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Investigating the scalar equivalence of the English version of the South African Substance Use Contextual Risk Instrument across the English and isiXhosa mother tongue speakers

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DECLARATION

I declare that the "Investigating the scalar equivalence of the English version of the South African Substance Use Contextual Risk Instrument across the English and isiXhosa mother-tongue speakers" is my own work, that it has not been submitted before for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged as complete references.

Musa Masiza August 2016

Signed……

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ABSTRACT

There is an overwhelming concern about substance use amongst adolescents across the world, especially in low socio-economic status communities. The South African Substance Use Contextual Risk Instrument was developed to capture the contextual risk factors for adolescents in low socio-economic status South African communities. This study is part of a larger study which aimed to develop and conduct the initial validation of the instrument. In piloting the instrument, both English and isiXhosa mother tongue speakers were tested using the English version since the instrument is only available in English. The equivalence of the measure across the English and isiXhosa mother tongue speakers is however unknown. The purpose of this study is therefore to assess the scalar equivalence of the English version across the English and isiXhosa mother tongue speakers. The total sample was 674 consisting of 420 English and 247 isiXhosa language groups from low socio-economic status communities in Cape Town. The study employed the Hoteling's T square test (to assess significant difference of means between the groups), the equality of reliabilities (to assess the significance of differences between the scale reliabilities) and the Tucker's Phi coefficient of congruence (to assess the congruence of the construct across the two groups). In assessing the mean differences, the results revealed that there were significant mean differences, with the isiXhosa-speaking group performing significantly lower than the English-speaking group for most of the scales. Internal consistency was also generally lower for the isiXhosa group. The structural congruence revealed that there was incongruence between the two language groups for most of the scales with an exception of two of the twenty one scales. It can thus be concluded that the measure cannot be accepted as structurally equivalent across the two groups. It is clear that bias exists in the majority of the scales of the SASUCRI and that this version is thus not applicable for an isiXhosa speaking sample. The study recommends that the instrument is adapted for the isiXhosa speaking group.

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CHAPTER 1

INTRODUCTION

1.1.Background

Substance use has been identified as a universal problem across the world (Poonam & Kishore, 2014). The increasing number of using adolescents is a serious cause of concern across the world (Donenberg, Emerson, & Scot, 2006). The increased concern for this age group is due to the negative consequences associated with substance use. It is a major contributing factor to crime, violence, intentional and unintentional injuries amongst adolescents (Morojole, Parry, & Brook, 2009). In South Africa, which is one of the countries that has a major burden of substance abuse, the South African Police Service (SAPS) crime intelligence revealed that in about 80% of murders, 60% of attempted murders, 75% of rapes and 90% of all assaults, the perpetrators had consumed alcohol at the time they committed the crime (SAPS 2011). Research also indicates that substance abuse is associated with risky sexual behaviour, teenage pregnancies and HIV in South Africa (Harker et al., 2014; Marojele, Brook, & Kechienga, 2002).

Alcohol is the primary drug of choice throughout the South African regions and all age groups with cannabis being a popular secondary drug of choice (Dada et al., 2015). The country has one of the highest levels of alcohol consumption in the world (Parry et al., 1998).. The South African Community Epidemiology Network on Drug Use (SACENDU) February 2014 report revealed that there is an increase in the numbers of adolescents that consult treatment centres. Cannabis is the primary drug of choice amongst adolescents (people younger than 20 years of age) in treatment centres with the youngest child in treatment being 9 years old in 2014 (Dada et al., 2014). The South African National Health

and Nutrition Examination Survey (SANHANES-1), (2012) found that the initiation age in South African adolescents between the ages of 15- 24 years was 13 years. The problem is getting worse; there is a progression from one drug to more illicit ones, age and the number of using adolescents in South Africa (Shisana, et al., 2014). The progression is not only in type, quantity and age but the consequences are also getting more severe for the using adolescent and society at large (Kandel, 2002).

One of the major consequences of substance use is the diagnoses of substance abuse disorder. The likelihood of developing substance abuse disorder is higher if one starts to use at an early age (Winter, Smith, Bresani, & Meyers, 2014). Research indicates that 15% of individuals who start drinking before age 14 eventually develop alcohol abuse or dependence as compared to just 2% of those who start using at the age of 21 years or older (Winter, Smith, Bresani, & Meyers, 2014).

In support of these findings, Kandel's Gateway Theory discusses in detail the progressive nature of the substance use and addresses the early onset of the behaviour. It suggests that individuals usually initiate substance use with cigarettes and alcohol. The use thereafter progresses to stronger substances like cannabis and more illicit drugs. Kandel (2002) further suggests that adolescents should postpone or avoid the initiation of the gateway substances as this can help in avoiding or postponing the initiation of more illicit drugs like heroine. Many preventative interventions in the United States consider Kandel's gateway theory very important and accurate. This makes sense as much research has been conducted in the United States to evaluate the onset and the progression of substance use amongst adolescents in order to inform for preventative interventions.

However, it's important to note that not much is known about the onset of substance use amongst adolescents in South Africa. However, preventative interventions used in South Africa are based on the United States research findings and interventions are adapted from

this setting without taking into consideration the contextual differences. Patrick, Collins, Smith, Caldwell, Flisher and Wegner (2009) stress that it's important to take into consideration the diverse cultural context of South Africa when looking into the onset and progression of use for purposes of implementing interventions in South African context. The question is whether the progression of substance use is similar across the different cultures. Effective interventions for South African context cannot be implemented in confidence if research is not done in the country in order to inform preventative interventions.

Researchers have taken into consideration the racial (Ewing , Kamilla, Mead, & Bryan, 2011) and gender Meyers, Louw, & Posche, 2011 differences of substance use prevalence to inform interventions in South Africa. Research has been conducted to determine the risk factors for substance use and researchers have discovered various factors that play a significant role in the initiation of substance use (Poonam & Kishore, 2014). The result revealing that adolescents use substances as a coping mechanism to avoid negative emotions, to escape problems and to affirm identity by experimenting with substances to identify with a certain group (Griffin et al., 2000; Patrick, et al., 2010). Family history and behaviour, community norms and school environment also play a significant role in the initiation of substance use among adolescents (Morejele, et al., 2009; Poonam & Kishore, 2014). However, little has been documented regarding the contextual risk factors associated with the onset of substance use amongst adolescents in South Africa.

When investigating and making conclusions that will have an impact on humans it is important to ensure that such investigations and decisions have the human's best interests at heart and issues like the context that the intervention will be implemented in are important as it the intervention has to speak to the individuals of that context. Culture is one of the important considerations as emphasised by Patrick and colleagues (2009).

1.2.Rationale of current study

Substance use amongst adolescents has received considerate amount of attention in research studies (Dada et al, 2015; Harker et al., 2014; Morejele, Parry & Brook, 2009). The initiation, progressive nature of substance use, risk and protective factors, racial, gender prevalence of substance use have been identified in order to inform interventions for substance using adolescents is South Africa yet the problem still persists. The numbers of adolescents in treatment centres have increased and the crimes committed under the influence of some substance are also increasing (SAPS, 2011). It is thus advantageous that the individual and contextual risk factors associated with substance use amongst adolescents are assessed in order to inform for effective preventative interventions. The South African Substance Use Contextual Risk Instrument (SASUCRI) aims to address this issue. It aims to assess the individual and contextual risk factors associated with substance use amongst adolescents in low socio-economic status communities in the Western Cape.

The SASUCRI was developed with the aim of addressing the above mentioned purpose of the instrument. During the initial validation of the instrument it was discovered that participants that had answered the English version of the instrument were isiXhosa mother speakers. It was therefore decided that the isiXhosa sample's data could not be used for the purpose of that validation study and that it would be used to assess if the instrument was equivalent across the isiXhosa and English sample. This study is therefore based on the recommendations by Florence (2014). It aims to contribute to the validation process of the instrument by assessing equivalence. It assesses whether the construct being measured across the English isiXhosa mother tongue speakers is similar or the same by investigating the scalar equivalence of the English version of the instrument.

Scalar equivalence is an important aspect in monolingual testing. It addresses issues of equivalence and bias across groups from different cultural and language groups assessed using an instrument available in a single language version (Harachi, Choi, Abbott, Catalano, &Bliesner, 2006). This study is important as the English and IsiXhosa mother tongue learners were tested using the English version of the instrument. It is not possible to reach a conclusion that the measurement indeed measures the same construct across the two language groups, therefore, it is necessary to assess the scalar equivalence of the SASUCRI for the English version. This study is very important to ensure fairness and comparability across the two groups. This study will assist in motivating for an IsiXhosa version if the findings that there are no similarities in the conceptualisation of the constructs being measured by the SASUCRI. With this information the appropriate, fair and effective preventative intervention can eventually be employed to all groups.

1.3 Aims of the current study

The study aims to investigate the scalar evidence of the English version of the instrument across the English and isiXhosa mother tongue speakers.

Objective 1: To assess the mean differences in the scale totals of the English version of the SASUCRI across the English and IsiXhosa mother tongue speakers.

Objective 2: To assess the group differences between the reliability coefficients of the scale totals of the English version of the SASUCRI between the English and IsiXhosa mother tongue speakers.

Objective 3: To assess construct equivalence of the English version of the SASUCRI across the English and IsiXhosa mother tongue speakers.

The first chapter is the introduction chapter; it focuses on the background of this study. It mainly focuses on the burden of substance use that the entire world is faced with. It particularly gives insight into the problem within the South African adolescent population. It highlights the rationale of this study, the main aim of the study and the objectives that aim to address the overall aim of the study. The second chapter is a review of research studies that address issues of validity and particularly equivalence related studies. The history of psychological testing in South Africa is discussed in this chapter to give the background of testing in South African context. Equivalence of differing contexts like gender and age are included in the chapter with a major focus on cross cultural validation studies. This study is concerned with monolingual testing, therefore, intense focus is directed to such studies in this section. The consequences of cross cultural testing, specifically monolingual testing and the solutions to the issues are also discussed in the chapter.

Chapter three is the theoretical framework chapter. It defines concepts of the theoretical framework of the study. It particularly explains the taxonomy of bias and framework of equivalence and concludes by discussing how the framework relates to the study.

Chapter four is the Methodology chapter which gives details about the procedures that were taken to address each of the objectives. It gives details of all the steps taken for each of the procedure and motivates why the particular procedure was the best to address the objective.

Chapter five is the results chapter which illustrates the results of the procedures conducted as explained in Chapter four. All the results are followed by a brief explanation of what they mean.

Chapter six is the discussion chapter which further discusses the results obtained from chapter four. The meaning or interpretation of the results is discussed in this chapter and

conclusions regarding the data are made. Limitations of the study and further recommendations are stipulated to conclude.

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CHAPTER 2

LITERATURE REVIEW

2.1. Introduction

Psychological assessments are used for various purposes with a wide array of clients (Foxcroft, Paterson, le Roux, & Herbst, 2004). They are commonly used in industry, clinical, counselling practice and in educational contexts to identify and diagnose psychiatric conditions, describe intellectual, cognitive and personality functioning, for selection, development purposes and psycho-legal assessment (Foxcroft, Paterson, le Roux, & Herbst, 2004). . The understanding is that people have inherent abilities and characteristics that can be measured (Coetzee & Schreuder, 2010). However the traits are not static as people function differently in different contexts simultaneously (Foxcroft & Roodt, 2009). With the realisation of the value context in measurement it is a requirement for instrument developers and users ensure that the tests address different contexts such as biological, intrapsychic and social context that might influence the results of the test. This is useful in avoiding the negative implications of conclusions made based on tests (Foxcroft & Roodt, 2009). Neglecting the value of context might result in bias and in-equivalence. The construct being measured might be conceptualised differently by groups according to the different contexts and therefore leading to the measure measuring different constructs across the groups (Matsumo & van de Vijver, 2011).

This study aims to address aspects of social context which are important in interpreting the results of an instrument: the study specifically focuses on culture and language. It aims to assess the scalar equivalence of the English version of the SASUCRI across English and isiXhosa mother tongue speakers in South African context. The study therefore focuses on cross-cultural and cross-linguistic testing in the diverse South African context.

This chapter explores cross cultural testing, that is, multilingual and monolingual testing. Examples of validation studies comparing groups are discussed. The chapter ends with a summary of how this relates to the current study is discussed at the end of the chapter.

2.2 Cross cultural testing

Society is rapidly changing due to the increasing migration, economic, social, political and technological globalization (Visser & Moleko, 2012). Changes are drastic and more visible in countries like South Africa (van de Vijver & Rothman, 2004). As a result of these important population shifts, professionals are frequently working with clients from different cultural groups leading to an increased interest in cross cultural validation and equivalence studies (Rossier, 2005).

Cross cultural testing refers to the systematic, comparative study of thought and behaviour across cultures (van de Vijver & Leung, 1997). The comparison of scores across participants of different groups is known as cross-cultural testing (Matsumoto & van de Vijver, 2011).The most important question in cross-cultural testing is whether the test measures what it was designed to measure across different groups. Bias and equivalence answer this question (Laher, 2010).

According to Foxcroft and Roodt (2009), the content of any instrument cannot be divorced from the culture of the developers; the content reflects the culture of the developers and the country that the instrument will be used. Consequently, the people who are not of that culture will have difficulty answering the test. Similarly, Hui and Triaundis (1985) stress that the way people think, what they believe, how they behave and what they know are influenced by their culture thus people from different cultural backgrounds may respond differently to tests. A good example of cross cultural testing and the negative implications it can have is in Psychological testing in South Africa during the apartheid era.

2.3 Psychological testing in South Africa

Psychological testing in South Africa cannot be divorced from its political history (Laher & Cockcroft, 2014). During the apartheid era people were classified by the Population Registration Act under the white government according to their race. The act recognised White, Indian, Black, and Coloured racial groups, land was divided amongst the racial groups so that there was no contact between the white racial with the non-white racial groups (Magubane, 2014). The non- white population was systematically stripped off land they owned prior to apartheid era and political rights that they had while the political power of the white people grew (Magubane, 2014). The non-white population was regarded as inferior in cognitive abilities compared to the white population (Kogila & Heriber, 2000). The classification of people into racial groups had profound economic and social implications for the minority groups in South Africa and Psychology played a significant role is those implications (Laher & Cockcroft, 2014).

Psychological testing in South Africa was introduced at this time; a time of unequal distribution of resources according to racial categories (Foxcroft & Roodt, 2009). Tests were initiated with the white racial population in mind. South African psychological tests were imported from overseas and adapted for the use of the White racial group. The popular tests were adapted or developed to be used by the Department of education to place white pupils in special education (Laher & Cockcroft, 2014). These measures were also used in research to measure the intellectual ability to stress the distinct nature of racial groups, thus showing the superiority of one racial group from another (Foxcroft & Roodt, 2009). Members of the minority group in South Africa suffered in that they were not familiar with the psychological test material, the constructs being measured were not the equivalent to those they were originally standardized to measure thus not valid to be used within these groups.

Multicultural societies were not adequately represented in the standardization samples used to derive the norm tables (Foxcroft & Roodt, 2009).

