (>0.30), this item is dropped from subsequent analysis.

Table 4.5: Factor loadings on each of the three Factors retained in the parallel analysis of the Adapted WHOQOL-BREF

	Item	Factor 1	2	3
QOL01	You feel that physical pain prevents you from doing what you need to do*	0.017	-0.167	**0.660**
QOL05	You need some medical treatments to function in your daily life*	0.070	0.029	**0.634**
QOL04	You feel your life is meaningless	0.210	-0.348	**-0.583**
QOL13	You have negative feelings such as blue mood, despair, anxiety, depression*	0.131	-0.110	**0.568**
QOL09	You have enough energy for everyday life	**0.568**	0.344	0.127
QOL12	You are satisfied with your sleep	**0.578**	0.004	0.174
QOL18	You are satisfied with your capacity to work	**0.562**	0.370	-0.017
QOL22	You are satisfied with your ability to perform your daily living activities	**0.619**	0.327	-0.032
QOL21	You are satisfied with the condition of your living place	**0.564**	0.293	0.022
QOL24	You are satisfied with yourself	**0.501**	0.436	0.042
QOL03	You are satisfied with your personal relationships	**0.427**	0.122	0.132
QOL14	You are satisfied with the support you get from your friends	**0.578**	0.225	-0.185
QOL17	You have available information that you need in your day-to-day life	**0.466**	0.321	-0.180
QOL11	You have enough money to meet your needs	**0.637**	0.107	-0.140
QOL08	You are satisfied with your access to health services	**0.613**	0.222	0.100
QOL23	You are satisfied with your transport	**0.633**	0.204	-0.094
QOL15	You are able to get around well	0.208	**0.595**	-0.048
QOL02	You do enjoy life	0.216	**0.406**	-0.023
QOL10	You are able to concentrate	0.301	**0.395**	0.097
QOL20	You are able to accept your bodily appearance	0.162	**0.649**	-0.083
QOL16*	**You are satisfied with your relationship with people of opposite sex**	**0.195**	**0.294**	**-0.232**
QOL06	You feel safe in your daily life	0.149	**0.685**	0.016
QOL07	You live in a healthy physical environment	0.442	**0.464**	0.118
QOL19	You have enough opportunity for leisure activities	0.312	**0.496**	-0.186

Extraction Method: Principal Component Analysis.

4.2.2.4 Polychoric correlation matrix of adapted WHOQOL-BREF

Table 4.6 below shows the Polychoric correlation matrix of the WHOQOL-BREF. This was used to compute the Polychoric Alpha, the Polychoric alpha was obtained as 0.881364.

Table 4.6: Polychoric correlation matrix of adapted WHOQOL-BREF

	QOL01	QOL02	QOL03	QOL04	QOL05	QOL06	QOL07	QOL08	QOL09	QOL10	QOL11	QOL12	QOL13	QOL14	QOL15	QOL16	QOL17	QOL18	QOL19	QOL20	QOL21	QOL22	QOL23	QOL24	QOL25	QOL26
QOL01	1																									
QOL02	0.41	1																								
QOL03	0.04	0.17	1																							
QOL04	0.08	0.1	0.42	1																						
QOL05	-0.1	0.03	0.36	0.31	1																					
QOL06	-0.07	0.06	0.3	0.36	0.41	1																				
QOL07	-0.1	0.03	0.31	0.35	0.16	0.56	1																			
QOL08	-0.09	0.03	0.3	0.2	0.2	0.26	0.28	1																		
QOL09	-0.24	-0.29	-0.07	0	-0.06	0	0.04	-0.02	1																	
QOL10	-0.04	0.04	0.41	0.33	0.34	0.41	0.35	0.24	-0.11	1																
QOL11	0.3	0.19	0.03	0.13	-0.01	0.04	0.07	-0.03	-0.26	0.06	1															
QOL12	-0.12	0.03	0.32	0.2	0.45	0.41	0.41	0.28	-0.04	0.32	-0.07	1														
QOL13	-0.05	0.06	0.47	0.28	0.4	0.52	0.63	0.34	-0.12	0.28	0.07	0.41	1													
QOL14	0.02	0.07	0.33	0.29	0.22	0.26	0.18	0.27	-0.06	0.29	0.1	0.15	0.3	1												
QOL15	-0.12	0.04	0.43	0.3	0.36	0.46	0.5	0.26	0.12	0.26	-0.06	0.31	0.45	0.26	1											
QOL16	-0.08	-0.03	0.18	0.08	0.24	0.25	0.25	0.23	0.01	0.14	-0.21	0.21	0.27	0.2	0.29	1										
QOL17	-0.12	-0.08	0.29	0.18	0.4	0.38	0.31	0.36	0.17	0.36	-0.02	0.4	0.39	0.23	0.3	0.15	1									
QOL18	-0.04	0.09	0.56	0.32	0.38	0.45	0.46	0.3	-0.13	0.35	0.04	0.35	0.5	0.28	0.35	0.16	0.49	1								
QOL19	-0.08	0.09	0.55	0.4	0.3	0.43	0.46	0.3	-0.03	0.32	0.07	0.29	0.41	0.29	0.35	0.17	0.36	0.55	1							
QOL20	-0.09	0	0.39	0.33	0.31	0.41	0.41	0.26	0.12	0.3	-0.05	0.25	0.39	0.28	0.44	0.19	0.3	0.43	0.39	1						
QOL21	-0.13	-0.05	0.39	0.28	0.4	0.47	0.43	0.2	0.05	0.39	-0.02	0.37	0.35	0.22	0.46	0.28	0.34	0.33	0.35	0.41	1					
QOL22	-0.16	-0.06	0.4	0.22	0.39	0.4	0.45	0.28	0.03	0.21	-0.06	0.41	0.45	0.18	0.42	0.25	0.39	0.4	0.35	0.33	0.36	1				
QOL23	-0.02	0.04	0.43	0.3	0.27	0.5	0.54	0.32	0.05	0.26	0.06	0.4	0.52	0.33	0.41	0.28	0.33	0.42	0.44	0.38	0.43	0.33	1			
QOL24	-0.13	0	0.43	0.25	0.32	0.46	0.56	0.23	-0.01	0.29	0.03	0.28	0.54	0.27	0.47	0.23	0.3	0.4	0.46	0.5	0.39	0.37	0.54	1		
QOL25	-0.03	0.06	0.47	0.28	0.4	0.52	0.63	0.34	-0.12	0.28	0.07	0.41	1													
QOL26	-0.02	0.07	0.33	0.29	0.22	0.26	0.18	0.27	-0.06	0.29	0.1	0.15	0.3	1												

4.2.3 Exploratory Factor Analysis for the Child Depression Inventory (CDI)

4.2.3.1 Scree plot for the Parallel Analysis for the Child depression Inventory.

The scree plot showing the number of factors to retain in the adjusted WHO QOL_BREF is shown in Figure 4.2 below. Two factors with Eigen values > 1 are retained. These two factors are the ones on the steep straight line just before the curve.

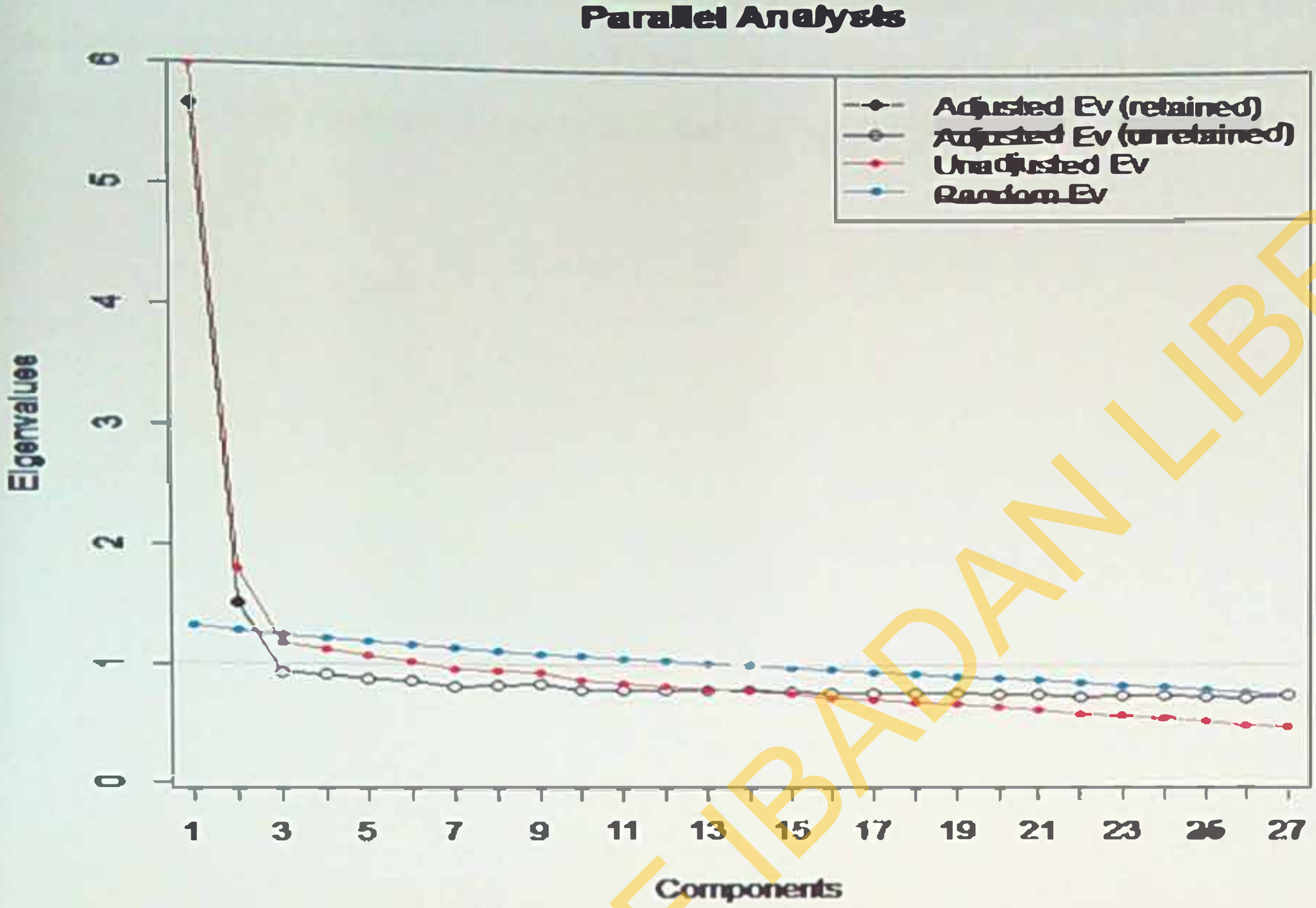

Figure 4.2: Scree plot for the Parallel Analysis for the Child Depression Inventory

4.2.3.2 Horn's Parallel Analysis for Factor retention (for the CDI)

Table 4.7 shows the result of the Parallel analysis for the CDI in which only two Factors were retained. Factors with eigenvalues larger than the average random eigenvalue from the parallel analysis were retained for EFA. While Factor 1 had an Eigen value of 5.67, factor 2 had an Eigen value of 1.52 with estimated biases of 0.31 and 0.27 respectively.

Table 4.7 Results of Horn's Parallel Analysis for component retention (for the Child Depression Inventory)

Component	Adjusted Eigenvalue	Unadjusted Eigenvalue	Estimated Bias
1	5.669760	5.984740	0.314979
2	1.519332	1.789761	0.270429

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

4.2.3.3 Factor loadings on each of the two Factors retained in the parallel analysis of the CDI

Factor loadings on each of the two factors retained in the parallel analysis are shown in Table 4.8. The Child Depression inventory has 27 items in all, 19 items loaded on the first Factor and eight loaded on the second factor respectively. Items that loaded on the second factor include sleeping well, being alright with school work, liking oneself and some other positive image items. However, items that loaded on the first factor include sadness, crying always, fighting and not feeling like eating.

Table 4.8: Factor loadings on each of the two components retained in the parallel analysis of the Child Depression Inventory.

Rotated Component Matrix

		Factors	
		1	2
CDI01	I am sad all the time	**0.553**	0.019
CDI06	I am sure that terrible things will happen to me	**0.609**	0.150
CDI10	I feel like crying everyday	**0.590**	0.130
CDI11	Things bother me all the time	**0.582**	0.009
CDI17	I am tired all the time	**0.534**	0.069
CDI18	Most days I don't feel like eating	**0.432**	-0.048
CDI27	I get into fights all the time	**0.562**	0.061
CDI02	Nothing will ever work for me	**0.585**	0.048
CDI08	All bad things are my fault	**0.541**	0.070
CDI09	I want to kill myself	**0.534**	0.210
CDI14	I look ugly	**0.524**	0.139
CDI25	Nobody really loves me	**0.560**	0.112
CDI03	I do everything wrong	**0.555**	0.094
CDI04	Nothing is fun at all	**0.505**	0.028
CDI05	I am bad all the time	**0.589**	0.094
CDI13	I cannot make up my mind about things	**0.434**	0.007
CDI21	I never have fun at school	**0.402**	-0.056
CDI24	I can never be as good as other kids	**0.521**	0.140
CDI26	I never do what I am told	**0.514**	0.114
CDI16	I sleep pretty well	0.194	**0.480**
CDI19	I don't worry about aches and pains	-0.255	**0.332**
CDI07	I like myself	0.260	**0.560**
CDI15	Doing school work is not a big problem	0.040	**0.406**
CDI23	My school work is alright	0.161	**0.494**
CDI12	I like being with people	0.135	**0.588**
CDI20	I do not feel alone	-0.126	**0.465**
CDI22	I have plenty of friends	0.043	**0.524**

Extraction Method: Principal Component Analysis.

4.2.3.4 Polychoric Correlation Matrix and Polychoric / Ordinal Alpha of the Child Depression Inventory.

The Polychoric correlation matrix used to compute the Polychoric Alpha for the Child Depression Inventory is shown in table 4.9 below. This was used to calculate the Polychoric alpha, which was obtained as 0.887334.

Table 4.9: Polychoric correlation matrix of Child Depression Inventory

	CD101	CD106	CD110	CD111	CD116	CD117	CD118	CD119	CD127	CD102	CD107	CD108	CD109	CD114	CD125	CD103	CD104	CD105	CD113	CD115	CD121	CD123	CD124	CD112	CD120	CD122	CD126
CD101	1																										
CD106	0.37	1																									
CD110	0.43	0.46	1																								
CD111	0.45	0.51	0.6	1																							
CD116	0.17	0.2	0.19	0.21	1																						
CD117	0.37	0.42	0.43	0.35	0.19	1																					
CD118	0.31	0.26	0.36	0.32	0.16	0.31	1																				
CD119	-0.12	-0.12	-0.12	-0.13	0.04	-0.11	-0.1	1																			
CD127	0.33	0.43	0.42	0.3	0.18	0.39	0.22	-0.17	1																		
CD102	0.44	0.55	0.34	0.4	0.25	0.33	0.22	-0.18	0.44	1																	
CD107	0.14	0.37	0.31	0.21	0.27	0.2	0.16	0.02	0.28	0.3	1																
CD108	0.35	0.47	0.4	0.39	0.2	0.36	0.23	-0.1	0.4	0.39	0.18	1															
CD109	0.33	0.51	0.54	0.34	0.25	0.38	0.28	-0.06	0.49	0.45	0.44	0.49	1														
CD114	0.28	0.47	0.41	0.35	0.2	0.32	0.25	-0.1	0.39	0.37	0.3	0.34	0.49	1													
CD125	0.32	0.37	0.4	0.34	0.13	0.3	0.3	-0.07	0.44	0.43	0.27	0.35	0.41	0.37	1												
CD103	0.42	0.47	0.37	0.4	0.16	0.4	0.26	-0.08	0.39	0.44	0.21	0.4	0.36	0.34	0.41	1											
CD104	0.34	0.39	0.27	0.33	0.11	0.27	0.21	-0.13	0.33	0.38	0.19	0.31	0.33	0.3	0.35	0.38	1										
CD105	0.45	0.48	0.39	0.33	0.19	0.41	0.26	-0.18	0.44	0.48	0.29	0.45	0.57	0.44	0.37	0.5	0.36	1									
CD113	0.24	0.27	0.35	0.31	0.08	0.25	0.22	-0.03	0.19	0.27	0.16	0.33	0.36	0.27	0.32	0.22	0.33	0.26	1								
CD115	0.08	0.13	0.12	0.03	0.13	0.1	0.03	0.09	0.1	0.06	0.13	0.05	0.04	0.04	0.14	0.1	0.07	0.07	0.05	1							
CD121	0.28	0.32	0.23	0.23	0.1	0.25	0.22	-0.17	0.25	0.25	0.09	0.19	0.25	0.24	0.36	0.16	0.28	0.23	0.22	0.01	1						
CD123	0.15	0.21	0.21	0.12	0.28	0.13	0.05	0.05	0.13	0.16	0.31	0.18	0.2	0.13	0.19	0.13	0.1	0.21	0.16	0.2	0.1	1					
CD124	0.36	0.37	0.37	0.34	0.25	0.31	0.2	-0.13	0.46	0.41	0.2	0.29	0.31	0.37	0.48	0.34	0.39	0.38	0.27	0.08	0.39	0.23	1				
CD112	0.09	0.16	0.15	0.05	0.27	0.19	0.02	0	0.19	0.08	0.45	0.12	0.3	0.22	0.16	0.17	0.18	0.21	-0.02	0.18	0.11	0.2	0.21	1			
CD120	0.03	-0.06	-0.04	-0.04	0.14	0.01	-0.07	0.23	-0.05	-0.06	0.11	-0.01	0.02	0.02	0.02	0.01	-0.02	-0.05	-0.03	0.15	-0.06	0.08	0.04	0.15	1		
CD122	0.11	0.12	0.16	0.12	0.21	0.01	0.06	0.08	0	0.1	0.28	0.11	0.14	0.09	0.09	0.12	0.08	0.08	0.09	0.13	0.06	0.23	0.05	0.26	0.16	1	
CD126	0.28	0.34	0.32	0.24	0.15	0.33	0.3	-0.11	0.48	0.3	0.21	0.31	0.38	0.36	0.47	0.42	0.33	0.37	0.34	0.13	0.22	0.14	0.33	0.21	0.01	0.08	1