Owing to the manner psychological assessment was utilised in the apartheid era, psychology had a negative reputation in South Africa (Coetzee & Schreuder, 2010). Based on the political turn in South Africa in 1994, after the democratic elections, the trade unions were against psychological testing and the Employment Equity Act banned psychometric testing for purposes of employment (Laher & Cockcroft, 2014). According to Laher and Cockcroft (2014) Health Professions Council of South Africa (HPCSA), Psychological Society of South Africa (PsySSA) and professionals working in the industry appealed for the Employment Equity Act to be revised and reconsider the stand on psychometric testing. The appeal was successful and the country introduced the appropriate use of psychological testing. The revised Employment equity Act 55 of 1998 section 8 (Government Gazette, 1998, p.9) amended in 2013 (Government Gazzette, 2014, p.5) states that psychological tests and similar assessments are prohibited unless the test 1) has been scientifically shown to be valid and reliable, 2) can be applied fairly to all employees and 3) is not biased against any employee. However, Meiring, van de Vijver, Rothman and Barrick (2005) stress that to date psychological testing in South Africa cannot be viewed as separate to the country's political, economic and social history. Tests currently in use in South Africa still do not adequately address issues of validity and reliability; there is still a lot that needs to be done (Foxcroft, Paterson, le Roux & Herbst, 2004). South Africa still has a long way to go, much research is needed on bias and equivalence of assessment tools used in South African context before tests can live up to the standards of the Employment Equity Act (van de Vijver & Rothman, 2004). To date South African professionals still uses instruments that were developed and normed in other countries for use in those countries, those that were developed in the country need to be updated and adopted so that they are available in different languages to

accommodate cultural diversity in the diverse South African population (Foxcroft, Paterson, le Roux & Herbst, 2004).

The country is one of the countries that have multiple cultures with eleven official languages. This is a challenge for test developers and users in the country. In a needs analysis that aimed to assess the patterns of test use and the needs of psychological assessment practitioners Foxcroft et al. (2004) found that majority of the tests practitioners use are not developed for the South African context which makes it difficult to make conclusions based on the instrument. Additionally, professionals expressed that the instruments that were developed in South Africa for South African context are outdated and need to be updated. Concerns were also raised about the language barrier in South Africa. South Africa has limited tests available in the languages used in the country. In summary, the findings of the needs analysis indicate that professionals are in need for adapted instruments that can be confidently used in the multicultural South African context and that instruments in the country need to be updated and made available in the diverse South African languages.

2.4 Cross-cultural testing research

Currently, professionals in the field are dedicating themselves in redressing psychological assessment issues previously experienced in South Africa by ensuring that South Africa has valid and reliable tests to be utilised in the country (Matsumoto & van de Vijver, 2011) . They are developing and adapting tests in the country to accommodate diversity in terms of language, educational background, and socio economic status to mention a few (Laher & Cockcroft, 2014). The focus is mainly on equivalence studies of cross-cultural testing and most importantly cross-linguistic testing (van de Vijver & Rothman, 2004).

An interesting study was conducted by Rossier (2005) reviewing cross cultural equivalence of frequently used personality inventories. These instruments are used internationally,

including South Africa. Personality inventories are usually used by counsellors and other professionals' to assess career beliefs, career maturity, skills, aptitude, abilities and personality traits. Counsellor's interventions are based on the results obtained from these instruments (Rossier, 2005) (Rossier, 2005). Some of the instruments they use theoretically depend on cultural context and others are universal. The Five-Factor Model (FFM) argues that traits are biologically based and the five factors and their structure can be inherited. On the contrary, the Internal Locus of Control (LOC) theory emphasizes the importance of environment and that reinforcement occupies the central position in the development of patterns of behaviour. Thus FFM may be used in the same way across cultures and the structure of the LOC should vary across culture.

Since these instruments are used universally it is important to ensure that the instruments are equivalent for use across different countries and different cultures. The NEO Personality Inventory (NEO-PI), The Sixteen Personality Factor questionnaire (16PF5) and Zuckerman-Kuhlman Personality Questionnaire (ZKPQ-III) are the three widely used inventories measuring five personality dimensions as per FFM. These instruments are translated into various languages for use in different cultures and languages with the understanding that traits are biologically based. In the review, Rossier, (2005) found that the structural equivalence of the NEO-PI-R or Locus Of Control (LOC) measurement were assessed but none of the other commonly used assessments (16PF5 or the ZKPQ) were assessed for structural equivalence. Findings in this study illustrated that NEO-PI-R and ZKPQ had high structural equivalence while the 16PF5 had much lower structural equivalence illustrating that NEO-PI-R and ZKPQ can be reasonably used across cultures. It is concerning that the structural equivalence of the 16PF5 is low considering that it is universally used.

The LOC which takes into consideration the cultural context illustrated some factors are stable across cultures thus suggesting that only some part of the LOC may represent a certain

disposition. This is a cause for concern as these measures are used in many countries. Decisions based on assessments, particularly psychological assessment can have an immense impact on a person's life (Coetzee & Schreuder, 2010). These assessment results can impact on career choice, appointments, promotions, other benefits and even the way people regard themselves (Coetzee & Schreuder, 2010). Culturally specific norms must be a prerequisite for personality inventories (van de Vijver & Tanzer, 2004). Additionally, Rossier (2004) stressed that researchers should assess the scalar equivalence of the measures. When the measure is scalar equivalent, the origin of the scale is the same for the different groups (Rossier, 2005).

Another example of a study that address cross cultural testing is the study by Taliep and Florence (2012) who assessed the psychometric properties of an instrument that was originally developed in Europe to be used in Europe. The researchers conducted an initial validation study to assess if the measure was reliable and valid for use in South African context.

Savahl, Isaacs, September and Koch (2009) used the KIDSCREEN together with Children's Hope Scale and Recent Exposure to Violence Scale to explore the subjective Health-related quality of life (HRQoL) of South African adolescents from the historically disadvantaged area in the South Metropole of Western Cape. Seeing that the KIDSCREEN was developed and normed for European population and used in South Africa which is a different context all together, Taliep and Florence (2012) extended in the above mentioned study to investigate the psychometric properties of the measure for South African context. This validation was an initial validation of the KIDSCREEN measure in the South African context. The researchers investigate the reliability and validity; construct validity of the measure in South African context. Various statistical techniques were used; Cronbach's alpha was used to assess the internal consistency of the whole measure and the individual subscales of the KIDSCREEN-52. The results indicated that the measure is internally reliable for HRQoL assessment in

South African population. Exploratory Factor Analysis (EFA) used to assess the internal structure; items did not load as they would be expected to if the same construct was being measured across the European and South African groups. Thus the KIDSCREEN instrument cannot be confidently used in South African context as it does not prove to be equivalent across the cultures.

Various factors may be accountable for the inequivalence of the measure between European group and the South African groups. Construct irrelevance occurs when the construct being measured may be relevant in one group and not for the other (Haupt & Koch, 2012). Therefore Taliep and Florence (2012) suggest that health and well-being maybe expressed differently by the South African participants than the original norm group. The South African sample consisted of Xhosa first language speakers, Afrikaans first language and English first language speakers. Based on the sample's language, Taliep and Florence (2012) further suggest that language may have played a significant role in the way results came out. Words may not have the same meaning across groups, or certain languages might not even have certain words therefore careful consideration of language is advised. Language is a significant aspect of cross cultural testing. Cultural groups may have different languages across the cultures thus cross-cultural testing requires cross linguistic tests to be equivalent (van de Vijver & Leung, 1997).

Usually monolingual and multilingual tests are used in countries with various cultures and languages. In the next section the focus is on the language context, mainly monolingual testing.

2.5 Monolingual testing

Cross linguistic tests may refer to multi-lingual or monolingual tests (Haupt & Koch, 2012). Multi-lingual tests refer to tests that are administered to different individuals from different

language groups in diverse languages; the test is available in more than one language. Thus test takers are tested in preferred language (Gray & Blake, 2015). On the contrary, monolingual tests refer to tests administered to different groups and the test is only available in one language (Ismail & Koch, 2012). Thus all test takers being tested in one/ the same language. The focus will be shifted from multilingual tests and focus on monolingual tests as this study is concerned with monolingual testing.

Monolingual tests are most popular in contexts like South Africa that are multilingual. South Africa has 11 official languages. In this country it is assumed that assessment administration in English is acceptable since the majority South Africans are educated in English from grade four and higher education institution and work place use English as the language of instruction (Foxcroft & Roodt, 2009). Tests are commonly administered in English in this context (Brown, 2012). Measures used in South Africa are usually imported overseas and are commonly in English, those developed in South Africa are outdated and are also in English thus not accommodating the variety of languages in South Africa (Foxcrof, Paterson, le Roux & Herbst, 2004).

There are various limitations to monolingual testing. The complications can be on three levels; the language in which the test is constructed, the difficulty level of the test language and the language competency of the test taker (Ismail & Koch, 2012).

2.6 Monolingual testing research

An interesting study on the topic was conducted in South African context by Koch and Dornbrack (2008). Higher Education (HE) in South Africa has certain requirements for entrance into the institutions with language being a major one. Most HE institution requires a certain level of English and or Afrikaans as admission criteria in the country. In a diverse country like South Africa which has 11 official languages this is a cause for concern.

In their study, Koch and Dornbrack (2008) aimed to explore the validity of using only English language criteria to make a decision regarding admission to the university by providing empirical evidence of the bias and differential access that would result from the English-only criteria.

The mean performance of the language groups were compared; including first language variables, and academic performance (AP). The relationship between language (English language criteria and first language school subjects) and the AP of first-year degree students in the various language groups were explored. The impact of English language variables and the language criteria on the AP, and the fair access to this institution of first- and second-language speakers of English should English language variables be used for admission decisions were also explored. Participants included; isiXhosa first-language students who had probably attended ex-Department of Education and Training (DET) schools which refers to schools that catered for black children schooling and English and Afrikaans first language students who had attended ex-model-C schools which refers to schools that catered for the white children schooling.

The mean differences revealed that in respect of the language variables and AP among the different language group; English and isiXhosa groups performed similarly in terms of AP. Second language speakers performed poorly compared to English first language speakers in terms of the English language variables; their performance in terms of AP was similar to that of first-language speakers of English. Within the English second language learners, the isiXhosa students from ex-model-C schools and the Afrikaans students performed better than the isiXhosa students from ex-DET schools for the English variables but not for AP.

An ANOVA test on English as a subject indicated a significant first language effect..

Post-hoc t-tests showed that Afrikaans and isiXhosa speakers who took their own language as a first language fared significantly worse in respect of English as a subject than English speakers who took their own language as a first language. Afrikaans fared significantly better than isiXhosa speakers that took their own language as the first language. English speakers who took their own language as a first language fared significantly better in respect of English than all other language groups. IsiXhosa speakers, who did not take their own language as a first language, fared significantly better in English than isiXhosa speakers who took their own language as a first language. The same results were found in respect of the reading comprehension (RC) test.

These results illustrate that language differences have a major effect on whether the people will qualify for higher education or not. There are clearly significant differences in proficiency in English between the English home language speakers and the English second language speakers. Construct relevance is of importance in monolingual tests; the first and second language speakers may have different reading processes, the construct may be more relevant to the first language speaker than the second language speaker thus leading to unfair conclusions of the construct being measured. Based on these results Higher education language requirements are biased for the English second language speakers, they are in favour of the first language speaker (van de Vijver & Tanzer, 2004). Kock and Dornbrack (2008) therefore suggest that if Higher education institutions are serious about redressing the past inequalities in South Africa then they should revisit the idea of monolingual admission criteria into the Higher education institutions. English proficiency should not be a barrier a multilingual country for people to overcome the restraints imposed by poverty.

In cross-cultural studies when a measure is used for admission purposes it should not assess individuals' proficiency in a language, it should be based on aptitude and achievement measure (Haupt & Kock, 2012). Ismail and Koch (2012) adds that if a monolingual test is not

used to assess proficiency in that particular language then the measure should be made available in more languages to accommodate the population. In redressing inequalities in South Africa multilingualism and equivalence cannot be taken for granted and thus should be promoted (Laher & Cockcroft, 2014).

Construct bias is an important aspect of monolingual testing, Construct bias is concerned with the question of whether the same construct is measured across groups, when there is evidence of construct bias, it means that the construct being measured is not the same across groups thus the instrument being in favour of the group that has a clear understanding of the construct being measures and unfair for the group who understands it differently (van de Vijver & Leung, 1997). The example of admission requirements is a good example of construct bias since the construct being measured across the different language groups does not seem to be equivalent across the different language groups with the English first language speakers having a better understanding than the second language speakers. Careful considerations of construct equivalence are advised due to the implications that can be achieved from these results. Individuals think and discuss better in their language thus they would be more likely to perform better in tests available in their own language (Foxcroft & Roodt, 2009).

Similar to the study above, Haupt and Koch (2012) aimed to investigate the scalar equivalence of the WMLS English version across the English first language speakers and isiXhosa language speakers. The WMLS aims to measure proficiency in four areas; oral language, listening, reading and writing. The measure consists of four subscales; Picture Vocabulary, Verbal Anologies, Letter Word Identification and Dictation. The measure is an overall measure of language competence and cognitive academic language proficiency. It was standardised on the population in USA, Central America, South America and Spain. At the time this study was conducted, there was research being conducted on the instrument in

South Africa (see Koch, 2009) however the measure had not yet been normed for the South African population.

Various techniques were used to assess the scalar equivalence. Descriptive statistics were used to illustrate the mean and standard deviations per group. Thereafter inferential statistics were examined; the Hotellings'T^2 statistic and the post hoc t-tests to assess if the language means differences were significant

The study found that there were significant differences between the English first-language-speaking group and the Xhosa first-language-speaking group on their mean scores. Reliability differences were also revealed on each subtest for between the language groups and in addition, there were significant differences between the language groups on the item characteristics of each subtest. Differential item functioning was displayed on all of the subtests. Based on the significant findings Haupt and Koch (2012) concluded that the scores do not show scalar equivalence therefore the two groups not being comparable. Further scalar equivalence can be suggested for WMLS use in South African context across different language groups. To investigate possible language bias, it can also be suggested that the DIF items be further investigated to understand why the items function differently across the identified language groups. Adaptation or development of an instrument useable in South African context across various language groups can also be suggested.

Ismail and Koch (2012) further investigated the scalar equivalence of the adapted version of the verbal analogies (VA) subscale of the Woodcock Munoz Language Survey (WMLS) across the English and IsiXhosa first language speakers. The researchers specifically focus on the VA scale which is used to measure listening and speaking skills, individually or collectively. It also assesses the individual ability to oral analogies. Differential item functioning (DIF) of the VA scale across the two groups was assessed. Exploratory factor

analysis was used to evaluate the construct equivalence across the two groups, followed by a tucker's phi to assess the congruence of the constructs across the two groups. Both Exploratory factor analysis and tuckers phi were done first with the DIF items and then once the DIF items were detected they were conducted without the DIF items.

Three items were found to have DIF, these results pointed to in-equivalence across the two groups. The tuckers phi with DIF items displayed non- negligible incongruities for both factors in the scale thus it was concluded that the scale does not measure the same construct across the two language groups with the DIF items. However when the DIF items were removed factor one of the factors revealed that the same construct was being measured across the groups however this was not the case for factor two. The scale did not measure the same construct across the groups thus construct equivalence still could not be achieved even after the DIF items removed.

Similar to Haupt and Koch (2012); Koch and Dorbrack (2008), poor performance of the isiXhosa first language speakers on this scale could be due to lack of domain knowledge and not due to lack of understanding English instructions and not due to inadequate verbal reasoning. Hence cross linguistic studies stress that if the test is not administered to assess the proficiency in the particular language then it should be made available in different languages to avoid problems such as construct bias (Haupt & Koch, 2012). It is thus cautioned that the scale cannot be used in confidence as a monolingual measure across language groups in the South African context as the scale does not measure the same construct across the two groups and this may lead to unfair treatment, prejudice and stereotyping (Laher, 2010).