4.2.4 Reliability of the New Hypothesized Subscales of the CDI and Adapted WHOQOL-BREF.

The Polychoric and Cronbach alphas for the Subscales and their respective number of items of the WHOQOL-BREF and the CDI are presented in Table 4.10 below. The polychoric alpha value was consistently higher than the Cronbach alpha, however, both showed a reasonably reliable subscale except for factor 3 of the QOL (α=0.08, αp=0.08). Both the CDI and QOL had a high reliability. For instance the CDI has a Cronbach alpha value of 0.840, while the QOL has a value 0.847. Similarly, the polychoric alphas also showed high reliability, with values of 0.887 and 0.881 for the CDI and QOL respectively.

Table 4.10. Reliability of the New Hypothesized Subscales of the CDI and . Adapted WHOQOL-BREF.

Scale	N of items	Cronbach's Alpha	Polychronic Alpha
QOL			
Factor 1	12	0.854	0.88
Factor 2	7	0.727	0.79
Factor 3	4	0.088	0.08
Combine	23	0.847	0.88
CDI			
Factor 1	19	0.865	0.91
Factor 2	8	0.550	0.63
Combine	27	0.840	0.89

4.3. CONFIRMATORY FACTOR ANALYSIS

4.3.1 Child depression inventory

4.3.1.1 Path Diagram showing the five factor Model for the CDI (the Theoretical Model)

A path diagram is drawn to show the relationship between the manifest variables of the CDI and their Latent constructs in Figure 4.3. The boxes represent the manifest/observed variables and the Circles or Ovals represent the latent Variables. Double arrow headed lines shows the correlation between the two latent constructs of the CDI while the single headed arrow lines shows the effect of the latent construct on the manifest variable. This model shows five factors for the CDI, with the respective variables loading on them. The factors include Anhedonia, Ineffectiveness, Negative self esteem, interpersonal and Negative mood scale.

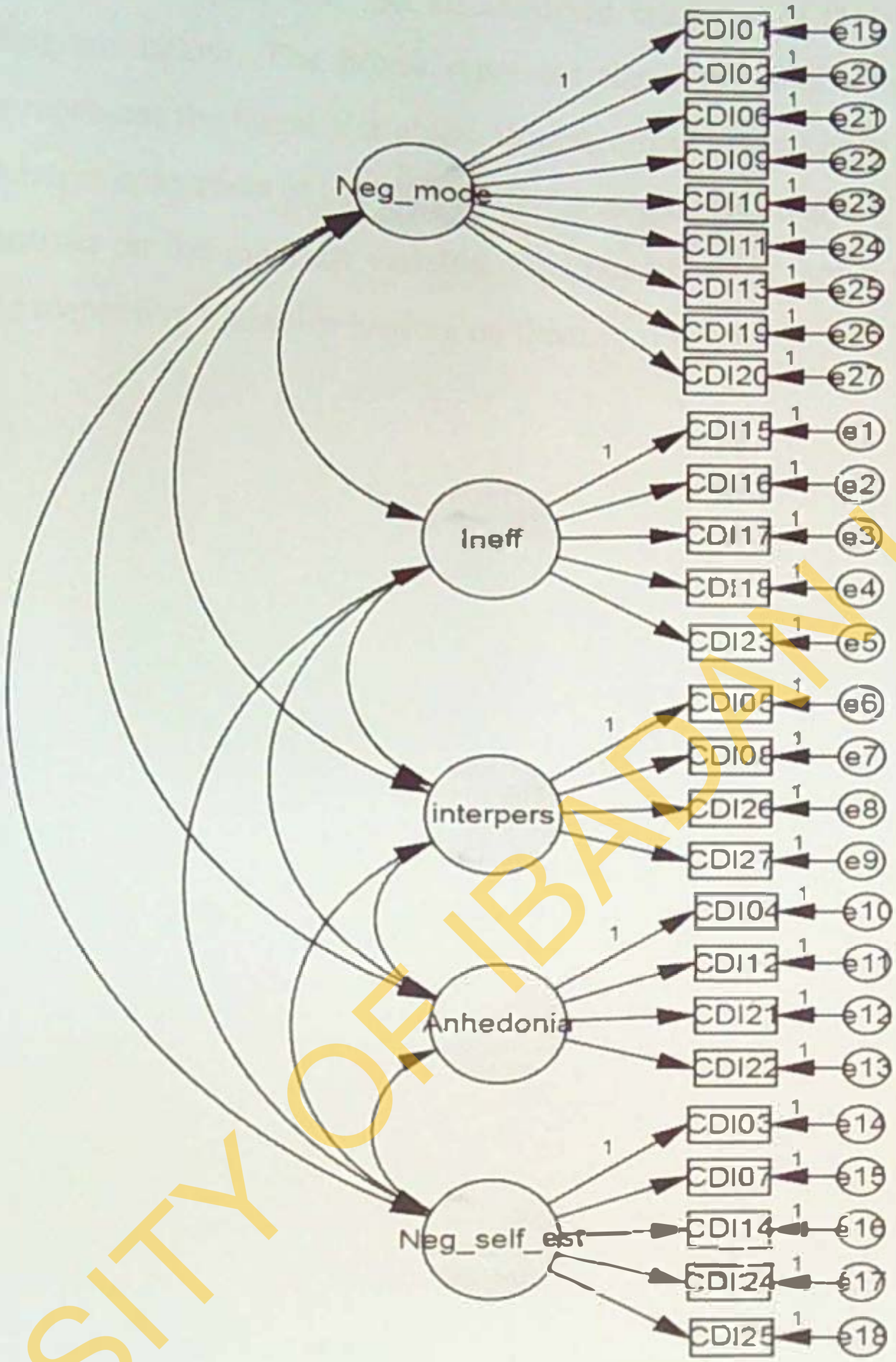

Figure 4.3 Path diagram showing the 5 factor model of the Child depression inventory (theoretical model)

4.3.1.2 Path Diagram showing the Hypothesized Model for the CDI

A path diagram is drawn to show the relationship between the manifest variables of the CDI and their Latent constructs in Figure 4.4. The standardized estimates of the regression weights are shown in the diagram below. The boxes represent the manifest/observed variables and the Circles or Ovals represent the latent Variables. Double arrow headed lines shows the correlation between the two latent constructs of the CDI while the single headed arrow lines shows the effect of the latent construct on the manifest variable. This hypothesized model shows two factors for the CDI, with the respective variables loading on them.