Professionals have raised concerns regarding Psychological and educational testing in South Africa. While there is a growing interest in the field the problem of invalid and unreliable

tests persists in South Africa (Harachi et al. 2006). The majority of measures used in psychology, education and industry in the country are still not being thoroughly researched for bias (Foxcroft et al. 2004). Few cross-cultural studies have been published for use in South Africa and very few are available in various South African languages (Foxcroft & Roodt, 2009). South Africa has experienced severe implications in the past; the implications are still not being adequately addressed (Laher & Cockcroft, 2014). Coetzee and Schreuder, (2010) suggests that South Africa needs newly developed measures that are broadly applicable and sensitive to multicultural South African context ensuring that they consistently measure what they were developed to measure.

2.7 Solution for cross cultural/ cross linguistic testing: Adaptation, translation and assembly

Currently, there is a growing interest in redressing such issues; the effect of language, culture and education (Reynolds & Suzuki, 2012). In South Africa researchers and test developers are looking into ways of having appropriate psychological and educational measures (Harachi, Choi, Abbott, Catalano & Bliesner, 2006). They are dedicating themselves in ensuring that South Africa has valid and reliable tests that can be used in South African context (Laher & Cockcroft, 2014). Test developers are either investigating that measures developed overseas and used in South Africa are measuring the same construct when used in South African context. When the instruments are construct bias researchers and test developers, either develop a measure appropriate for South African context or adapt the instrument so that it is usable for the South African context (Foxcroft & Roodt, 2009).

In addressing invalid and unreliable testing and its implications in South Africa, Foxcroft and Roodt (2009) suggest that instrument developers should develop South African context relevant instruments, translate or adapt in order to accommodate the diversity of the country.

Adaptation of instruments is important in multicultural and multilingual contexts if the researchers want to ensure that they obtain valid and reliable results for all test takers.

Test translation is the process of converting the test to another language; this can be one or more languages, however,, the meaning of words is retained (Foxcroft & Roodt, 2009). Test adaptation on the other hand is making the measure more applicable to all cultural groups but the language is retained with certain words or constructs are changed without tempering with the original meaning (Tanzer & Sim, 1999). This is done to ensure that the measure is fair across all groups and to facilitate comparative studies.

Furthermore, Tanzer and Sim (1999) stress that it's more than translation and adaptation. The adaptation of the instrument, psychological, psychometric, cultural, cross-cultural and linguistic aspects must be taken into consideration.

In addition to translation and adaptation, He and van de Vijver (2012) suggest assembly as an option when translation and adaptation remain unsatisfactory linguistically, culturally and psychometrically. Assembly is the compilation of a new instrument. However assembly may also have its disadvantages; it may also interfere with the numerical comparisons of scores across cultures. Therefore the choice of translation, adaptation and assembly depends on the instrument and the target culture however for statistical comparisons, He and van de Vijver (2012) recommended adaptation. The important question to address in all psychological and educational instruments (mono or multilingual tests) used across different groups is whether the same construct is being measured across the groups. Equivalence and bias testing aim to answer this question (van de Vijver & Tanzer, 2004).

There is a growing number of instrument adaptation and development for South African context, Casillas and Robbins (2005) cited in (Foxcroft & Roodt, 2009) reports that between

1964 and 1983 only 20 articles were published focusing on cross-cultural assessments however between 1984c and 2004 about 198 articles were published.

Some examples of instrument assembling in South African context include; Taliep, Ismail, Seedat and Suffla, (2014). In their study, the researchers aimed to develop and conduct an initial validation of the standardised family functioning scale for administering to families with children aged 0-7 years for the South African context. Taliep, Ismail, Seedat and Suffla (2014) identified South Africa is in need of assessment measure of family functioning in child maltreatment prevention. The researchers raise a concern that while there are tests that measure the construct, such measures are predominantly developed and validated in Western countries and the tests do not conform to South African context. The aim of the study was based on this realisation.

The reported study involved the conceptualisation and operationalization of the construct of family functioning, item generation and item refinement therefore the study represents the initial step in establishing the construct validity of the FFS. In the development of a measure the content and conceptualisation phase contributes to the construct validity of the measure as the content of the measure is directly related to the purpose of the measure (Foxcroft & Roodt, 2009). This study focused on the first phase of the validation; a review of existing measures was conducted; (for the review see: (Sheriff et al. 2010 a1). Various professionals or specialists in the field were consulted for validation purposes.

A literature review was conducted in order to formulate a clear conceptualisation of the construct of family functioning and related constructs that could be important for the instrument. It was also conducted to consider possible pitfalls in developing the FFS. Since the population of interest were South African families, the literature review contributed in defining family in South African context. In this context it was realised that families are not

just nuclear in structure, they consist of extended systems including members beyond the immediate family and it also takes into consideration guardians. Nuclear, single parent, child-headed and extended family arrangements were considered in the conceptualisation of the family.

In compiling items, items were borrowed from three measures. (Babbie, 2013; Dornyei & Taguchi, 2009) have suggestions on keys to compiling effective questions for a competent item writer. Such considerations were taken in this study; for the item relevance, wording, response format, type and layout of questionnaire and subscales. The guidelines were followed.

Various experts (including disciplines of psychologists, health promotion, public health, injury and violence prevention) were consulted to review the items for the purpose of face and content validity. The final pool of items was there after concluded.

Taliep, Ismail, Seedat and Suffla (2014) aimed to achieve substantive validity. It was achieved however one cannot conclude that this measure is reliable and valid. The steps taken towards validity for this measure in their study was only an initial step in the validation process. Similar to the Taliep and Florence (2012) study, South African children in low socio economic communities can benefit enormously from this study as it would contribute to the prevention of child maltreatment.

There are various statistical measures that can be utilised to assess the construct validity of the measure. Based on the urgent need of the scale it can be suggested that the scale is piloted and further validation is conducted so that significant or meaningful inferences can be achieved.

While there is a growing interest in cross cultural and cross linguistic studies in South Africa, researchers are also taking other contexts into consideration as proposed by Foxcroft and Roodt (2009); biological, intrapsychic and social contexts must be taken into consideration when administering psychological and educational assessments. One important way of dealing with these issues is the investigation of equivalence.

An interesting example of equivalence assessment of adapted scale for South African context is the study by Savahl, Casas and Adams (2015). They compared the equivalence of a scale across socio-economic status groups. Socio-economic status groups may conceive certain constructs differently due to environmental differences (Reynolds & Suzuki, 2012). In other contexts, socio-economic group differences are important factors to predict unfortunate consequences; important concerns include among others that psychiatric clients may be over diagnosed, students disproportionately placed in special classes, and applicants unfairly denied employment or college admission because of purported bias in standardized tests(Reynolds & Suzuki, 2012). Additionally, in-equivalent measures across groups may lead to severe stereotyping and prejudice (Laher & Cockcroft, 2014).

In the reported study, Savahl, Casas and Adams (2015) aimed to contribute to the validation of the Children's Hope Scale amongst adolescents in Western Cape, Cape Town. Their objectives were to test the overall fit structure of the Children's Hope Scale and to test the fit indices of the Children's Hope Scale by socio-economic status group (low, medium, high).

CHS is a self-report scale consisting of six items, it is based on Snyder's theory of hope and measures goal orientated hopeful thinking. It was originally validated for two factors. However, research on validation of the measure found a better fit for one dimension structure.

The Snyder et al (1997) original scale was adapted to the South African context. The process included cognitive testing; which assisted in the phrasing, refining and of items in the scale;

translating the measure to Afrikaans; using two Afrikaans translators to translate the revised instrument by backward translation method; and piloting the measure.

Confirmatory factor analysis was used to test the fit indices of the scale to determine if the scale is appropriate to be used in South African context with different groups. In comparing the CFA scores factor invariance was considered. There were three steps in testing multiple group models, first step; multi-group with no constraints was tested, second; factor invariance was tested with constrained standardized factor loadings and lastly; factor variance by constraining the intercept of the equation was tested.

Means analysis revealed that there were significant differences between the SES groups, however conclusions could not be reached regarding equivalence based on these results, further evaluation of the data was required to confirm the findings.

Confirmatory factor analysis results suggested a good fit for a single factor. The scale is a satisfactory measure of the single higher order construct of hope. The overall model showed a good fit for two error co-variances and the items loaded adequately for the overall model.

CFA indicated good fit indices for the overall model with two error co-variances. The multi-group analysis with constrained factor loadings and intercepts showed good fit across socio-economic status groups.

According to Savahl, Casas and Adams (2015), these results indicate that the measure shows good adaptation and the construct being measured across the socio-economic status groups is the same. The scores of the different groups obtained from this scale can be compared and decisions can be made based on the scores obtained from this scale in the South African context. As previously mentioned, validation is an ongoing process. Seeing that the mean differences suggested that there were some SES differences, further evaluation can be

suggested. Scalar equivalence can be suggested to assess the full scale equivalence of the scale.

The above discussed studies speak to the equivalence of measures across diverse groups. The aim of the discussion is to emphasize that equivalence studies are not limited to cross-cultural studies; various contexts need to be taken into consideration. Construct-irrelevance may occur across any different groups as we have experienced in preceding example. Construct-irrelevance occurs when a construct being measured may be relevant in one group and not in another group (Foxcroft & Roodt, 2009). Owing to the population diversity (cultural, linguistic, gender, educational, socio economic, etc.) in South Africa particularly, diversity represents a potential source of construct-irrelevant variances, which should always be considered when measuring a construct across diverse populations.

In light of this, Haupt and Koch (2012) emphasises that when group differences are identified, the researcher needs to evaluate the construct being measured with more scrutiny for construct-irrelevance and construct under-representation.

As previously discussed the history of psychological testing in South African is not an appealing one. Psychological testing in South Africa was impacted by apartheid policies which had major negative implications in people's lives. An example of testing and its implications is the measure that was used to particularly show the superiority of one group another. Fick's research cited in Foxcroft and Roodt (2005) was on cognitive abilities of children, it concluded that the inferior performance of the black children in comparison to the white children was due to innate differences.

Measures that were used in South Africa in the apartheid era did not consider cultural differences in terms of the construct relevance and the item content. Currently, there is a growing interest in redressing such issues, as the studies discussed earlier demonstrate; the

effect of language, culture and education need to be taken into consideration when assessment measures are conducted (Reynolds & Suxuki, 2012). Foxcroft and Roodt (2009) raise concern that majority of measures used in psychology, education and industry in South Africa are still not being thoroughly researched for bias, few cross-cultural have been published for use in South Africa and very few are available in various South African languages. Due to the severe implications that Psychological testing can have Coetzee and Schreuder, (2010) suggests that South Africa needs newly developed measures that are broadly applicable and sensitive to multicultural South African context ensuring that they consistently measure what they were developed to measure. This is supported by the findings of the needs assessment by Foxcroft and colleagues (2004).This study therefore aims to investigate the equivalence of the English version across the two groups. The study will contribute motivating for an IsiXhosa version of the instrument if these two groups are not comparable based on the English version.

This chapter aimed to highlight the importance of cross cultural testing in diversely populated environments. It explored cross cultural testing; multilingual and monolingual testing, giving examples of studies that have investigated the validity and particularly the equivalence of instruments across diverse groups. It highlights the negative implications that monolingual testing can have and provides some solutions followed by examples of studies that have been conducted to address these issues. The researcher concludes the chapter by indicating how the chapter relates to the current study.

The next chapter is the theoretical framework chapter. This study wants to know if the construct being measured is the same for the two groups in question, Haupt and Koch (2012) stress that equivalence aims to answer this question. This chapter therefore focuses on the taxonomy of bias which directly impacts on equivalence and the taxonomy of equivalence

which assists in addressing the overall aim of this study. The chapter is concluded with a brief explanation of how the theory will be applied to the current study.

CHAPTER 3

THEORETICAL FRAMEWORK

3.1 Introduction

In this section the focus is on the theoretical framework of the study. The framework of bias and equivalence in particular are discussed in this chapter. Bias and equivalence are identified as the key factors in group comparison studies. The lack of equivalence indicated by the presence of bias jeopardizes the validity of instruments in group comparison studies. The taxonomy of bias and the framework of equivalence are thus discussed in this chapter. In concluding the chapter, a brief explanation of the importance of bias and equivalence particularly for this study is provided at the end of this chapter.

3.2 Bias and Equivalence

Bias is a generic term for nuisance factors in cross-cultural score comparisons (van de Vijver & Tanzer, 2004). It is the presence of factors that challenge the validity of group comparisons. When a test shows bias it means that the measurement is in favour of one group over another (van de Vijver & Leung, 1997). The presents of bias in cross cultural testing is an indication of in-equivalence since bias affects the scores on the construct measure, making it impossible to compare scores across groups (Laher, 2010). An equivalent measure is when the measurement operations yield the measures of the same attribute under different conditions of observing and studying phenomena (Kankaras & Moors, 2010). If individuals

with the same scores on the underlying construct have the same expected true score on the item level and the subscale total score level then the test has measurement equivalence Raju, Laffitte & Byrne, 2002. It can thus be concluded that equivalence is associated with measurement level at which scores obtained in different groups can be compared (van de Vijver & Leung, 1997). The absence of equivalence means that one cannot compare different groups nor generalize to other groups based on the scores obtained from that measure (van de Vijver & Tanzer, 2004).

When the test measures the same or similar constructs across two groups, the results should be the same or similar and if a test is able to obtain such results the test is equivalent meaning the groups can be compared (Brown, 2012). Incomparability of groups is possible in the case that the differing groups are assessed using the same measure as there is the possibility of differing understanding of the assignments and concepts across the groups (Kankaras & Moors, 2010). This is why equivalence assessment studies are highly encouraged.

As previously mentioned in the literature review, in-equivalence between two groups may be as a result of gender differences, age differences, socioeconomic differences, cultural differences, language differences, ethnicity differences and or geographical location differences (Coetzee & Schreuder, 2010; Foxcroft & Roodt, 2009)). It is always important to take these contexts into consideration when measuring different groups.

Bias is discussed in this section since bias is a common problem in cross-cultural studies and there is a theoretical link between equivalence and bias and as discussed above, when there are biases in the measure equivalence cannot be achieved (van de Vijver & Tanzer, 2004).

3.3 Taxonomy of Bias

Bias are not random errors, they are systematic measurement errors (He & van de Vijver, 2012) In order to examine these systematic errors the taxonomy of bias should be followed. There are three types of bias; they depend on whether invalidity is from the theoretical construct (construct bias), the measurement instrument (method bias) or from specific items (item bias) (van de Vijver & Tanzer, 2004).

Construct bias refers to when the construct being measured across the groups is not the same or similar. It is concerned with overlap in construct definitions across different cultural groups (van de Vijver & Leung, 1997). An example is the definition of depression; Chinese depressed outpatients associate depression with somatic symptoms while Australians associate depression with depressed mood and cognitive anxiety symptoms (He & van de Vijver, 2012). Similarly, behaviours associated with loneliness in different geographical locations differ (van de Vijver & Tanzer, 2004). van de Vijver and Tanzer (2004), suggest that construct bias can be dealt with by specifying the theoretical conceptualization underlying the measure.