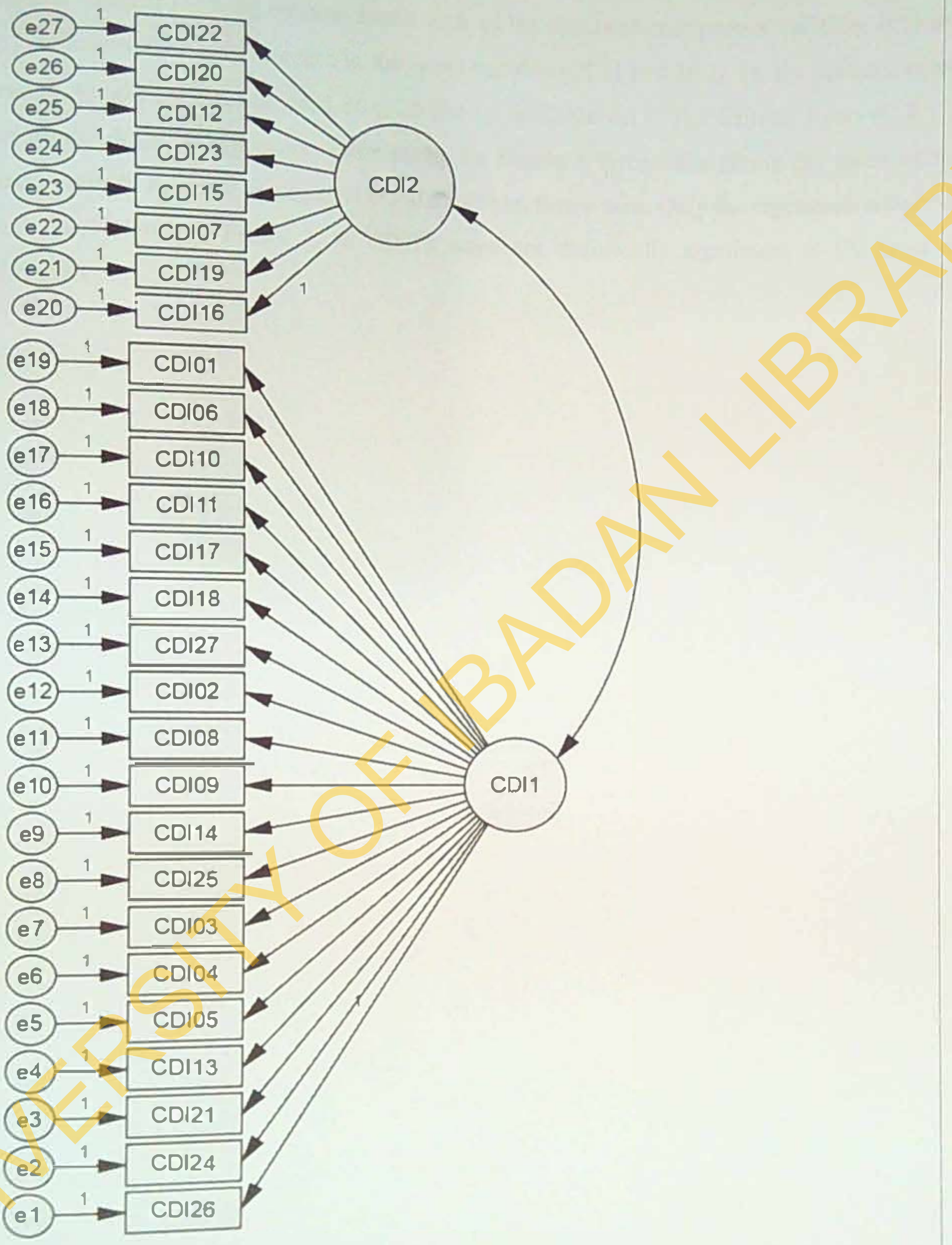

Figure 4.4: Path Diagram Showing the 2 factor model of the CDI (the hypothesized model).

4.3.1.3. Regression Weights of the Child Depression Inventory

Regression weights showing by how much each of the observed endogenous variables (CDI01-CDI27) increases for a unit increase in the latent variable (CDI1 or CDI2), i.e. the estimate of the regression weight and its standard error is shown in Table 4.11. The Critical Ratio (C.R.) is gotten by dividing the regression estimate by its Standard Error, thus giving the value of the regression weight estimate in terms of Standard Errors above zero. Only the regression weight of Factor2 on CDI20 and Factor 2 on CDI19 were not statistically significant at 1% level of Significance.

Table 4.11: Regression Weights of the Child Depression Inventory

			Estimate	S.E.	P
CDI26	<---	F1	0.528		
CDI24	<---	F1	0.501	0.088	< 0.001
CDI21	<---	F1	0.353	0.075	< 0.001
CDI13	<---	F1	0.367	0.069	< 0.001
CDI05	<---	F1	0.670	0.078	< 0.001
CDI04	<---	F1	0.464	0.071	< 0.001
CDI03	<---	F1	0.615	0.078	< 0.001
CDI25	<---	F1	0.519	0.081	< 0.001
CDI14	<---	F1	0.539	0.080	< 0.001
CDI09	<---	F1	0.577	0.062	< 0.001
CDI08	<---	F1	0.535	0.076	< 0.001
CDI02	<---	F1	0.551	0.082	< 0.001
CDI27	<---	F1	0.574	0.076	< 0.001
CDI18	<---	F1	0.332	0.064	< 0.001
CDI17	<---	F1	0.503	0.076	< 0.001
CDI11	<---	F1	0.481	0.075	< 0.001
CDI10	<---	F1	0.581	0.077	< 0.001
CDI06	<---	F1	0.583	0.080	< 0.001
CDI01	<---	F1	0.526	0.073	< 0.001
CDI16	<---	F2	0.429		
CDI19	<---	F2	0.034	0.093	0.415
CDI07	<---	F2	0.508	0.137	< 0.001
CDI15	<---	F2	0.243	0.116	< 0.001
CDI23	<---	F2	0.446	0.142	< 0.001
CDI12	<---	F2	0.487	0.140	< 0.001
CDI20	<---	F2	0.124	0.102	0.003
CDI22	<---	F2	0.366	0.139	< 0.001

4.3.1.4. Correlation of the latent constructs of the child depression inventory.

An estimate of the correlation between the two Latent constructs of the Child depression inventory Scale (shown in Table 4.12) is given as 0.388. This shows that the two latent constructs are positively related to each other.

Table 4.12. Correlations of the two factors of the CDI

	Estimate
CDI1 <--> CDI2	0.388

4.3.1.5 Squared multiple correlations of the components of the child depression inventory.

The squared multiple correlations of the Observed/Manifest variables of the CDI, which is the proportion of its variance explained by its predictors, are shown in Table 4.13. For example, 13.4%, 1.5%, 23.7% and 19.9% of the individual variances for the Variables CDI22, CDI20, CDI12, and CDI23 respectively are explained by the predictor F1. Similarly, 33.7%, 25.8%, 34.0% and 45.0% of the individual variances of the observed/manifest variables CDI10, CDI07, CDI06, and CDI05 respectively, are explained by the Latent Variable F2.

Table 4.13. Squared Multiple Correlations of Variables of the Child Depression Inventory.

Manifest/observed Variables	Estimate
CDI22	0.134
CDI20	0.015
CDI12	0.237
CDI23	0.199
CDI15	0.059
CDI07	0.258
CDI19	0.001
CDI16	0.184
CDI01	0.276
CDI06	0.340
CDI10	0.337
CDI11	0.231
CDI17	0.253
CDI18	0.111
CDI27	0.329
CDI02	0.303
CDI08	0.286
CDI09	0.333
CDI14	0.291
CDI25	0.269
CDI03	0.378
CDI04	0.215
CDI05	0.450
CDI13	0.135
CDI21	0.125
CDI24	0.251
CDI26	0.278

4.3.1.6 Model Fit Summary of the Child Depression Inventory.

Model Fit indices for the hypothesized and theoretical models are respectively shown in Table 4.14. The Value of the minimum sample discrepancy (CMIN) and the value when it is divided by its degrees of freedom (CMIN/DF) for the hypothesized model are given as 927.996 and 2.873, respectively. The RMR and RMSEA reports values less than 0.5. All the values of the GFI, AGFI, PGFI, and CFI are close to 1 for the hypothesized model. The AIC for the Hypothesized model is given as 1037.996. However, the theoretical model was not identified by this sample.

Table 4.14 Summary of Model Fit indices of the model fitted for the Child Depression Inventory Scale.

Index	Hypothesized Model	Theoretical model*
CMIN	927.996	
CMIN/DF	2.873	
RMR	0.022	
GFI	0.930	
AGFI	0.918	
PGFI	0.794	
CFI	0.879	
RMSEA	0.044	
AIC	1037.996	
BIC	1306.980	

*Model unidentified

4.3.2. Confirmatory factor analysis of the adapted WHOQOL-BREF.

4.3.2.1. Path diagram showing domains of 4-factor model of the adapted WHOQOL-BREF.

The relationship between the manifest variables of the Adapted WHOQoL-BREF and their Latent constructs are shown in the path diagram in Fig. 4.4. The model shows four factors for the instrument, with the various items loading on them. The factors include Physical health domain (PHD), the Psychological Domain (PSD), Environmental Domain (END), and the Social Relationship domain (SRD).

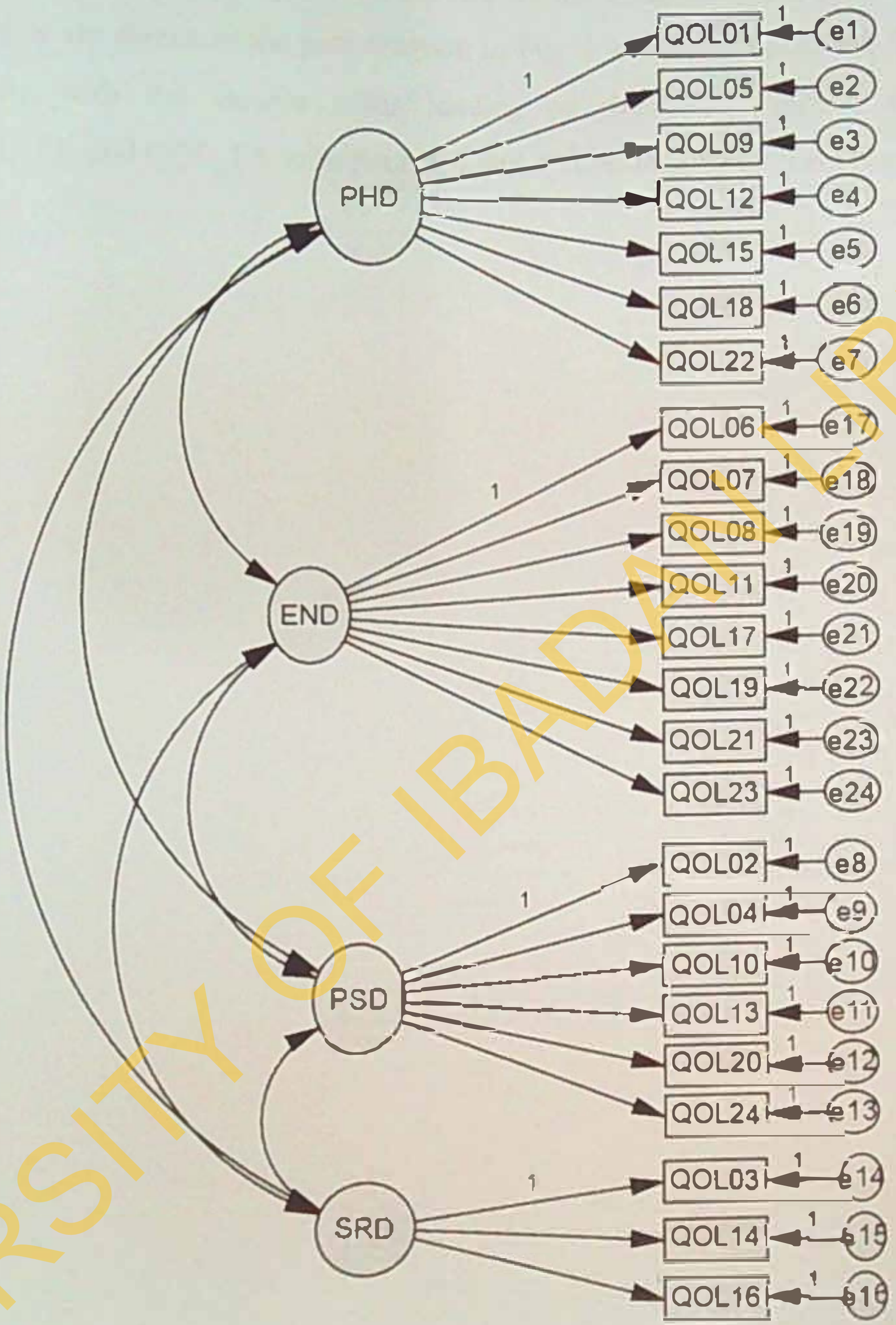

Figure 4.4 Path Diagram Showing Domains Of the 4-factor model of the Adapted WHOQoL-BREF (Theorectical model).

4.3.2.2. Path diagram showing domains of 3-factor model of the adapted WHOQOL-BREF (Hypothesized model).

The relationship between the manifest variables of the Adapted WHOQoL-BREF and their Latent constructs are shown in the path diagram in Fig. 4.4. The model shows three factors for the instrument, with the various items loading on them. The factors are labelled as QOL_F1,QOL_F2, and QOL_F3, with twelve, 7 and 4 items loading on them respectively.

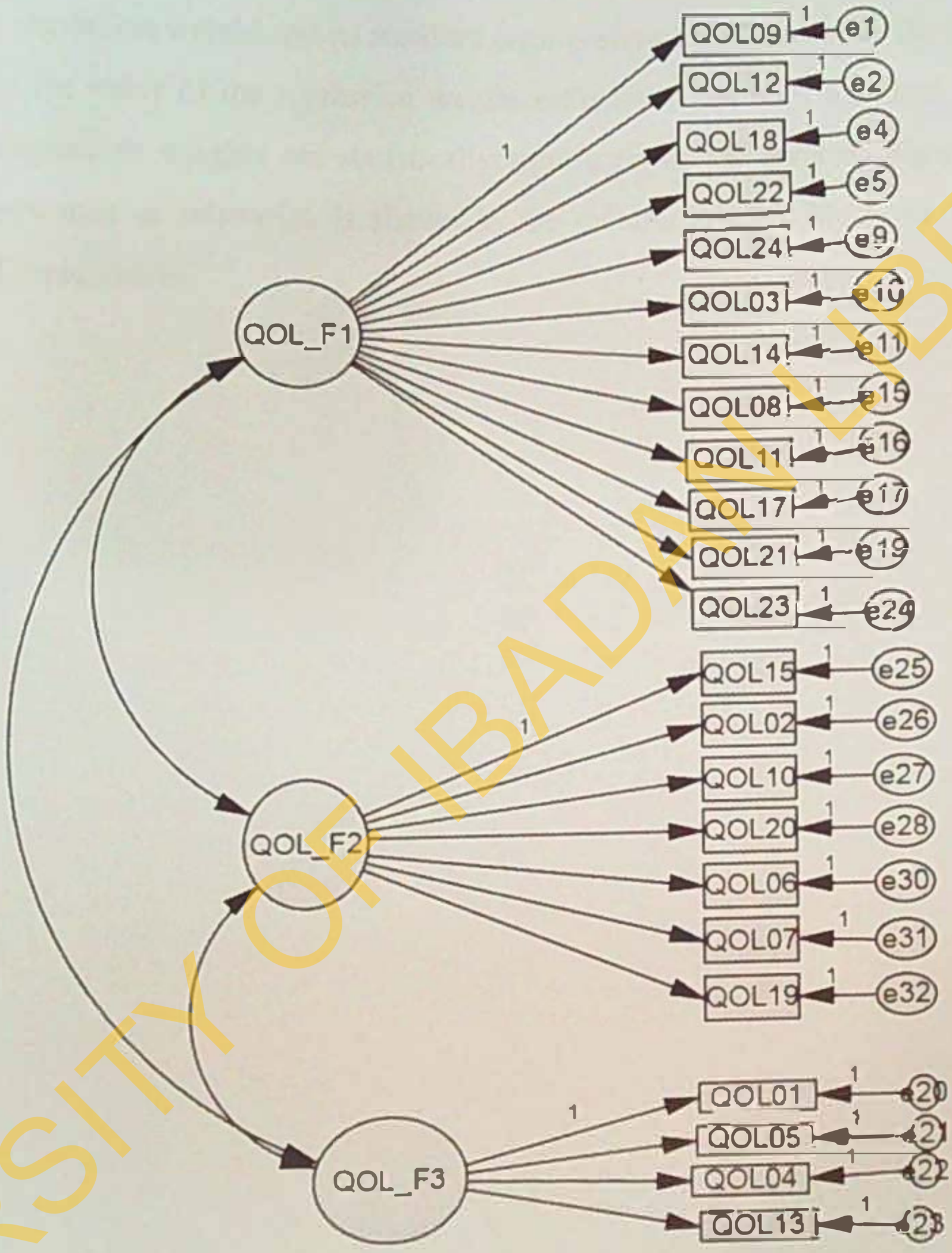

Figure 4.5 Path Diagram Showing Domains Of the 3-factor model of the Adapted WHOQoL-BREF (Hypothesized model).

4.3.2.3 Regression weights of the 3- factor model of the adapted WHOQOL-BREF

Regression weights showing the Increase in the observed endogenous variables (QOL01-QOL24) for a unit increase in the latent variable (QOL_F1, QOL_F2 or QOL_F3), i.e. the estimate of the regression weight and its standard error is shown in Table 4.15. The Critical Ratio (C.R.) which is the value of the regression weight estimate in terms of Standard Errors above zero. All the regression weights are statistically significant at 1% level of Significance. This statistical significance or otherwise is shown in the column labelled P shows the statistical significance of these values.

Table 4.15: Regression Weights of the items of the 3-factor model of the Adapted WHOQOL-BREF on each of its domains.

			Estimate	S.E.	C.R.	P
QOL09	<---	QOL_F1	0.569			
QOL12	<---	QOL_F1	0.428	0.063	11.482	< 0.001
QOL18	<---	QOL_F1	0.562	0.072	14.199	< 0.001
QOL22	<---	QOL_F1	0.653	0.076	15.768	< 0.001
QOL24	<---	QOL_F1	0.670	0.081	16.043	< 0.001
QOL03	<---	QOL_F1	0.413	0.066	11.131	< 0.001
QOL14	<---	QOL_F1	0.553	0.070	14.029	< 0.001
QOL08	<---	QOL_F1	0.605	0.078	14.961	< 0.001
QOL11	<---	QOL_F1	0.545	0.069	13.883	< 0.001
QOL17	<---	QOL_F1	0.509	0.070	13.171	< 0.001
QOL21	<---	QOL_F1	0.626	0.079	15.317	< 0.001
QOL23	<---	QOL_F1	0.629	0.079	15.375	<0.001
QOL15	<---	QOL_F2	0.553			
QOL02	<---	QOL_F2	0.480	0.069	12.087	< 0.001
QOL10	<---	QOL_F2	0.454	0.071	11.590	< 0.001
QOL20	<---	QOL_F2	0.547	0.082	13.309	< 0.001
QOL06	<---	QOL_F2	0.564	0.081	13.590	< 0.001
QOL07	<---	QOL_F2	0.614	0.090	14.391	< 0.001
QOL19	<---	QOL_F2	0.498	0.073	12.422	< 0.001
QOL01	<---	QOL_F3	0.554			
QOL04	<---	QOL_F3	-0.385	0.109	-6.514	< 0.001
QOL05	<---	QOL_F3	0.513	0.152	6.821	< 0.001
QOL13	<---	QOL_F3	0.350	0.104	6.206	< 0.001

4.3.2.4 CORRELATION OF THE LATENT CONSTRUCTS OF THE ADAPTED WHOQOL-BREF.

The correlation between the Latent constructs of the Adapted WHOQOL-BREF Scale is shown in Table 4.16. While the correlation between factor 3 and factor 2 is -0.013, that between factors 1 and 2 is 0.932, and that between factors 1 and 3 is 0.009. The correlation between Factor 1 and 2 is higher than that of the other factor.