Method bias refers to systematic errors from methods or procedures of the study and instrument. Method bias is the generic term for nuisance factors deriving from sampling (sampling bias), structural features of the instrument (structural bias) or from the administration process (He & can de Vijver, 2012). Sample bias refers to the lack of similarities between samples thus leading to incomparability on other aspects other than the target variable. For example, when measuring individuals from different educational levels, scores obtained from a mental ability test will be in favour of the higher levels of education than lower, therefore meaning that the comparison of scores from these levels would not be valid and reliable. They wouldn't be a true reflection of the mental ability (van de Vijver & Tanzer, 2004).

The bias may also be as a result of the characteristics of the test or of the administration of the test. Stimulus familiarity and response styles may have an impact on instrument bias; participants from different cultural groups may have different familiarity with certain response styles (Laher & Cockcroft, 2014). Pictures taken in one culture may not have the same relevance in the next culture. Computer assessments may also not be effective as certain cultures are not familiar with the usage of computers. Also, multiple choice questions may not be a popular response style for certain cultures thus leaving them at a disadvantage (He & van de Vijver, 2012). Bias can also come from administration condition and interaction between participant and test administrator. Cultural and linguistic differences between the interviewer and the participants may affect the results of the test and also if the interviewer is not familiar or has no knowledge of the language that the test is being administered in (Foxcroft & Roodt, 2009).

The third type of bias is item bias also referred to as differential item functioning (DIF) (van de Vijver & Tanzer, 2004).This refers to distortion at the item level. The item is biased if it has different meanings across cultures if people with the same trait from different cultures do not understand the item the same the item is said to be biased (He & van de Vijver, 2012). Item bias also occurs when the item is written in a manner that will lead the respondent to respond in a particular manner Babbie, 2013. Additionally, if the test has a difficult item and participants from different cultural groups who are equally intelligent or equally anxious are being tested then an unbiased item should be equally difficult (van de Vijver & Tanzer, 2004). In addition, item bias may also be produced by poor item translation, inadequate item formulation, inapplicability of item contents in different cultures and ambiguous connotations (van de Vijver & Leung, 1997).

3.4. The framework of equivalence

Van de Vijver and Leung (1997) suggest that there are different levels of equivalence and they are hierarchically ordered. The three levels of equivalence are; construct equivalence, measurement unit equivalence and scalar equivalence (Matsumoto & van de Vijver, 2011).

The first level is construct equivalence also referred to as structural equivalence or functional equivalence. There is evidence of construct equivalence when the measure proves to measure the same construct across different groups (Laher, 2010). When there is a lack of shared meaning across the groups then construct equivalence cannot be claimed those groups with regards to the measure in question. Foxcroft and Roodt (2009) add that psychological constructs are tied to their natural contexts and they cannot be studied outside of that context. Different cultures cannot be compared when an instrument measures different construct across the groups as it would be like comparing oranges and apples (Matsumoto & van de Vijver, 2011). Van de Vijver and Leung (1997) further relate this to the concept of depression. Depression has different meanings across cultural groups thus no link can be found between scores obtained from these different groups regarding the construct depression. In order to claim for construct equivalence, the instrument needs to measure the same construct across the two cultural groups. Construct equivalence evidence may be assessed by means of exploratory factor analysis (Visser & Vissers, 2010) or Confirmatory factor analysis (Hair, Black, Babin & Anderson, 2010).

The next level is measurement unit equivalence which is regarded as the next highest-level of equivalence. Measurement unit equivalence refers to the consistency of the measurement unit across the groups (Hauot & Koc, 2012). This level means that the tests have the same measuring unit but different origins (Laher, 2010). Matsumoto and van de Vijver (2011)

gives an example of the measurement of temperature using Kelvin and Celsius scales, the measurement scale is identical but the origins of the scales are not, these scores cannot be compared unless their origins are known so that they can be converted to become comparable. To emphasize the point, He and van de Vijver (2012) illustrate an example with kilometres and miles; some countries use kilometres to measure road distances and others use miles. Kilometres and miles cannot be directly compared, but with the formula (1 mile is about 1.6 km) one can convert one scale to the other thus allowing the data to be comparable enabling distances to be compared across countries.

The last, also regarded as the highest level of equivalence is scalar equivalence (van de Vijver & Leung, 1997). It's also referred to as full scale equivalence (van de Vijver & Tanzer, 2004). Scalar equivalence requires that the instrument has the same measurement unit, that the measurement scale has the same origins and that it measures the same construct across the groups (van de Vijver 7 Tanzer, 2004). Scalar equivalence can only be attained when the measure is completely bias free, that is there is no construct bias, item bias or method bias. Direct group comparisons can only be made when the scalar equivalence of an instrument has been achieved (Matsumoto & van de Vijver, 2011). When the researcher wants to compare the means obtained in the groups or wants to compare scores of individuals belonging to the different groups it is necessary that scalar equivalence is present.

There are various methods to establish scalar equivalence, one may assess the reliability coefficients, assess the internal structure of a measure and may also assess the invariance using multiple groups confirmatory factor analysis (Harachi, Choi, Abbott, Catalano & Bliesner, 2006). Additionally, the assessment of incongruences through techniques like the tuckers phi (Laher, 2010).

To assess the scalar equivalence of the SASUCRI, this study compares mean sub-scale total scores of the groups, assesses the group differences between reliability coefficients of the scales and to assess the construct equivalence between the two groups exploratory factor analysis was conducted to inform the tucker's phi which compares the similarities between the two groups within the different scales of the measure.

3.5. Application of theory for current study

The scalar equivalence of the SASUCRI was assessed between the English and isiXhosa mother tongue speakers. The instrument is available in English for use by the English and isiXhosa mother tongue speakers. When using psychological and educational instruments across different groups it's important to ensure that the same construct is measured across the groups to ensure that the scores are comparable and fair for all groups being tested. This study assessed if the same construct is being measured across the two groups (English and isiXhosa mother tongue speakers) using the English version of the measure in order to eliminate issues of unfair assessment and decision making.

3.6 Conclusion

This chapter discussed the theoretical framework of the study, particularly the taxonomy of bias and framework of equivalence. It also discussed the relevance or how the framework relates to the study.

The next chapter provides the methodology that was used to achieve the research aims of the study. It particularly speaks to the design of the study, the participants and the data analysis which in turn speaks to the statistical procedures that were used for this study.

CHAPTER 4

METHODOLOGY

4.1 Introduction

This chapter gives a detailed discussion of all the techniques that were used in order to assess the scalar equivalence of the English version of the SASUCRI across the English and isiXhosa mother tongue speakers. Justifications of the techniques used are also provided in this section. The chapter specifically gives detail about the design of the study, the sample and sampling procedure for the study and how missing data was managed. Before getting into the details of the procedure taken to analyse the different objectives, the measurement tools specifics and validation details are provided. This chapter is directly related to the next chapter as it gives detailed steps taken to reach the results in Chapter 5 which are further discussed in Chapter 6.

4.2 Design of the study

This study falls within quantitative research methodology. Quantitative research methodology is suitable for this study as the nature of the study is descriptive and explorative, using comparative statistics to assess the scalar equivalence of the English version of the SASUCRI across the English and isiXhosa mother tongue groups. The researcher used an exploratory differential research design. The exploratory differential research design is useful when there are uncertainties about a subject or problem that is not well understood, it identifies the environment in which the problem reside and identifies the salient factors that might be useful for the research. Additionally, it's useful when there are uncertainties concerning the comparing of groups with differences that existed before any research was done on them (Gabrenya, 2003). This research study explores the scalar equivalence of a newly developed

instrument owing to the uncertainties about the equivalence for the English version of the instrument across the English and isiXhosa mother tongue speakers. There are uncertainties about the construct validity of the measure for the isiXhosa group thus it is necessary to explore the structure of the measure for both groups. The study is exploratory in that it explores the structure of the measure across the two groups in order to assess the construct equivalence of the measure across the groups. It uses a differential design in that the study compares the groups on the basis of the pre-existing language differences (English and isiXhosa). These differences existed before any research was done. An exploratory differential design was thus appropriate for this study in order to address the overall aim of this study which is to assess if the two language groups differ in any way on the English version of the SASUCRI.

4.3 Sampling and Participants

Secondary data (see 4.5 for definition) were used for this study, thus the participants from the initial validation study were retained for this study. Some of the isiXhosa participants were recruited by the researcher of the current study as there were a small number of isiXhosa mother tongue speakers from the initial validation study. The additional sample of isiXhosa mother-tongue speakers was also recruited in order to meet the sample requirements of exploratory factor analysis (see 4.3.1.1.1). Non-probability purposive sampling was used to select schools from three districts in Western Cape for the initial validation study. Non-probability sampling was appropriate for the validation of the instrument. Attempts were made to ensure that the sample was representative in the larger study, but a probability sample was not necessary for the validation of the instrument. Non- probability purposive sampling is used when the researcher uses their special knowledge about some group to ensure certain types of individuals display certain attributes (Berg, 2001). The research

required adolescents from low socio economic status communities in Western Cape and respondents from both rural and urban schools were selected to participate. Only schools that catered for English and Afrikaans first language were selected since the instrument was only available in English and Afrikaans for the initial validation study. Within the schools, learners were sampled using convenience cluster sampling in that whole classes were sampled and not individual learners. This was decided on in order to minimise disruption to the school programme. Learners from grade eight to grade twelve were selected to participate in the study since the age group of 13 to 18 years was represented in these grades.

The same procedure was conducted for the additional isiXhosa sample as was done for the initial validation study. These isiXhosa mother tongue speakers were recruited from schools that catered for isiXhosa as a first language. The table below illustrates the distribution of the sample.

The total sample for the initial validation study consisted of 606 English who identified themselves as English first language learners however it was discovered that of the 602 English first language speakers, 186 learners were isiXhosa mother tongue speakers.

In this study, the English sample of 420 English mother tongue speakers, 186 isiXhosa mother tongue speakers and an additional 68 isiXhosa mother tongue speaker who were for the current study therefore the current study had a total of 674 participants. Below is the brake down of the current study's sample.

Table 1: Sample before missing data analysis

	English		Initial isiXhosa		Additional isiXhosa		Total
Grade	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	
8	40	39	43	28	0	5	155
9	57	51	24	13	12	21	178
10	65	38	43	5	0	2	153
11	45	26	14	11	22	5	123
12	28	28	1	1	0	0	58
Missing	1	2	1	2	0	1	7
Total	236	184	126	60	34	34	674

4.4 Missing data analysis

This section is a discussion the manner in which the researcher managed the missing data. A missing data analysis was conducted in the initial validation study therefore missing data was managed for the sample obtained from that study. Cases with more than 50% missing values were discarded and those with less than 50% missing values were substituted with average scores (Florence , 2014).

After the missing data analysis the final sample for this study was 667 participants consisting of 420 English speaking participants and 247 isiXhosa speaking sample. The table below illustrates the sample after missing data had been managed.

Table 2: After missing data analysis

	English			isiXhosa			Total
Grade	**Female**	**Male**	**Missing**	**Female**	**Male**	**Missing**	
8	40	39		41	32		152
9	57	51	1	35	34	1	179
10	65	38	1	41	7		152
11	45	26		37	16		124
12	28	28		1	1	1	59
Missing		1		1			2
Total	235	183	2	155	90	90	667

4.5 Measurement tool

The South African Substance use Contextual Risk Instrument was developed to measure the individual and contextual factors associated with adolescent substance use. The instrument was developed to be used in low-socio economic status communities in South Africa to identify contextual risk factors for adolescents at risk of substance use with the ultimate goal of eventually developing preventative interventions for at risk adolescents and communities.

Bronfenbrenner's ecological systems theory was used as the theoretical framework when developing the SASUCRI (see Florence, 2014). Bronfenbrenner's understanding is that when one aims to understand the development of human beings, one needs to take into consideration the entire ecological system within which their development takes place (Bronfenbrenner, 1994). His ecological systems theory comprises of five systems levels; the micro-, meso-, exo-, macro- and chrono systems levels (Bronfenbrenner, 1994). The systems levels are discussed below.

Micro-systems level is concerned with the relationship between the individual and the immediate environment they directly interact with, for example the school, peer group and family. This systems level comprises of the interaction between the child and their immediate environment (Paquette & Ryan, 2002). This systems level includes the structures; family, school and neighbourhood. At this level the child's behaviour is impacted on by the parents for example and they too in turn impact on the behaviour and beliefs (Paquette & Ryan, 2002). Beck (2002) refers to this as bi-directional influences.

Meso-systems level is a system of micro systems. This means that this systems level comprises of the relationships between settings that impact the development of an individual (Bronfenbrenner, 1994). For example, the Meso systems provide connections between the different structures in the child's life, for example, the connection with the child's parents and the child's teacher (Bronfenbrenner, 1994).

Exo-systems level comprises of the larger social systems in which there is no direct child growth influence from but has a connection with one of the structures that the child has direct interaction with. Bronfenbrenner (1994) gives an example of the relationship between home (in which a child's development takes place) and the parents work place (which no child development takes place but directly influence the home setting in which the child's development takes place). The child is not directly connected with the work place but they do feel the negative or positive impact that it has with the interaction between the child and parent structure (Bronfenbrenner, 1994).

Macro-systems level includes the overall pattern between the other systems level characteristics of culture and subculture including beliefs, bodies of knowledge, customs and etc. in these systems. This systems level influences formulation of relationships, where and how one formulates them (Bronfenbrenner, 1994). The culture beliefs and customs affect all

the systems levels, the cultural beliefs influence the relationship between the parents and the child and also the parent's relationship with the workplace for example (Paquette & Ryan, 2002).

Chrono- systems level is concerned with time as it relates to the child's development. Elements of this systems level may be internal like Physiological changes and external like the death of a parent (Berk, 2000). It is concerned with the consistency of the characteristics of the individual and the environment that the individual lives in (Bronfenbrenner, 1994).

Most recent extension of the ecological paradigm goes beyond context and takes into consideration the biology, psychology and behavioural aspects of the developing individual (Bronfenbrenner, 1994). They included three types of person characteristics that influence the direction and power of the proximal process; 1) Force which refers to characteristics like temperament, motivation and persistence. 2) Bio-ecological resources which refer to mental and emotional resources like ability and experience and 3) Demand which refers to immediately observable characteristics like age and gender. The later developments of the model which focuses on person context relational process is referred to as proximal processes which is the interaction of the person and the environment over a period of time influencing the development of the individual. According to Bronfenbrenner (2005) these personal characteristics influence the power, content and the direction of proximal processes.

The structure of the SASUCRI is based on this model and theories obtained from the community. In addition to the ecological theory, various committees were consulted to contribute to the development of the SASUCRI. This was done in order to gain an understanding of the community's perceptions of the contributing factors to substance use. The committees consisted of government representatives such as the police service, social

services, health department and the education department. Non-government organisations, non- profit organisations, businesses and religious actors also engaged in the study.

Additionally, other members of the community were purposefully sampled through the above mentioned committees. Parents, at school and out of school, using and non-using adolescents were part of the sample that engaged in the focus groups.