Table 4.16 Correlation of the Latent constructs of the Adapted WHOQOL-BREF.

			Estimate
QOL_F1	<-->	QOL_F3	0.009
QOL_F1	<-->	QOL_F2	0.932
QOL_F3	<-->	QOL_F2	-0.013

4.3.2.5 SQUARED MULTIPLE CORRELATIONS OF THE OBSERVED VARIABLES OF THE ADAPTED WHOQOL-BREF INSTRUMENT.

The Squared multiple correlations of the Manifest/observed variables for the Adapted WHOQOL-BREF are shown in Table 4.17. This is the proportion, for a particular Manifest/observed Variable, of its variance explained by its predictors. For example, for the Variables QOL01, QOL05, QOL04 and QOL13 are 30.6%, 26.1%, 15.1%, 12.2% of their individual variances explained by the predictor QOL_F3.

Table 4.17 Squared Multiple Correlations of the Observed Variables of the Adapted WHOQOL-BREF Instrument

Manifest/ Observed Variable	Estimate
QOL23	0.396
QOL01	0.306
QOL05	0.263
QOL04	0.148
QOL13	0.122
QOL21	0.391
QOL19	0.248
QOL17	0.259
QOL11	0.297
QOL08	0.366
QOL07	0.378
QOL06	0.318
QOL14	0.306
QOL03	0.170
QOL24	0.449
QOL20	0.300
QOL10	0.206
QOL02	0.230
QOL22	0.426
QOL18	0.316
QOL15	0.306
QOL12	0.183
QOL09	0.324

4.3.2.6 Model fit summary of the adapted WHOQOL-BREF

Table 4.18 shows the indices of Model Fit for the hypothesized and theoretical models constructed for the adapted WHOQOL-BREF instrument.

For the hypothesized model, the minimum sample discrepancy (CMIN) is given as 720.842, and the value when it is divided by its degrees of freedom (CMIN/DF) is given as 3.176. The RMR and RMSEA are 0.021 and 0.047 respectively, while the values of the GFI, AGFI, PGFI, and CFI are close to 1. The values of the AIC and BIC are respectively given as 818.842 and 1058.482. However, the values of the fit indices for the theoretical model of the QOL consistently differed from that of the hypothesized model. For instance, the AIC for the theoretical model is 1094.459 which is higher than that of the hypothesized model (818.842). In a similar way, the BIC of the theoretical model (1358.552) was higher than that of the hypothesized model.

Table 4.19 Summary of Model Fit indices of the adapted WHOQOL-BREF Scale.

Index	Hypothesized Model	Theoretical model
CMIN	720.842	986.459
CMIN/DF	3.176	4.010
RMR	0.021	0.024
GFI	0.938	0.916
AGFI	0.924	0.897
PGFI	0.771	0.751
CFI	0.906	0.862
RMSEA	0.047	0.055
PCLOSE	0.892	0.007
AIC	818.842	1094.459
BIC	1058.482	1358.552

4.4 STRUCTURAL EQUATION MODEL OF THE RELATIONSHIP BETWEEN CDI AND ADAPTED WHOQOL-BREF

4.4.1. Path diagram showing relationship between the 5 factor model of the CDI and the 4 factor model of the adapted WHOQOL-BREF.

The relationship between the two scales for assessing Childhood/Adolescent depression and Quality of Life,The CDI and the adapted WHOQOL-BREF respectively, is shown in the path diagram below. The CDI has a 5 factor structure and it's influence on the QOL is assessed.

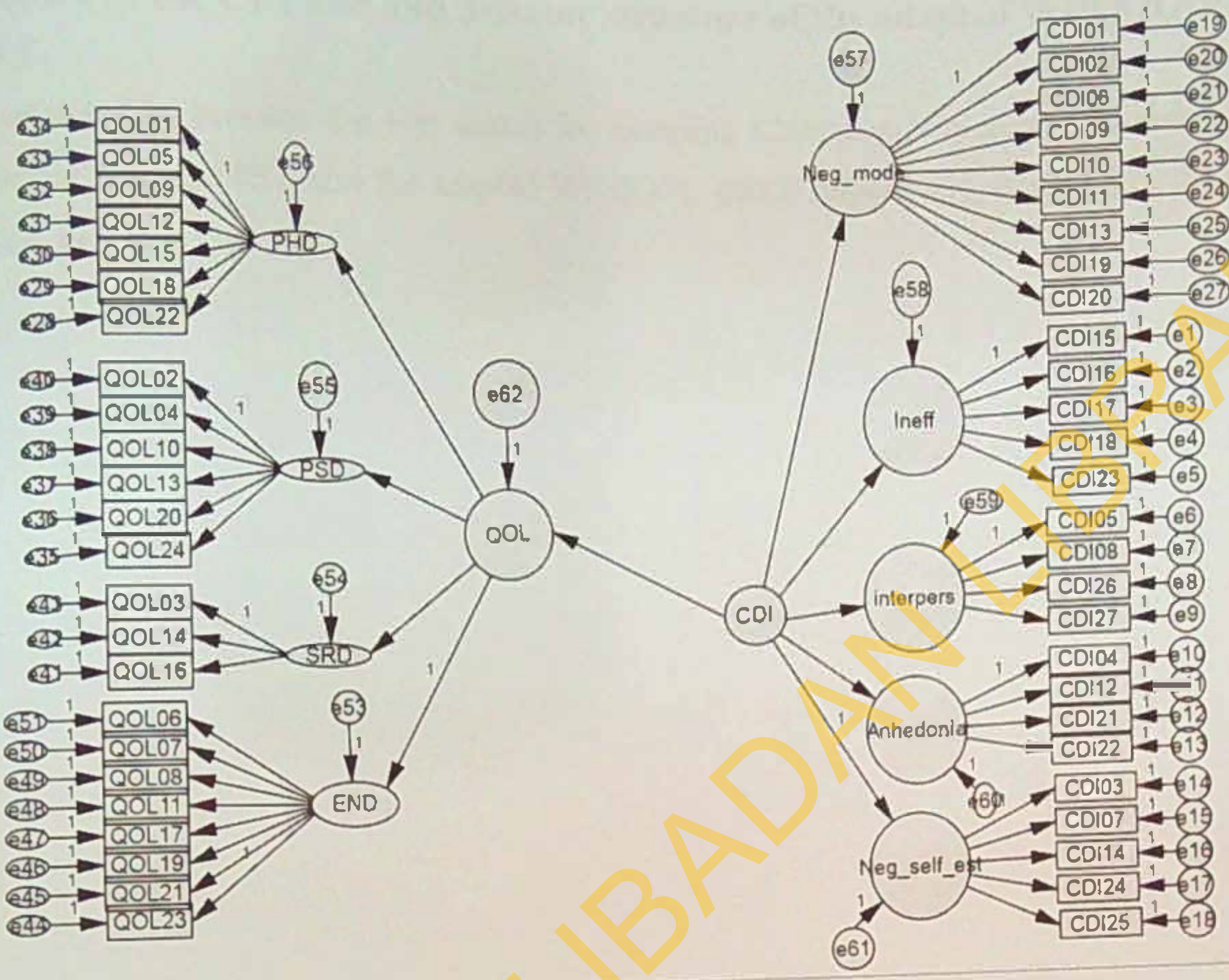

Figure 4.6 Path Diagram Showing the relationship between quality of life and child depression Of the 3-factor model of the Adapted WHOQoL-BREF (Theoretical model).

4.4.2. Path diagram showing relationship between the hypothesized 2 factor structure of the CDI and and 3-factor structure of the adapted WHOQOL-BREF.

The relationship between the two scales for assessing Childhood/Adolescent depression and Quality of Life,The CDI and the adapted WHOQOL-BREF respectively, is shown in the path diagram below. .

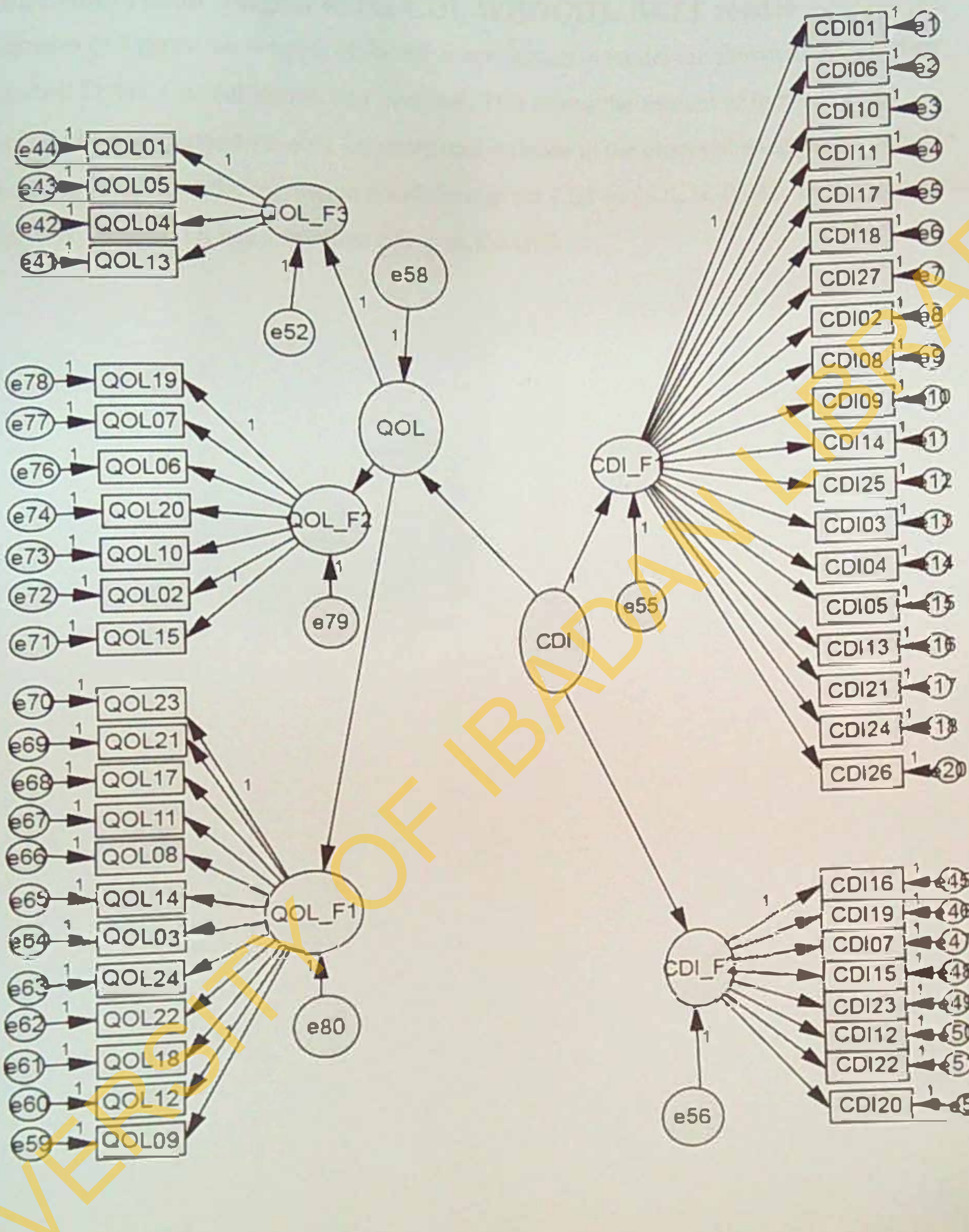

Figure 4.7 Path diagram of the causal relationship between Childhood/Adolescent depression (Measured by the CDI) and their quality of life (Measured by the adapted WHOQOL-BREF)

4.4.3. Regression weights of the CDI, WHOQOL-BREF model

Estimates of Regression weights of the Structural equation model are shown alongside their Standard Errors, Critical Ratios, and P-values. This shows the amount of increase in the unobserved endogenous variable for every unit increase in the observed endogenous variable. The table shows that the regression coefficient of the CDI on QOL is -0.048. That is depression measured by the CDI has a negative effect on the QOL.

Table 4.20: Regression weights of the variables in the CDI, Adapted WHOQOL-BREF model.

			Estimate	S.E.	P
QOL	<---	CDI	-0.048	0.002	0.761
QOL_F3	<---	QOL	0.034		
CDI_F1	<---	CDI	2.515	2.264	0.732
CDI_F2	<---	CDI	0.154	0.129	0.733
QOL_F2	<---	QOL	-0.903	32.700	0.452
QOL_F1	<---	QOL	-1.036	47.796	0.457
CDI09	<---	CDI_F1	0.576	0.066	<0.001
CDI14	<---	CDI_F1	0.538	0.086	<0.001
CDI25	<---	CDI_F1	0.519	0.087	<0.001
CDI03	<---	CDI_F1	0.615	0.084	<0001
QOL13	<---	QOL_F3	0.346	0.101	<0.001
QOL04	<---	QOL_F3	-0.383	0.106	<0.001
QOL05	<---	QOL_F3	0.506	0.147	<0.001
QOL01	<---	QOL_F3	0.566		
CDI16	<---	CDI_F2	0.428		
CDI19	<---	CDI_F2	0.033	0.093	0.422
CDI07	<---	CDI_F2	0.508	0.137	<0.001
CDI15	<---	CDI_F2	0.242	0.117	<0.001
CDI23	<---	CDI_F2	0.446	0.142	<0.001
CDI12	<---	CDI_F2	0.487	0.141	<0.001
CDI22	<---	CDI_F2	0.366	0.140	<0.001
CDI01	<---	CDI_F1	0.526		
CDI06	<---	CDI_F1	0.583	0.086	<0.001
CDI10	<---	CDI_F1	0.580	0.083	<0.001
CDI11	<---	CDI_F1	0.482	0.080	<0.001
CDI17	<---	CDI_F1	0.503	0.082	<0.001
CDI18	<---	CDI_F1	0.332	0.068	<0.001
CDI27	<---	CDI_F1	0.573	0.081	<0.001
CDI02	<---	CDI_F1	0.550	0.088	<0.001
CDI08	<---	CDI_F1	0.535	0.082	<0.001
CDI26	<---	CDI_F1	0.528	0.084	<0.001
CDI24	<---	CDI_F1	0.502	0.095	<0.001
CDI21	<---	CDI_F1	0.354	0.080	<0.001
CDI13	<---	CDI_F1	0.367	0.074	<0.001
CDI05	<---	CDI_F1	0.670	0.083	<0.001
CDI04	<---	CDI_F1	0.465	0.076	<0.001
CDI20	<---	CDI_F2	0.124	0.102	0.004
QOL09	<---	QOL_F1	0.607		
QDL12	<---	QOL_F1	0.428	0.052	<0.001
QOL18	<---	QOL_F1	0.561	0.056	<0.001
QOL22	<---	QOL_F1	0.651	0.056	<0.001
QOL24	<---	QOL_F1	0.666	0.059	<0.001
QOL03	<---	QOL_F1	0.411	0.055	<0.001
QOL14	<---	QOL_F1	0.552	0.054	<0.001
QOL08	<---	QOL_F1	0.604	0.059	<0.001
QOL11	<---	QOL_F1	0.544	0.054	<0.001
QOL17	<---	QOL_F1	0.511	0.055	<0.001
QOL21	<---	QOL_F1	0.621	0.059	<0.001
QOL23	<---	QOL_F1	0.585		
QOL15	<---	QOL_F2	0.533		
QOL02	<---	QOL_F2	0.479	0.066	<0.001
QOL10	<---	QOL_F2	0.455	0.068	<0.001
QOL20	<---	QOL_F2	0.546	0.077	<0.001
QOL06	<---	QOL_F2	0.562	0.075	<0.001
QOL07	<---	QOL_F2	0.614	0.082	<0.001
QOL19	<---	QOL_F2	0.516		

4.4.4. Adequacy of the structural equation model of the relationship between childhood/adolescent depression and quality of life.

Values of the model fit indices for the fitted model on the relationship between childhood/Adolescent depression and Quality of Life are given in table 4.21 below. The RMSEA and RMR reports values less than 0.04. The CFI, GFI, AGFI, PGFI all have values between 0.8 and 1.0. The Akaike Information Criterion and Baye's Information Criterion for the hypothesized model are also given respectively as 2563.431 and 3076.945. The ratio of the sample Minimum discrepancy (CMIN) and its degree of freedom (CMIN/DF) is reported as 1.927. However, the theoretical model of the relationship between CDI and QOL was unidentified.

Table 4.21 Summary of Model Fit indices of the Structural Equation Model of the relationship between Childhood/Adolescent Depression and Quality of Life.