Table 3: Example of revised items per scale

Systems levels	Scales (21)	Original items	Items in revised scales (132)	Max scores	Cronbach Alphas
Individual systems level	**Social identity**	4-10	**9**(3,8,9,10,18,26,27,28,33)	36	.735
	Sense of belonging	14-20	**12**(1,4,5,6,11,12,13,14,16,17,19,20)	48	.813
	Self-efficacy	21-28	**11**(21,22,23,24,25,29,30,31,32,34,35)	44	.839
	Effects of drugs	36-41	**6**(36-41)	29	.929
	Religiosity	42-46	**5**(42-46)	20	.820
Micro (family) systems levels	**Family functioning**	47-54	**8**(57,62-68)	32	.859
	Communication and social support	-	**7**(48-54)	28	.847
	Parental monitoring	55-62	**5**(56,58-61)	20	.746
	Economic pressure in family	69-76	**8**(69-76)	32	.884
Micro (community) systems levels	**Peer support**	77-81	**6**(77-81,89)	24	.782
	Peer influence	82-86	**5**(82-86)	20	.845
	School as a support	87-92	**7**(87,88,90-92,99,100)	28	**.646**
	School as a stressor	93-98	**6**(93-98)	24	**.639**
	Neighbourhood	99-107	**6**(102-107)	26	.751
Meso-systems levels	**Contradictions**	108-116	**2**(108-109)	8	.882
	Mixed messages		**7**(110-116)	28	.860
Macro-systems levels	**Tolerance for child and adolescent drug use**	117-124	**5**(117-118,121-123)	20	.847
	Tolerance for soft drugs		**3**(119-120,124)		**.681**
Chrono-systems levels	**Hopelessness individual**	133-138	**3**(137,143,145)	28	**.491**
	Hopelessness community		**4(**133,135-136,138)	28	**.628**
	Hope for the future	139-147	**7**(139-142,144,146,147)		.630

Data obtained from the community was compared to the systems levels and themes were extracted to formulate scales into the systems levels. Based on the data it was decided that the

micro-systems level would be divided into two systems levels; the micro-family systems level and the micro- community systems level as family and community themes came up and they were related to the micro-systems level. When the factor analysis was conducted in the initial validation study by Florence (2014) separate factor analysis were run for the micro systems levels; Micro (family) and Micro (community) systems levels.

The initial instrument consisted of 147 items within 23 scales. These scales were reduced to 131items within 20 scales in the initial validation study of the instrument. Below, table 3 illustrates the examples of the revised scales and items. This illustrates how the items were rearranged and which were removed after the initial validation.

The initial validation study yielded results indicating the extent to which the instrument is valid and reliable. The content validity was confirmed by assessing construct relevance, and representation as well as face validity. In terms of reliability 15 of the 20 scales had reliability coefficient ranging between .74 and .93, one of the scales had a coefficient of .49 ("Hopeless individual") and the other 4 ranged between .63 and .68 (see table 3).With "School as a support"; .65, "School as a stressor"; .64, "Tolerance for soft drugs"; .68 and "Hopeless community"; .63.

4.6 Data analysis

Secondary data was used for this study. Secondary data analysis refers to data that was originally collected by another researcher and analysed for another purpose (Church, 2001). Primary data was also used for this study in order to supplement the sample and make it possible to do the analysis proposed. Primary data refers to data collected and used for a particular purpose (Church, 2001). Statistical Package for the Social Sciences (SPSS version 22) package was used to conduct different statistical tests/ techniques.

Below is a table illustrating the steps and techniques that were used in the analysis process.

Table 4: Breakdown of steps and techniques used in the analysis process

Aims	Steps	Techniques
Objective 1: Compare Mean differences of scale totals across English and isiXhosa mother tongue speakers	1) Calculating the mean scale totals of the groups. 2) Assessing the significant difference of the means on the different scales	1) Cross Tabs 2) Hotelling's t-test
Objective 2: Differences between reliability coefficients of scales across English and isiXhosa mother tongue speakers	1) Assess the reliability of the scales for both groups. 2) 2) Compare the reliabilities	1) Cronbach's alpha 2) Equality of reliabilities Formula: $\frac{1-alpha1}{1-alpha2}$
Objective3:Construct equivalence: Assessing if the instrument measures the same construct across the two groups	1) Determine the factor loadings of the scale totals 2) Assessing how the scales function differently across the two languages 3) Validating findings of the Tuckers Phi coefficient	1) Exploratory factor analysis 2) Tucker's Phi coefficient 3) Identity lines

This section discusses the analysis that was used to address each of the objectives in order to achieve the overall aim of assessing the scalar equivalence of the English version of the SASUCRI across the English and isiXhosa mother tongue groups.

4.6.1 Objective 1: To assess the mean difference between the scales totals of the English version of the SASUCRI across the English and IsiXhosa mother tongue speakers.

Descriptive statistics were used to calculate the mean scale totals of the two language groups on the SASUCRI. Inferential statistics were used to assess the significant differences of the means on the different scales of the SASUCRI. A Hotelling's T-square was used to assess if the means of the groups differ significantly.

Hotelling's T-square is an extension of the t- test which is a means of comparing two different population groups on the basis of one dependent variable. If differences between two different population groups are being compared using several dependent variables, a t-test is not adequate, one would have to carry out a number of t-tests which would increase the possibility of Type I error (incorrectly rejecting a true null hypothesis) (Field, 2009). Hotelling's T- test is thus a useful technique for controlling the family-wise error (inflation of type one error). It is also a form MANOVA which is used when comparing several groups on several variables however Hotelling's T- test is limited to two groups (Field, 2009). It's used to test equality of mean vectors of two populations on several dependent variables.

The Hotellings T- test was the appropriate statistical procedure to assess if there is a significant mean difference between the English and isiXhosa mother tongue speakers on the scales using scale totals. The two groups were the English and isiXhosa mother tongue groups and the several variables were the scales of the SASUCRI.

The following hypothesis was being tested;

H_0: There is no significant mean difference between the English and isiXhosa mother tongue speakers on the English version of the SASUCRI.

4.6.2 Objective 2: To assess the group differences between reliability coefficient of the scales of the English version of the SASUCRI between the English and IsiXhosa mother tongue speakers.

Cronbach's alpha is the statistical technique that was used to assess the internal consistency of the SASUCRI. Cronbach's alpha was calculated for all the scales for both the English and isiXhosa group. The equality of reliabilities between the groups was there after assessed using the formula: $\frac{1-alpha1}{1-alpha2}$. The differences follow an F distribution with N_1 -1 and N_2 -1 degrees of freedom, for this study the critical was 1.22 (p=.05).

4.6.2.1 Reliability

Measurements are commonly used in social sciences to observe human behaviour (Drost , 2011). Various psychological constructs are measured using these measurements and critical decisions are made based on the results of these instruments concerning individual's lives (Coetzee & Schreuder, 2010). Validity and reliability concepts are therefore very important concepts in Social Sciences (Kaplan & Saccuzzo, 2009). In South Africa, the Employment Equity Act (Republic of South Africa 1998) states that all scientific tests used in South Africa have to be valid, reliable and fair (Laher, 2010). Based on these recommendations researchers assess the internal consistency and construct validity of instruments in order to address issues raised in the Employment Equity Act.

Validity and reliability are very closely related to one another. Validity is concerned with whether the measure measures what it intends to measure and reliability is concerned with the consistency of the measure; if the measure consistently measures what it aims to measure (Tavokol & Dennick, 2011). The assumption is that the measurement property remains the same therefore the expectation is that the measurement should yield similar results under similar conditions (Coetzee & Schreuder, 2010). However, psychological tests have some

amount of error as there are factors that might affect the score of the respondent therefore we work with the degree of reliability (Kaplan & Saccuzzo, 2009).

There are several techniques for measuring reliability, including test-retest reliability, equivalent-form reliability, internal consistency reliability and inter-ratter reliability (Coetzee & Schreuder, 2010).

Test-retest reliability: The test is administered to the same group of people at two different points in time and then the scores are compared by means of correlation. A high correlation would mean that the test can be regarded as reliable (Foxcroft & Roodt, 2009). In the alternate- form reliability, measures are administered to the same group at different points in time. This type of reliability testing is not popular as it is expensive and time consuming for researchers to develop two tests measuring the same construct (Coetzee & Schreuder, 2010).

The split-half reliability is obtained by administering the test to a group of people and the scoring the items are split into equivalent halves (Coetzee & Schreuder, 2010). Each person gets two scores for the test and the correlation coefficient is calculated by comparing each individual's two scores (Coetzee & Schreuder, 2010). The inter-item consistency is based on the consistency of responses to all items in the measurement (Foxcroft & Roodt, 2009).

Inter - ratter reliability; two additional ratters' score the test takers protocols and correlate the scores given by the assessors (Coetzee & Schreuder, 2010). Alternatively, the intra-scorer ratter reliability method may be utilised. This is when the same ratter scores the same protocols.

The most widely used technique to assess internal consistency **is** Cronbach's alpha (Drost, 2011;Tovokol & Dennick, 2011). This technique is considered to be more objective, practical to use and less expensive unlike the test – retest technique for example as it only requires a

single test administration (Tavokol & Dennick, 2011). The formula for Cronbach's alpha is $\alpha = \frac{N^2\,\overline{\mathrm{Cov}}}{\sum S^2_{\mathrm{item}} + \sum \mathrm{Cov}_{\mathrm{item}}}$ (Field , 2005).

The researcher used Cronbach's alpha to calculate the reliability of the scalea in this study. Once the reliability coefficients for both groups were obtained for all scales, the equality of the reliabilities were assessed.

van de Vijver and Leung (1997) suggest the statistic: $\frac{1-alpha_1}{1-alpha_2}$ to test the equality of two independent reliability coefficients. $alpha_1$ refers to reliability coefficient for group one and $alpha_2$ refers to the reliability coefficient for group two. To test for significance of the difference between the two reliability coefficients an F distribution is followed with degrees of freedom of N_1-1, N_2 -1; N_1 referring group one sample total and N_2 to group two sample total. The statistical equality of reliabilities was calculated based on the recommendations by van de Vijver and Leung (1997). The critical value was 1.22 for this study based on p-value at p=.05 and sample size 400. The following hypothesis was being tested;

H_0: There is no significant reliability difference between the English and isiXhosa mother tongue speakers on the English version of the SASUCRI

4.6.3 Objective three: Assessing the construct equivalence of the English version of the SASUCRI across the English and isiXhosa groups.

4.6.3.1 Factor Analysis

Factor analysis is a multivariate statistical procedure commonly used in Psychology and education in developing, refinement and evaluation of measures used in these fields (Williams, Brown & Onsman, 2010). The technique is used to explore the underlying structure of a set of variables by investigating the inter-correlations existing between a large number of variables with the ultimate goal of reducing the variables to groups of variables

that are highly correlated. These groups are known as factors (Hair et al., 2010). The variables that are grouped together are similar in content and meaning (Hooper , 2012). The technique is extensively used in scale development to make a large pool of items more concise and reliable (Hooper , 2012). The technique is also useful in the formation and refinement of theory and in providing construct validity evidence of self-reporting scales (Williams, Brown & Onsman, 2010).There are two types of Factor Analysis technique; Confirmatory factor analysis and Exploratory factor analysis.

Confirmatory factor analysis (CFA) is a statistical technique used to test a proposed theory or model, it verifies the factor structure of a set of variables. When a researcher uses CFA they have expectations and assumptions based on an existing theory regarding the number of factors and which model best fits the data. Contrary to CFA, Exploratory factor Analysis (EFA) is used when the objective is to reduce data by identifying and grouping inter-correlating variables or to explore the main dimensions to generate a theory or model from large sets of latent constructs represented by a set of items (de Vet, Ader, Terwee & Power, 2005).

Some researchers (Tabachnick & Fidell, 2007; Thompson, 2004) regard CFA as a more "appropriate" technique however, even though the number of factors per systems level have been proposed in the initial validation study, it's important to note that regardless of the theoretical contributions regarding the systems level of the instrument (see section 4.4) there are no set theoretical requirements regarding the structure of the data (Florence, 2014). CFA is used when the intention is to test a proposed theory and verifies the structure of the set of variables. EFA is currently being used when researchers assess construct validity and construct equivalence (Laher, 2010). Construct validity is concerned with the relationships among variables.

It's important to note that Exploratory Factor Analysis as a statistical approach has received controversy and criticism. Researchers (Tabachnick & Fidell, 2007; Thompson, 2004) criticise the subjective nature of the results that are determined by the researcher. They express that decision about the comparison of factorial models are subjectively determined by the researchers (Laher, 2010).

Laher (2010) suggests that the assumptions and steps of executing factor analysis are taken into consideration in the order that they are discussed below to ensure the reliability of the conclusions reached. Exploratory factor analysis is used in this study to provide matrices with the factor loadings in order to inform the assessment of congruencies between the two groups. Sireci and Hambleton (2003) stress that congruence in multi-group comparisons may be incorrectly interpreted if the exploratory factor analysis is not conducted in a precise and systematic manner. The methodology of exploratory factor analysis is therefore discussed below to ensure correct conclusions for the assessment of congruence across the two groups.

4.6.3.1.1 Exploratory factor analysis design issues and assumptions

4.6.3.1.1.1 Sample size

The reliability of factor analysis is influenced by the sample size. However so much has been said about the adequate sample for factor analysis. According to Yong and Pearce (2013) factor analysis generally works better with larger samples as they yield reliable estimates of correlations among variables. They further recommend that researchers have a minimum sample of 300 participants. Other recommendations are based on the minimum ratio of N to the number of variables. Kass and Tinsley (1979) cited in Field (2009 recommend variables have 5 to 10 observations up to a total of 300. Findings from a study by Arrindell and van der Ende (1985) also cited in Field (2009) indicate that if a factor has four or more loadings greater than 0.6 it is reliable regardless of the sample size and factors with 10 and more

loadings more than .40 are reliable if the sample is more than 150. Furthermore factors with few low loadings should not be regarded as reliable unless the sample is more than 300. Everrit (1975) suggests that exploratory factor analysis can reasonably be done with 5:1. Thus in this study, the sample adequacy was as per Everrit's recommendations of 5:1. It was decided that the systems level with the largest number of items would be used to assess the sample adequacy for factor analysis since the analysis were done per systems level. The Individual systems level had the most items, it consists of 5 subscales with 43 items, and the total sample was 667 made up of 186 initial isiXhosa group and 68 additional isiXhosa group making up a total of 254, therefore this sample was adequate as the there ratio was 254/43= 5.9:1 for this group. The total English sample was 413 thus making the sample adequate as the ratio was 413/43=9.6:1.

4.6.3.1.1.2 Variable selection

An important aspect of factor analysis is that correlations can be calculated among all variables therefore the items should be at interval level like the likert scale as interval level variables are easily measured by several types of correlations compared to non-metric variables (Hooper, 2012; Hair et al. 2010). Hair et al. (2010) further suggests that there should be at least five variables that may represent a single factor. In the current study, there are 147 items likert scale items and 21 factors.

4.6.3.1.1.3 Measures of inter-correlation

As previously mentioned one of the underlying assumptions of factor analysis is that there should be an underlying structure in the set of variables that are selected and the sample should be homogeneous with regards to the underlying factor structure therefore when running a factor analysis variables need to correlate well however Hair et al. (1995) cautions that they shouldn't correlate perfectly.

There are various techniques to assess the correlations of variables. Inter-correlations of variables can be examined through visual inspection of a correlation matrix which displays the relationship between the variables (Williams, Brown & Onsman, 2010). Williams, Brown and Onsman (2010) suggest that there should be a reasonable number of correlations greater than .30. which indicates that the factors account for approximately 30% relationship with the data. Should there be no substantial number of correlations greater than .30 factor analysis is probably not the correct statistical procedure for the data.

Kaiser-Meyer-Oklin is commonly used the technique to justify that the data matrix has an adequate correlation. It ensures lack of multi-collinearity. The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) was used to assess the adequacy of the sample for factor analysis in this study. KMO is aimed at assessing if data will factor well based on correlation and partial correlation (Field, 2009). The KMO index varies between 0 and 1. Field (2005) suggests a minimum of 0.5 to proceed with factor analysis, he further suggests that 0.7 and 80 is good, above 80 to 90 great and anything over .90 is superb. The criteria of .50 are recommended when the ratio is 1:5.

Another commonly used technique is the Barlette's Test of Sphericity. The Barlett's Test of Sphericity was also used for this study to assess lack of multicollinearity and homoscedasticity. This is another way of assessing the appropriateness of using factor analysis (Hair et al., 2010). Barlett's Test of Sphericity tells us about the correlation matrix's statistical significance of significant correlations among some variables. The Sphericity should be $p<.05$ for a reliable factor analysis (Williams, Brown & Onsman, 2010).

4.6.3.1.1.4 Normal distribution

A researcher can use visual inspection of data plots and P-P plots, to test for normality and Kolmogorov-Smirnov tests which provide inferential statistics on normality. Outliers can be

identified through visual inspection of histograms/frequency distribution or by converting data to z-scores (Osborne & Waters, 2004). However, Hooper (2012) states that deviation from normality is not detrimental to the results of a factor analysis. PP-plots, Kolmogorov-Smirnov tests and inferential statistics were used to assess the assumption of normal distribution of the data in this study.

4.6.3.1.2 Executing Factor Analysis

4.6.3.1.2.1 Factor analysis extraction method

The purpose of factor extraction is to minimise a large number of items to factors and produce scale unidimensionality (Williams et al. 2010). One cannot retain all factors hence the tendency is to retain those with eigenvalues larger than one. Several criteria are available to guide researchers in the extraction of factors (Field, 2009).

The choice of method is based on two things; the purpose of the factor analysis and some prior knowledge of the characteristics of the relationship between the variables (Hair et al. 2010). Two factor extraction methods are identified in research; Component analysis (CA) otherwise known as principal components analysis (PCA) and Common factor analysis (CFA) methods (Field, 2009). The differences between the two methods are theoretical and empirical. Component factor analysis is useful when data reduction is the main concern and there's prior knowledge of the error variance. It takes into consideration the total variance and derives factors with small variance and error variance.

Common factor analysis is useful when the aim is to identify the constructs represented in the original variables and the researcher has limited knowledge about the amount of specific or error variance and thus needs to eliminate the variance (Hair, Black, Babin & Anderson, 2010). While Component factor analysis takes into consideration the total variance, common

factor analysis only takes into consideration the common or shared variance thus factors derived from the common factor analysis are based on common variance.

Principal component analysis was used within EFA in this study. This is a commonly used technique in EFA by personality instruments developers. It's an effective method to determine factors that explain all the variance and error variance in the correlation matrix (Laher, 2010).

4.6.3.2.1.2 Number of factors to extract

A precise decision needs to be made regarding the factors to extract for the solution to obtain a satisfactory solution. Laher (2010) identifies six methods that are commonly used by researchers to extract factors. Namely: the Guttman-Kaiser eigenvalues more than one rule, Cattell's scree test, parallel analysis, Velicer's minimum average partial, Bartlett's test for equality of eigenvalues and maximum likelihood tests. In addition, Hair et al. (2010) identifies the a priori criterion and the percentage of variance criterion.

In factor analysis, eigenvalues greater than one indicate the importance of the factor, it's therefore advised that eigenvalues greater than one are retained. Various extraction approaches are available to facilitate decisions about the number of factors that should be extracted. Researchers may use the Guttman-Kaiser eigenvalues more than one rule, Cattell's scree test, parallel analysis, Velicer's Minimum Average Partial, Bartlettes Test for Equality of Eigenvalues and Maximum likelihood tests (Laher, 2010) and the a priori criterion and the percentage of variance criterion (Hair et al. 2010).

The researcher used multiple techniques for this study; A priori criterion was used to specify the initial number of factors and then a follow up of statistical procedures using the Kaiser's

eigenvalues greater than one criterion, taking into consideration the cumulative variance and the scree plot to find the point of inflexion were used to ensure a good model (Hooper, 2012). The initial validation study used the residual less than 50% criteria, the eigenvalues less than 1 criteria, the scree plot. In addition to the initial point of extraction, the initial study used theoretical knowledge; the ecological theory and community's theory discussed in section 4.4 under measurement tool. The initial number specified for all systems levels in this study is based on the final solution of the initial validation study by Florence (2014).

A priori criterion refers to when researchers know how many factors they wish to extract based on conceptual, empirical and prior research. The criterion is used when the researcher aims to test the theory or hypothesis of the number of factors that should be extracted or if the researcher wants to retain the number of factors that were previously found in previous research (Hair et al. 2010).

When taking into consideration the residual analysis criteria Hair et al. (2010) contends that in social sciences solutions accounting for 60% total variance are regarded as satisfactory. In the case that residual did not meet the requirements specified above the researcher may further use eigenvalues and scree plot to reach a decision regarding the good model.

The Kaiser Eigenvalues more than one is usually used in conjunction with the scree plot (discussed in the succeeding paragraph). The eigenvalues criteria retain all factors with eigenvalues more than one. The understanding is that eigenvalues represent the amount of variation. The technique can be used when the sample size is more than 250 and the average communality is greater than or equal to 0.6.

Catell's scree plot is the most commonly used method to select factors (Hair et al. 2010). The scree plot is a graph with eigenvalues against the factors with which they are associated with.

The graph demonstrates the importance of eigenvalue. The factors that should be extracted are illustrated by the point of inflexion of the curve and factors to retain on the left of the inflexion point without the inflexion point itself (Field, 2009).

Multiple methods were used to inform the number of factors to extract in this study. For the initial number extracted for each systems level the a priori criterion was used. This was based on the theoretical background which is discussed in detail in the initial validation study (see Florence, 2014). The a priori criteria were further followed by residual, eigenvalues and scree plot analysis to ensure a good final model.

4.6.3.2.1.3 Factor rotation method

Rotations help in placing the variables close to the factors that are designed to explain them (Laher, 2010). They maximise high item loadings and minimises low item loadings thus producing simplified and easily interpretable solutions (Williams et al. 2012). This helps in informing which factor really best explains the item and it ensures that the item only loads on the necessary factor (Field, 2009).

Two types of rotations can be used; othorgonal rotation and oblique rotation. Before rotation, factors are independent and uncorrelated. The differences are based on whether the variables should be correlated or uncorrelated. Othorgonal rotation ensures that they remain uncorrelated while oblique rotation correlates the factors. The decision between the two types of rotation is based on theory; there should be good theoretical grounds of whether the factors should be related or unrelated.

Researchers have several choices to choose from between the two methods. SPSS has three methods of orthogonal rotation; there is varimax, quatrimax and equamax. Under oblique rotation method there is direct oblimin and promax.

Researchers Reise, Waller and Comrey (2000) argue that direct oblimin rotation is more realistic for human, personality or psychological phenomena as psychological constructs are in some way correlated with some other psychological construct.

The default SPSS delta value does not allow high correlation of factors. When delta more that 0-0.8 is used its most likely that there will be high correlations and if it's a negative number the correlations will be too low.

Direct oblimin rotation therefore proved to be the most appropriate technique for this study since the constructs being measured by the SASUCRI are psychological constructs that are theoretically related. The default SPSS delta value 0 was used for this study to avoid too high or too low correlations.

4.6.3.2.1.4 Significant loading

Various views regarding an acceptable loading or significant loading have been expressed by researchers. Stevens (2002) cited in Field (2009) suggests that the significant loading depends on the sample; for a sample size of 50 a loading of 0.722 can be considered significant, for 100 the loading should be more than 0.512, for 200 it should be more than 0.364, for 300 it should be more than 0.298, for 600 it should be more than 0.21, and for 1000 it should be more than 0.162. all these values are based on an alpha level of .01.

Similar suggestions regarding the sample dependent significant loading are found in Hair et al., 2010. Hair and colleagues suggest that when the sample is 350 or more the factor loading of .30 is significant, sample of 250 factor loading of .35 is significant, sample of 200 loading of .40 is significant, sample of 150, a loading of .45 is significant; sample of 120 a loading of .50 is significant, sample of 100 a loading of .55 is significant; sample of 85, loading of .60 is

significant, sample of 70, a loading of .65 is significant, sample of 6o loading of .70 is significant and for a sample of 50 a loading of .75 is significant.

The sample size for this study was 667 thus it was more than 350 therefore the decision was made based on recommendations by Hair et al. 2010 that for a sample of 350 and more the factor loading of cut off .30 is significant with the significance level of .05. It is however important to note that the purpose of factor analysis for this study was not to assess salient loading but rather to inform the assessment of congruence of scales across the two language groups in order to answer the question of construct equivalence.

The pattern matrix may be used to identify the number of items contributing to factors and how the factors contribute to the construct being measured. The pattern matrix was presented but the researcher did not report the loadings as the purpose of factor analysis in this study was merely to inform the tuckers phi.

Van de Vijver and Leung (1997) state that when assessing construct equivalence, the model should be one where all scales are allowed to load on all factors and the degree of replication can be assessed by congruence coefficients (van de Vijver & Leung, 1997). The decision to not remove any items or do any analysis on items was thus based on the purpose of the study which is to assess scalar equivalence and therefore all item loadings on all factors were needed.

4.7 Congruence

Once the factor loadings of the items were determined, the factor agreement of the two groups was assessed. Marley Watkin's Rc Programme was used to calculate the tucker's Phi coefficient of agreement in order to assess how the scales function differently across the two groups on all the scales. Tucker's Phi coefficient of agreement also known as the coefficient

of proportionality is the most commonly used statistical technique for estimation of factorial agreement (van de Vijver & Leung, 1997). The technique looks at similarities between groups; it makes known how similar the factor loadings are across the groups (Zumbo, Sireci & Ronald, 2003). van de Vijver and Leung (1997) propose that tucker's phi coefficients higher than .95 can be viewed as evidence of factorial similarity and values less than .85 may indicate non- negligible incongruences. Also, McCrae et al. (1996) argue that the .90 cut off point is valid as values of and higher than .90 cannot be due to chance, these indicate adequacy of fit. Therefore, in this study any coefficient below .85 was regarded as an indication of non-negligible incongruence and anything from .90 and above being evidence of factorial similarity.

4.8 Identity lines

To validate the findings of the tucker's phi, identity lines were used. A scatterplot is a graph that plots individual scores on a variable against another score on another variable. Scatter plots are useful in identifying the nature of the relationship between two variables. They identify whether if there is a relationship between two variables and the nature of that relationship (Pretorius, 2007). In this study, scatter plots were useful in identifying if there are any differences between the scores. When the scores of the variables have been plotted a line, the identity line is drawn. When the loadings across there are aligned to the identity line then there are similarities between the two groups.

The hypothesis being tested was;

H_0: There is no significant construct in-equivalence between the English and the isiXhosa mother tongue speakers on the English version of the SASUCRI.

4.9 Ethical considerations and data collection procedure

Permission was requested by the researcher of the initial validation study from the Education department and district managers of the schools that participated. Permission from the school principals was also obtained to conduct the research in the schools while the data was collected for the validation of the SASUCRI. The researcher of the current study obtained permission from the school principals of the additional schools that participated in the current study. This permission was requested by the researchers (from initial validation study and current study) to conduct a study in the schools with the learners to gather information about the factors in the community that could lead to drug and alcohol use among adolescents (appendix 1). Trained field-workers and the researcher administered the test during the initial validation study. The researcher of the current study together with a trained field worker administered the data collection of this study.

The researcher of the initial validation study obtained ethics clearance (appendix 2) from the University of Western Cape to conduct the initial validation study for which the data to be analysed for this study was collected. Information letters (appendix 3 and 4) were issued to the learners and the research was explained to them. Consent forms were issued to the parents (appendix 6) and learners also signed assent forms (appendix 5). The teachers were asked to leave the room during the administration of the measure to ensure confidentiality. The study was explained to the learners before and during the administration of the instrument. The same procedure was followed for the additional sample that participated in this study and the same letters and forms were used for this study.

For the current study permission was granted by the researcher of the initial validation study to utilise data that was collected while piloting the instrument. No names of participants were mentioned in the current study and the researcher took the necessary precautions to ensure that no participants were harmed in any way. The school principal and the learners were

informed that a report of the results of the study would be made available on them uponb request.

4.10 Conclusion

This chapter explained the methodology used for this study. It explored the procedures followed to achieve the aims and objectives of this study. It also gives extensive details about each of the techniques used to answer each of the objective and the order that was followed in executing each of the techniques. In concluding the chapter, the ethical procedures that were followed in order to comply with ethics are discussed. The subsequent chapter reports the results of the analysis obtained from the techniques described in this chapter.

CHAPTER FIVE

RESULTS

5.1 Introduction

The chapter reports the results of the investigation of the overall aim of the study which is to assess the scalar equivalence of the SASUCRI across the English and isiXhosa speaking groups. The study consists of three aims. Some were analysed by means of descriptive statistics, inferential statistics or both. The statistical techniques that were utilised were calculations of Means, Hotelling's T- square, Cronbach's Alpha, Exploratory factor analysis and Tucker's Phi. The results are summarised in tables. These results will be utilised to facilitate the interpretation of the data, the significance of the results and conclusion which will be discussed in the succeeding chapters.

5.2 Assumptions for factor analysis

As previously mentioned in section 4.3.1.1.3 Kaiser (1974) cited in Field (2009) recommends a minimum of 0.5 with 0.5 and 0.7 being mediocre, values between 0.7 and 0.8 being good and between 0.8 and 0.9 being great and that above 0.9 being superb. For these data the value is .859 (see table 5), falling in the range of 0.8 and 0.9 which means that one can be confident that the sample size is acceptable for factor analysis.

Additionally, the Bartlett's test is significant ($p<.05$) meaning that the correlations between variables are significantly different from zero. Factor analysis is thus appropriate.

Table 5: Measure of inter-correlation

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.853
Bartlett's Test of Sphericity	Approx. Chi-Square	38349.6
	Df	8128
	Sig.	0

5.3 Objective one: Comparing the mean difference is scale totals across the English and isiXhosa mother tongue speakers.

Specific to objective one, the null hypothesis being tested is: There is no significant mean difference between the English and isiXhosa mother speakers on the English version of the SASUCRI.

To test the hypothesis, the first step that was conducted was the calculation of the means for the scale totals for both the English and isiXhosa groups. Below is an illustration of the means and standard deviations for the two groups.