Index	Hypothesized model	Theoretical Model*
CMIN	2254.246	
CMIN/DF	1.925	
RMR	0.018	
GFI	0.912	
AGFI	0.904	
PGFI	0.838	
CFI	0.894	
RMSEA	0.031	
PCLOSE	1.000	
AIC	2462.246	
BIC	2970.869	

*model unidentified

CHAPTER FIVE

DISCUSSION AND CONCLUSION

5.1. DISCUSSION

This study looked at the relationship between childhood/Adolescent depression and quality of life, and as against most other studies, this was carried out among a general population of non-diseased adolescents. Childhood depression was assessed using the child depression inventory (CDI), while the quality of life was assessed with an adaptation of the World Health Organisation Quality of Life BREF. (WHOQOL-BREF).

5.2. Exploratory factor analysis of the measurement scales

The variables measuring the Child depression inventory loaded on two factors as against the well-known 5 factor structure of the CDI (Logan et al., 2013; Schlo and Kamfar, 2015; Cole and Martin, 2005). This may be because most of the studies using the CDI to assess depression has been on diseased children, and the consistency in the factor structures found in community, paediatric and psychiatric samples is unknown (Rivera et al., 2005; Nemets et al., 2006; Logan et al., 2013). However, previous study (Logan et al., 2013) reported instances of studies where between two and five factor structures were reported for the CDI.

The overall factor structure reported in this study showed high internal consistency. This is similar to what other studies found (Logan et al., 2013; Rivera et al., 2005; Cole and Martin, 2005). The factor loadings showed a pattern as items that measured negative self-esteem loaded on one factor and items that measured positive self-esteem also loaded on another factor. These factors are respectively called CDI F1 and CDI F2 in this study. These sub scales both show relatively high internal consistency similar to those of the original CDI validation sample and studies reported by(Logan et al., 2013; Cole and Martin, 2005).

Similarly, the variables measuring the quality of Life loaded on three factors, with negative satisfaction items and positive satisfaction items loading on separate factors respectively. Notably, the positive items that relate to the respondents social and physical environment loaded on a particular factor (QOL_F2), while those that relate to the general well being of the respondent loaded on another factor (QOL_F1). However, items that relate to pain and

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Similarly, the variables measuring the quality of Life loaded on three factors, with negative satisfaction items and positive satisfaction items loading on separate factors respectively. Notably, the positive items that relate to the respondents social and physical environment loaded on a particular factor (QOL_F2), while those that relate to the general well being of the respondent loaded on another factor (QOL_F1). However, items that relate to pain and

discomfort loaded on another factor (QOL_F3). This three factor structure differs from the theoretical four factors structure which has been validated among Indian adolescents. Both, however, have a comparably high internal consistency (Agnihotri et al., 2010). The high overall internal consistency of the items of the QOL in this study is very similar to that of the validation sample conducted in 23 countries (Skevington et al., 2004) . Although the QOL showed a high overall internal consistency, the Cronbach's alpha for the negative satisfaction item sub scale (QOL_F3) is low.

This low value of internal consistency reported for the negative satisfaction sub scale (QOL_F3) may not be unrelated to the fact that the items on this subscale are measuring negative Health/pain related issues. As these respondents are a general population of adolescents, unlike some previous studies that had diseased adolescents, this sub item may not necessarily score high in internal consistency.

5.3. Confirmatory factor analysis of the measurement scales

The two factor model of the Child Depression inventory scale showed a good fit. The measures of model fit meets the criteria proposed by (McDonald and Ho, 2002; Hooper et al., 2008) and used by (Akpa and Bamgboye, 2015; Lei and Wu, 2007). This 2 factor model is different from the 5 factor model in previous studies (Logan et al. 2013; Gbiri and Akingbohungbe 2012; Rivera et al. 2005; Adeniyi et al. 2011; Cole and Martin 2005). The five factor structure had sub items on Negative mood, ineffectiveness, interpersonal problems, Anhedonia and negative self-esteem(Alvarez and Merino, 2009). Logan et al. (2013) however, reports studies where a 2 factor structure was confirmed. One of such studies is that among African American youths where only two of the original five factors structure emerged clearly as unique facets of depression (Steele et al., 2006).

The Model fit indices showed that the 3 factor model of the QOL is better than the 4 factor model in assessing the quality of life of adolescents. However, previous studies have reported 4 factor structure (Agnihotri et al., 2010; Skevington et al., 2004).

5.4. Relationship between depression and quality of life.

The structural model fitted to show the relationship between the childhood and adolescent depression showed a good fit. The regression weight was reported as -0.0148. This showed a

negative relationship between depression and quality of life among non-diseased adolescents. That is, depression is a negative predictor of quality of life among adolescents. This result is similar to results from other similar studies (Boylan et al., 2004; Sehlo and Kamfar, 2015; Gbiri and Akingbohungbe, 2012; Adewuya et al., 2008; Shittu et al., 2014). For Instance, Boylan et al (2004) reported that depression was a significant predictor of poor QoL among epileptic patients. In fact, no other variable predicted QoL other than depression, and it was largely untreated (Boylan et al., 2004). Results of a similar study among HIV patients in Nigeria reports that depression was significantly associated with Poorer health related QOL (Adewuya et al., 2008). A more recent study among children living with Sickle Cell Disease showed that, higher level of parental support associated significantly with better quality of life and decreased depressive symptoms (Sehlo and Kamfar, 2015). These studies predicted a negative effect of depression on quality of life. However, these studies were done among diseased adolescents. The non-negative in the causality of depression on quality of life may not be unrelated to the fact that this study was done among apparently healthy adolescents.

5.5. Conclusion

The Structural equation model fitted showed that Depression in a non-clinical, general population of Adolescents is a poor predictor of quality of life. The CDI (used in assessing childhood depression) had a 2-factor structure in a non-clinical general population of adolescents. Similarly, the adapted WHOQoL BREF had a 3-factor structure. Theoretical models proposed by previous authors for the relationship between depression and quality of life was not identified by this study. In a similar manner, while the theoretical 4-factor structure of the QOl was identified and estimated, the theoretical 5-factor of the CDI was not identified by this study. Although, the 4-factor structure of the QOL was identified and estimated, the 3 factor structure is more tenable.

5.6. RECOMMENDATIONS

Childhood depression should be identified and treated early. Further Studies should also look at the longitudinal structure of Depression and quality of life in a general population of adolescents. That is, the survey should be carried out again on the adolescents after an interval, of say 3 months.

APPENDIX I CHILD DEPRESSION INVENTORY

Subscales and item statement

	Negative Self Esteem Scale
CD03	I do everything wrong
CD14	I look ugly
CD25	Nobody really loves me
CD24	I can never be as good as other kids
CD07	I like myself
	Anhedonia Scale
CD04	Nothing is fun at all
CD12	I like being with people
CD21	I never have fun at school
CD22	I have plenty of friends
	Interpersonal Scale
CD05	I am bad all the time
CD08	All bad things are my fault
CD26	I never do what I am told
CD27	I get into fights all the time
	Ineffectiveness Scale
CD15	Doing school work is not a big problem
CD16	I sleep pretty well
CD17	I am tired all the time
CD18	Most days I don't feel like eating
CD23	My school work is alright
	Negative Mood Scale
CD01	I am sad all the time
CD02	Nothing will ever work for me
CD06	I am sure that terrible things will happen to me
CD09	I want to kill myself
CD10	I feel like crying everyday
CD11	Things bother me all the time
CD13	I cannot make up my mind about things
CD19	I don't worry about aches and pains
CD20	I do not feel alone

APPENDIX II ADAPTED WHOQOL-BREF.

	Subscales and item statement
	Quality Of life
	Physical Health domain (PHD)
QOL01	You feel that physical pain prevents you from doing what you need to do*
QOL05	You need some medical treatments to function in your daily life*
QOL09	You have enough energy for everyday life
QOL12	You are satisfied with your sleep
QOL15	You are able to get around well
QOL18	You are satisfied with your capacity to work
QOL22	You are satisfied with your ability to perform your daily living activities
	Psychological Domain (PSD)
QOL02	You do enjoy life
QOL04	You feel your life is meaningless
QOL10	You are able to concentrate
QOL13	You have negative feelings such as blue mood, despair, anxiety, depression*
QOL20	You are able to accept your bodily appearance
QOL24	You are satisfied with yourself
	Social Relationship Domain (SRD)
QOL03	You are satisfied with your personal relationships
QOL14	You are satisfied with the support you get from your friends
QOL16	You are satisfied with your relationship with people of opposite sex
	Environment Domain (END)
QOL06	You feel safe in your daily life
QOL07	You live in a healthy physical environment
QOL08	You are satisfied with your access to health services
QOL11	You have enough money to meet your needs
QOL17	You have available information that you need in your day-to-day life
QOL19	You have enough opportunity for leisure activities
QOL21	You are satisfied with the condition of your living place
QOL23	You are satisfied with your transport

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