Table 6: Means scores and standard deviation of subscale of the English version of the SASUCRI for the English and isiXhosa mother tongue speaking groups

		English		isiXhosa	
	Name of scale	**Mean**	**Std Deviation**	**Mean**	**Std Deviation**
Individual systems level	**Social Identity**	26.73	5.188	25.15	4.939
	Sense of belonging	35.92	6.753	**37.95**	5.927
	Self-efficacy	36.24	5.525	34.92	5.178
	Effect of drugs	23.27	5.818	18.78	8.745
	Religiosity	16.42	3.294	**16.68**	3.467
Micro (family) systems level	**Family functioning**	22.62	4.69	**23.48**	4.049
	Communication and social support	24.87	5.61	**25.94**	4.743
	Parent monitoring	17.94	5.61	17.18	2.803
	Economic pressure in family	26.34	4.64	23.78	4.968
Micro (community) systems level	**Peer support**	20.46	3.089	18.23	4.016
	Peer influence	15.94	3.7 91	14.08	4.35
	School as a support	19.73	4.076	**21.35**	3.86
	School as a stressor	17.23	3.738	15.88	4.055
	Neighbourhood	17.58	4.512	**18.28**	4.563
Meso-systems level	**Contradictions**	4.4	2.097	**5.12**	2.343
	Mixed messages	14.67	5.755	**16.97**	6.501
Macro-systems level	**Tolerance for child and adolescent drug use**	8.44	2.577	7.47	2.886
	Tolerance of soft drugs	17.23	4.382	13.62	5.184
Chrono-systems level	**Hopeless individual**	9.33	2.271	8.89	2.279
	Hopeless community	8.11	2.692	7.91	2.646
	Hope for the future	23.37	3.418	**23.69**	3.132

Table 5 illustrates the means and standard deviations of scale totals of the English and isiXhosa groups. The mean score appear to be higher for the English group than the isiXhosa group for most of the scales however the isiXhosa mother group obtained higher mean scores for 9 of the scales ("Sense of belonging", "Religiosity", "Family functioning", "Communication and social support", "School as a support", "Neighbourhood",

"Contradictions", "Mixed messages" and "Hope for the future") of the 21 scales. This indicates that the isiXhosa group performed lower than the English group for most of the scales and better for nine of the scales. The standard deviations for the English group were very high for six of the scales and the standard deviation of 13 the scales were higher for the isiXhosa group compared to the English group. This is an indication that there could be differences between the two groups. However no conclusion regarding the significant group differences can be made at this point. Further statistical investigation of mean differences was conducted using the Hotelling's T- square. The next table reports the results obtained from the Hotellings T- square.

Table 7: Hotellings trace results for the English and isiXhosa mother tongue speakers

Effect		Value	F	Hypothesis df	Error df	Sig.
Home Language	Pillai's Trace	0.336	15.535b	21	645	0.00
	Wilks' Lambda	0.664	15.535b	21	645	0.00
	Hotelling's Trace	**0.506**	**15.535b**	**21**	**645**	**0.00**
	Roy's Largest Root	0.506	15.535b	21	645	0.00

Using Hotelling's Trace statistics there was a significant language effect on the English and isiXhosa mother tongue groups T= 0.51, F (21,65) = 15.54, $p<0.05$.The Null hypothesis is thus rejected as there is a significant overall language effect on the English version of the SASUCRI for the two language groups.

Table 8: Test of between subjects effect

Systems level	Dependent Variable	Type III Sum of Squares	Df	Mean Square	F	Sig.
Individual systems level	Social Identity	386.5	1	386.5	14.877	0.00
	Sense of belonging	641.376	1	641.376	15.37	0.00
	Self-efficacy	268.958	1	268.958	9.226	0.002
	Effect of drugs	3128.971	1	3128.971	63.061	0.00
	Religiosity	10.74	1	10.74	0.952	0.33
Micro (family) systems level	Family functioning	114.68	1	114.68	5.755	0.017
	Communication and social support	178.937	1	178.937	6.356	0.012
	Parent monitoring	89.263	1	89.263	13.054	0.00
	Economic pressure in family	1018.579	1	1018.579	44.874	0.00
Micro (community) systems level	Peer support	773.077	1	773.077	64.529	0.00
	Peer influence	537.38	1	537.38	33.47	0.00
	School as a support	409.181	1	409.181	25.604	0.00
	School as a stressor	283.47	1	283.47	19.044	0.00
	Neighbourhood	76.901	1	76.901	3.746	0.053
Meso- systems level	Contradictions	80.955	1	80.955	16.859	0.00
	Mixed messages	821.738	1	821.738	22.513	0.00
Macro-systems level	Tolerance of soft drugs	168.022	1	168.022	7.623	0.006
	Tolerance for child and adolescent drug use	147.819	1	147.819	20.348	0.00
Chrono-systems level	Hopeless individual	29.822	1	29.822	5.767	0.017
	Hopeless community	6.69	1	6.69	0.935	0.334
	Hope for the future	16.014	1	16.014	1.457	0.228

There was no significant difference for the language groups for the scales: "Religiosity" ($p>.05$), "Hopelessness community" ($p>.05$) and Hope ($p>.05$). These results thus indicate that language has no significant effect on the performance of individuals from the different language groups (English and isiXhosa) for the three scales of the instrument.

However, the following scales indicate that there is a significant difference between the two language groups (English and isiXhosa). In the Individual systems level: "Social identity" ($p<.05$), "Sense of belonging" ($p<.05$) "Self-efficacy" ($p<.05$) and "Effect of drugs" ($p<.05$).

There was also a significant difference for all the Micro-family systems level scales; "Family functioning" ($p<.05$), "Communication and social support" ($p<.05$) "Parental monitoring" ($p<.05$), "Economic pressure in family" ($p<.05$). The same was found for all the Micro (community) systems level scales; "Peer support" ($p<.05$), "Peer influence" ($p<.05$), "School as a support" ($p<.05$)), "School as a stressor" ($p<.05$) , "Neighbourhood" ($p<.05$). There was also a significant difference for both scales in the Meso-systems level; "Contradictions" ($p<.05$), "Mixed messages" ($p<.05$) and that of the Macro systems level; "Tolerance for child and adolescent drug use" ($p<.05$), "Tolerance for soft drugs" ($p<.05$). However for the Chrono-systems level, "Hopeless individual" ($p<.05$) is the only scale that indicates that there is a significant difference between the two groups. Thus for these scales there are significant language differences between the English and isiXhosa mother tongue speaking groups.

The null hypothesis that there is no significant mean difference between the English and isiXhosa mother tongue speakers on the English version of the SASUCRI is thus rejected.

5.3 Objective 2: Assessing the group differences between reliability coefficient of the scales of the English version of the SASUCRI between the English and isiXhosa mother tongue speakers.

The hypothesis being tested for this objective is: There is no significant reliability difference between the English and isiXhosa mother tongue speakers on the English version of the SASUCRI.

To assess the hypothesis, the first procedure that was conducted was the calculation of Cronbach's alpha's for the scale totals of both language groups and then the difference of the reliability coefficients was calculated.

The table below illustrates the Cronbach's alpha for the different groups, the difference between the alpha's and the significance of the difference.

Table 9: The test of equality of reliability for English and isiXhosa mother tongue speakers

Systems level	Name of scales	Chronbach's Alpha		Difference between Alpha's	Significance of difference a=.05, Fcrit=1.22
		English	Xhosa		
Individual systems level	Social Identity	0.731	0.689	1.06	Not Sig
	Sense of belonging	0.821	0.747	1.09	Not Sig
	Self- efficacy	0.822	0.713	1.15	Not Sig
	Effect of drugs	0.935	0.97	0.97	Not Sig
	Religiosity	0.819	0.831	0.99	Not Sig
Micro (family) systems level	Family functioning	0.847	0.79	1.08	Not Sig
	Parent monitoring	0.706	0.662	1.08	Not Sig
	Communication and social support	0.868	0.775	1.16	Not Sig
	Economic pressure in family	0.88	0.846	1.04	Not Sig
Micro (community) systems level	Peer support	0.743	0.777	0.95	Not Sig
	Peer influence	0.836	0.82	1.02	Not Sig
	School as a support	0.637	**0.55**	1.16	Not Sig
	School as a stressor	0.667	0.654	1.03	Not Sig
	Neighbourhood	0.746	0.729	1.03	Not Sig
Meso - systems level	Contradictions	0.897	0.855	1.05	Not Sig
	Mixed messages	0.861	0.884	0.98	Not Sig
Macro-systems level	Tolerance of child and adolescent drug use	0.858	0.895	0.96	Not Sig
	Tolerance of soft drugs	0.669	0.7	0.96	Not Sig
Chrono-systems level	Hopelessness individual	**0.537**	**0.437**	1.23	**Sig**
	Hopelessness community	0.616	**0.545**	1.13	Not Sig
	Hope for the future	0.617	**0.509**	1.22	**Sig**

Table 8 reports the reliability coefficients for both the English and isiXhosa groups. The isiXhosa group internal consistency coefficient for the scale "School as a support" 0.55, "Hopeless individual" 0.437 and "Hopeless community" 0.545 were low. The English group revealed low reliability coefficients 0.537 for the Hopelessness individual scale only.

According to Nunnally (1978) cited in Lance, Butts and Michels (2006) a reliability of .80 is not high enough, it may be adequate but definitely not high, rather a reliability of .90 should be the minimum to be tolerated and a reliability of .95 should be considered the desirable standard. However Hair et al., (2010) contends that Cronbach alpha of .70 is acceptable and it may decrease to .60 in exploratory research. All reliability coefficients lower than .60 were regarded as low coefficients, 70's as adequate and 80 upwards as high in this study based on the above mentioned recommendations.

Furthermore, the table also reports the differences between the two language groups Cronbach alpha coefficients. The results of this table indicate that there was a significant difference between the two language groups Cronbach alpha's coefficients for two of the scales; "Hopeless individual" and "Hope for the future". Both these scales are in the Chrono systems level. Based on these results the Null hypothesis that there is no significant reliability difference between the English and isiXhosa mother tongue speakers on the English version of the SASUCRI is rejected.

5.4. Objective three: Assessing construct equivalence of the English version of the SASUCRI across the English and IsiXhosa first language speakers.

Further evaluation of group differences between the isiXhosa and English group on the English version of the SASUCRI were conducted. The exploratory factor analysis was conducted in order to obtain the factor loadings for all items to inform the comparison of scales between the two groups using the tuckers phi coefficient. The Tucker's Phi results were thereafter verified by means of identity lines.

Once a final structure was concluded the researcher compared the groups by investigating if there are any similarities between the two groups. The comparison is done by comparing the item loadings per factor. The incongruences were assessed using the tuckers phi coefficient.

According to van de Vijver and Leung (1997) values higher than .95 are an indication of factorial similarity those lower than .90 are an indication of non-negligible incongruities.

Below is a factor analysis of the data. This was conducted to see how the items load on the sub scales on each systems level (discussed in section 4.4) for both groups followed by the assessment of incongruences at the end of each systems level analysis.

5.4.1. Individual systems level

In this section the results of the factor analysis for the individual systems level are reported. Five factors are specified for the individual systems level since the systems level has five subscales (see discussion on Chapter 4, section 4.3.1.1.2). A follow up analysis factor analysis based on the results obtained from the initial proposed structure will be reported and then a report on the final structure that the researcher has concluded.

The following table reports the item loadings of the five factor structure of the Individual systems level.

Table 10: Five structure of original individual systems level for the English group

	1	2	3	4	5
Self-efficacy25	**0.727**	0.023	-0.121	0.04	-0.154
Self-efficacy 28	**0.699**	0.064	0.005	0.075	0.025
Self-efficacy 24	**0.689**	0.03	-0.047	-0.026	0.094
Self-efficacy 23	**0.574**	0.059	0.057	-0.071	0.07
Self-efficacy 30	**0.571**	-0.058	-0.008	0.012	0.1
Self-efficacy 22	**0.568**	-0.15	0.011	0.047	0.106
Self-efficacy 32	**0.515**	-0.157	0.009	0.009	0.005
Self-efficacy 31	**0.504**	-0.091	0.074	0.025	-0.001
Self-efficacy 27	**0.494**	-0.033	-0.092	0.105	0.024
Self-efficacy 26	**0.441**	0.264	-0.048	0.139	-0.054
Self-efficacy 29	**0.44**	0.017	0.098	0.118	0.198
Sense of belonging10	**0.395**	0.058	-0.061	-0.058	0.112
Effect of drugs36	-0.054	**0.934**	-0.037	0.026	0.012
Effect of drugs 37	-0.062	**0.92**	-0.03	0.046	0
Effect of drugs 35	-0.099	**0.916**	-0.065	0.026	0.027
Effect of drugs 38	-0.081	**0.914**	-0.061	-0.012	0.068

Effect of drugs 34	-0.092	**0.914**	-0.044	0.042	0.028
Effect of drugs 33	0.137	**0.565**	0.24	-0.026	-0.008
Social identity 9	0.158	**0.452**	**0.333**	0.054	-0.143
Social identity 4	-0.087	-0.006	**0.77**	0.035	0.169
Social identity 2	-0.148	-0.044	**0.707**	0.031	0.194
Social identity 3	-0.019	-0.082	**0.635**	0.064	-0.097
Social identity 5	-0.048	0.038	**0.549**	0.076	-0.116
Social identity 6	0.12	0.079	**0.485**	0.06	-0.23
Social identity 1	-0.074	-0.001	**0.43**	-0.074	-0.086
Social identity 7	0.197	0.104	**0.403**	-0.218	-0.026
Social identity 8	0.196	0.15	**0.378**	-0.311	-0.037
Religiosity42	0.017	0.036	0.094	**0.765**	0.05
Religiosity40	0.096	0.025	0.067	**0.758**	0.052
Religiosity41	0.06	-0.024	0.068	**0.721**	0.058
Religiosity43	0.073	0.064	0.002	**0.707**	0.023
Religiosity39	-0.036	0.065	-0.085	**0.688**	-0.028
Sense of belonging 19	-0.032	-0.041	-0.016	-0.144	**0.752**
Sense of belonging 17	0.046	-0.027	0.042	-0.006	**0.702**
Sense of belonging 12	0.034	-0.056	-0.001	0.072	**0.656**
Sense of belonging 18	-0.093	0.052	-0.064	-0.081	**0.614**
Sense of belonging 11	0.008	0.001	-0.061	0.16	**0.578**
Sense of belonging 13	0.116	-0.01	-0.003	0.157	**0.533**
Sense of belonging 21	0.108	0.059	-0.064	0.108	**0.518**
Sense of belonging 15	0.113	0.057	-0.006	0.089	**0.446**
Sense of belonging 14	0.096	-0.009	0.138	0.135	**0.444**
Sense of belonging 16	0.257	-0.032	0.071	0.062	**0.385**
Sense of belonging 20	0.24	0.071	-0.157	0.007	**0.328**

Table 9 reports the item loadings for the items of individual systems level scales. The researcher specified five factors based on the fact that the individual systems level has five subscales.

No analysis of the item loadings was conducted or discussed for the purpose of conducting the factor analysis was to inform the assessment of congruence.

The next section is concerned with identifying the most satisfactory number of factors that should be extracted in order to have a satisfactory solution. The researcher aimed to explore if there was a better solution for the individual systems level. As previously discussed, there are various approaches that can be used to make decisions about the number of factors that should be extracted. The researcher may utilise the Kaiser's eigenvalues greater than one criterion, taking into consideration the cumulative variance or the scree plot to find the point of inflexion (Hooper, 2012).

This section therefore explores the eigenvalues greater than one criterion, the cumulative variance and the scree plot.

Table 11: Eigenvalues and variance explained for the original Individual systems level

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	7.356	17.107	17.107	7.356	17.107	17.107	5.54
2	5.339	12.417	29.524	5.339	12.417	29.524	5.163
3	2.926	6.805	36.329	2.926	6.805	36.329	3.174
4	2.109	4.904	41.233	2.109	4.904	41.233	4.138
5	1.821	4.235	45.468	1.821	4.235	45.468	5.294
6	1.332	3.098	48.566				
7	1.234	2.871	51.437				
8	1.172	2.727	54.164				
9	1.12	2.604	56.767				
10	1.075	2.499	59.267				
11	1	2.325	61.592				
Non-redundant residuals with absolute value greater than .05						230	**25%**

Appendix 7 reveals that the model had 25% non-redundant residuals with an absolute value greater than .05. According to Field (2009) when there are less than 50% non-redundant residuals with an absolute value > .05 it is an indication of a good fitting model. Table 10

revealed that there were 11 eigenvalues greater than one however the scree plot (see figure 1) indicates 5 factors represented the data.

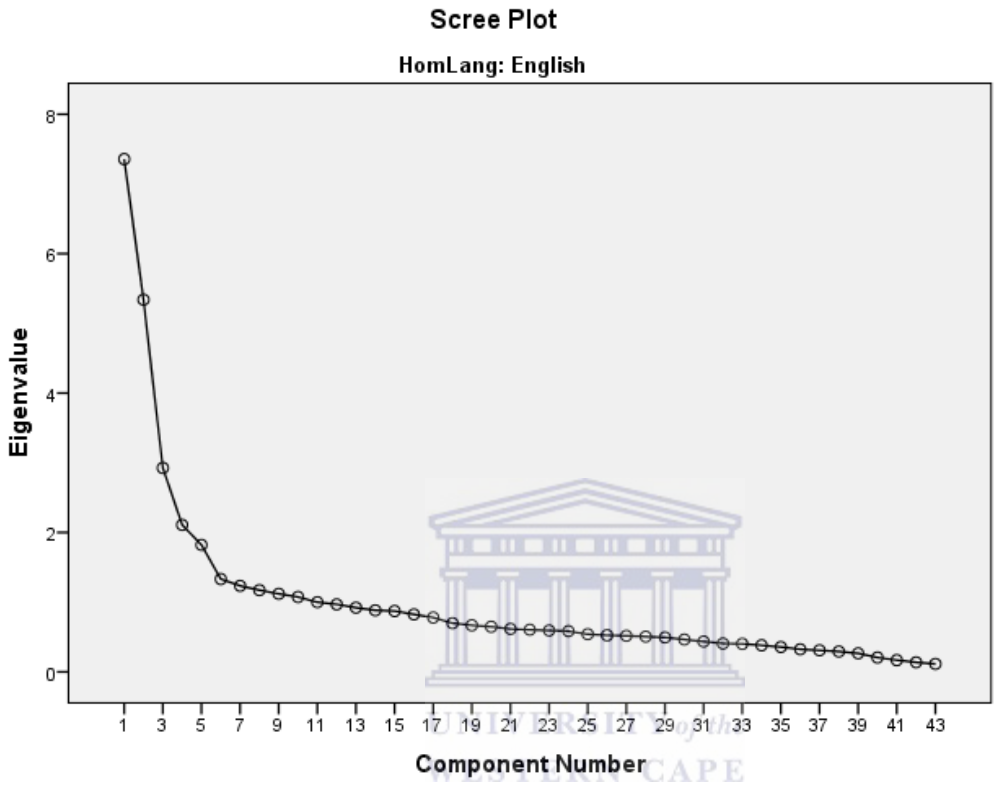

Figure 1: Scree plot for individual systems level

Based on the scree plot results the 5 factor structure was retained.

5.4.1.2 The final individual systems level factor structure for the two language groups

The following tables are the final five structures for the individual systems level for both the English and isiXhosa mother tongue groups. From these tables, we can see how the items load differently of similarly on the factors for the two groups.

Table 12: Final five structure of Individual systems level for the English and isiXhosa groups

English						isiXhosa					
	Self-efficacy	**Effect of drugs**	**Social Identity**	**Religiosity**	**Sense of belonging**		**Effect of drugs**	**Sense of belonging**	**Religiosity**	**Social Identity**	**Self-efficacy**
Self-efficacy 25	**0.727**	0.023	-0.121	0.04	-0.154	**Effect of drugs38**	**0.932**	0.012	-0.005	0.124	-0.086
Self-efficacy 28	**0.699**	0.064	0.005	0.075	0.025	**Effect of drugs37**	**0.93**	-0.031	0.051	0.1	-0.083
Self-efficacy 24	**0.689**	0.03	-0.047	-0.026	0.094	**Effect of drugs36**	**0.924**	-0.01	0.019	0.134	-0.073
Self-efficacy 23	**0.574**	0.059	0.057	-0.071	0.07	**Effect of drugs34**	**0.922**	-0.014	0.053	0.056	-0.14
Self-efficacy 30	**0.571**	-0.058	-0.008	0.012	0.1	**Effect of drugs35**	**0.918**	0.031	0.005	0.108	-0.047
Self-efficacy 22	**0.568**	-0.15	0.011	0.047	0.106	**Effect of drugs33**	**0.797**	0.016	0.007	0.058	-0.135
Self-efficacy 32	**0.515**	-0.157	0.009	0.009	0.005	**Sense of belonging 10**	**0.471**	0.186	-0.088	-0.26	0.077
Self-efficacy 31	**0.504**	-0.091	0.074	0.025	-0.001	**Sense of belonging 17**	0.035	**0.757**	0.107	-0.063	-0.058
Self-efficacy 27	**0.494**	-0.033	-0.092	0.105	0.024	**Sense of belonging 13**	-0.111	**0.706**	0.026	-0.061	-0.244
Self-efficacy 26	**0.441**	0.264	-0.048	0.139	-0.054	**Sense of belonging 11**	0.088	**0.685**	-0.021	-0.076	-0.024
Self-efficacy 29	**0.44**	0.017	0.098	0.118	0.198	**Sense of belonging 12**	0.107	**0.639**	-0.029	-0.032	0.074
Social identity10	**0.395**	0.058	-0.061	-0.058	0.112	**Sense of belonging 18**	-0.022	**0.502**	-0.174	-0.133	0.089
Effect of drugs 36	-0.054	**0.934**	-0.037	0.026	0.012	**Sense of belonging 21**	-0.069	**0.416**	0.085	-0.042	0.174
Effect of drugs37	-0.062	**0.92**	-0.03	0.046	0	**Sense of belonging 19**	-0.012	**0.414**	0.056	0.043	0.29
Effect of drugs 35	-0.099	**0.916**	-0.065	0.026	0.027	**Sense of belonging 20**	0.053	**0.389**	0.018	-0.011	0.119
Effect of drugs 38	-0.081	**0.914**	-0.061	-0.012	0.068	**Sense of belonging 14**	-0.036	**0.37**	0.035	0.101	-0.106
Effect of drugs 34	-0.092	**0.914**	-0.044	0.042	0.028	**Sense of belonging 15**	0.171	**0.349**	0.108	0.033	0.116
Effect of drugs 33	0.137	**0.565**	0.24	-0.026	-0.008	**Religiosity 41**	-0.04	-0.004	**0.795**	-0.015	-0.004

							9				
Social identity 9	0.158	**0.452**	**0.333**	0.054	-0.143	**Religiosity 42**	0.072	0.122	**0.763**	-0.041	0.012
Social identity 4	-0.087	-0.006	**0.77**	0.035	0.169	**Religiosity 39**	-0.114	-0.019	**0.755**	-0.007	-0.086
Social identity 2	-0.148	-0.044	**0.707**	0.031	0.194	**Religiosity 40**	0.042	-0.014	**0.738**	-0.027	0.136
Social identity3	-0.019	-0.082	**0.635**	0.064	-0.097	**Religiosity 43**	0.06	0.058	**0.719**	-0.017	0.143
Social identity 5	-0.048	0.038	**0.549**	0.076	-0.116	**Social identity4**	0.096	0.03	-0.026	**0.668**	0.025
Social identity6	0.12	0.079	**0.485**	0.06	-0.23	**Social identity2**	0.004	-0.11	0.022	**0.621**	-0.036
Social identity 1	-0.074	-0.001	**0.43**	-0.074	-0.086	**Social identity3**	0.056	-0.061	0.046	**0.576**	0.048
Social identity7	0.197	0.104	**0.403**	-0.218	-0.026	**Social identity8**	-0.017	0.023	-0.09	**0.556**	-0.048
Social identity 8	0.196	0.15	**0.378**	**-0.311**	-0.037	**Social identity7**	-0.103	0.001	-0.161	**0.539**	-0.097
Religiosity 42	0.017	0.036	0.094	**0.765**	0.05	**Social identity5**	0.103	-0.109	-0.114	**0.535**	0.104
Religiosity 40	0.096	0.025	0.067	**0.758**	0.052	**Social identity6**	0.04	0.041	0.098	**0.525**	0.034
Religiosity 41	0.06	-0.024	0.068	**0.721**	0.058	**Social identity9**	0.27	0.026	0.039	**0.364**	0.028
Religiosity 43	0.073	0.064	0.002	**0.707**	0.023	**Social identity1**	-0.276	0.086	0.067	**0.336**	-0.094
Religiosity 39	-0.036	0.065	-0.085	**0.688**	-0.028	**Self-efficacy24**	0.119	-0.007	0.094	0.045	**0.672**
Sense of belonging 19	-0.032	-0.041	-0.016	-0.144	**0.752**	**Self-efficacy25**	-0.109	-0.039	0.06	-0.01	**0.651**
Sense of belonging 17	0.046	-0.027	0.042	-0.006	**0.702**	**Self-efficacy28**	-0.022	-0.029	0.181	0.016	**0.61**
Sense of belonging 12	0.034	-0.056	-0.001	0.072	**0.656**	**Self-efficacy29**	-0.023	-0.118	-0.048	0.036	**0.592**
Sense of belonging 18	-0.093	0.052	-0.064	-0.081	**0.614**	**Self-efficacy27**	-0.14	0.019	-0.012	0.004	**0.544**
Sense of belonging 11	0.008	0.001	-0.061	0.16	**0.578**	**Self-efficacy30**	0.013	0.023	-0.02	-0.103	**0.525**
Sense of belonging 13	0.116	-0.01	-0.003	0.157	**0.533**	**Selfeffic22**	-0.085	0.263	-0.01	0.068	**0.506**
Sense of belonging 21	0.108	0.059	-0.064	0.108	**0.518**	**Self-efficacy23**	0.016	0.037	0.215	-0.045	**0.41**
Sense of belonging 15	0.113	0.057	-0.006	0.089	**0.446**	**Self-efficacy31**	-0.037	0.046	-0.02	-0.02	**0.311**

Sense of belonging 14	0.096	-0.009	0.138	0.135	**0.444**	**Self-efficacy26**	0.224	-0.029	0.002	-0.116	0.267
Sense of belonging 16	0.257	-0.032	0.071	0.062	**0.385**	**Self-efficacy32**	-0.097	0.18	-0.177	0.039	0.257
Sense of belonging 20	0.24	0.071	-0.157	0.007	**0.328**	**Sense of belonging 16**	-0.108	0.212	0.068	0.022	0.254

The five factor structure proved to be the best model for this systems level. The same findings were established from the first validation study by Florence (2014). For the English group, factor one represents "Self-efficacy", factor two; "effect of drugs", factor three; "Social identity", factor four; "Religiosity" and factor five; "Sense of belonging". For the isiXhosa group the factors differ considerably. Factor one is Effect of drugs, factor two is "Sense of belonging", factor three is "Religiosity", factor four is "Social identity" and factor five is "Self- efficacy". All items had at least one salient loading on at least one of the factors however Sense of belonging items 14, 16 and 20 did not load on any of the factors for the isiXhosa group. Social identity loaded item 8 on two factors; social identity and Religiosity for the English group.

An assessment of the similarities was further assessed by the Tuckers phi coefficient for each of the scales in the systems level (see table 31). The results were for "Social identity"; .21, "Sense of belonging"; .40, "Self- efficacy"; .28, "Effect of drugs" .11 and "Religiosity" .22. These results illustrate that the construct being measured by all the scales within this systems level across the two groups are not the same.

5.4.2 Micro (family) systems levels

This section reports the results of the exploratory factor analysis for the Micro (family) systems level. Four factors were specified for the systems level as the level has four subscales. A follow up is reported with the final structure determined based on various

approaches used to reach a decision regarding the number of factors that are appropriate for the Micro (family) systems level

The next table reports the item loadings of the four factor structure of the Micro (family) systems level.

Table 13: Four structure of original Micro (family) systems levels for the English group

	1	2	3	4
Communication and social support62	**0.758**	0.056	-0.03	-0.036
Communication and social support 61	**0.701**	0.071	-0.023	0.126
Communication and social support 60	**0.69**	0.104	0.034	0.135
Communication and social support 63	**0.627**	0.022	0.101	0.103
Communication and social support 58	**0.622**	-0.005	0.036	0.242
Communication and social support 59	**0.57**	0.059	0.127	0.215
Famfun50	**0.486**	0.077	-0.088	**0.435**
Communication and social support 56	**0.419**	0.106	0.353	0.101
Communication and social support 57	**0.414**	0.144	0.262	-0.113

Economic pressure in family 71	0.004	**0.827**	-0.098	-0.001
Economic pressure in family 70	-0.042	**0.825**	-0.063	0.088
Economic pressure in family 67	0.124	**0.804**	-0.05	-0.062
Economic pressure in family 66	0.052	**0.736**	-0.036	-0.058
Economic pressure in family 64	0.092	**0.731**	-0.113	-0.006
Economic pressure in family 68	0.099	**0.673**	-0.028	0.006
Economic pressure in family 65	-0.161	**0.657**	0.2	0.043
Economic pressure in family 69	-0.065	**0.602**	0.121	0.042
Parental monitoring51	-0.103	-0.036	**0.674**	0.098
Parental monitoring 54	-0.101	0.032	**0.672**	0.042
Parental monitoring 52	0.339	-0.118	**0.623**	0.003
Parental monitoring 53	0.297	0.025	**0.6**	-0.088
Parental monitoring 55	0.121	0.054	**0.555**	0.034

Family functioning47	0.125	-0.031	0.033	**0.757**
Family functioning 44	-0.146	0.091	0.189	**0.72**
Family functioning 48	0.124	0.043	-0.106	**0.699**
Family functioning 46	0.154	0.04	-0.117	**0.687**
Family functioning 49	0.314	-0.033	-0.116	**0.631**
Family functioning 45	-0.092	0.034	0.253	**0.521**

Table 13 indicates the loadings of items for the Micro family systems level with four factors specified.

To reach a decision regarding factors that should be extracted to have an appropriate structure for the Micro (family) systems level, the following tables report the eigenvalues greater than one criterion, cumulative variance and the scree plot.

Table 14: Eigenvalues and variances explained for the original Micro (family) systems level

Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	8.755	31.269	31.269	8.755	31.269	31.269	6.274
2	3.092	11.043	42.312	3.092	11.043	42.312	5.72
3	1.961	7.003	49.315	1.961	7.003	49.315	3.36
4	1.361	4.862	54.177	1.361	4.862	54.177	5.42
Non-redundant residuals with absolute value greater than .05						**111**	**29%**

Appendix 8 reveals that 29% non-redundant residuals with an absolute value greater than .05. Table 14 revealed that there were four eigenvalues greater than one. The scree plot (figure 2) indicates five factors represent the data. Based on the scree plot results it was decided that five factors would be re-specified for the follow up of all the Micro (family) systems levels.

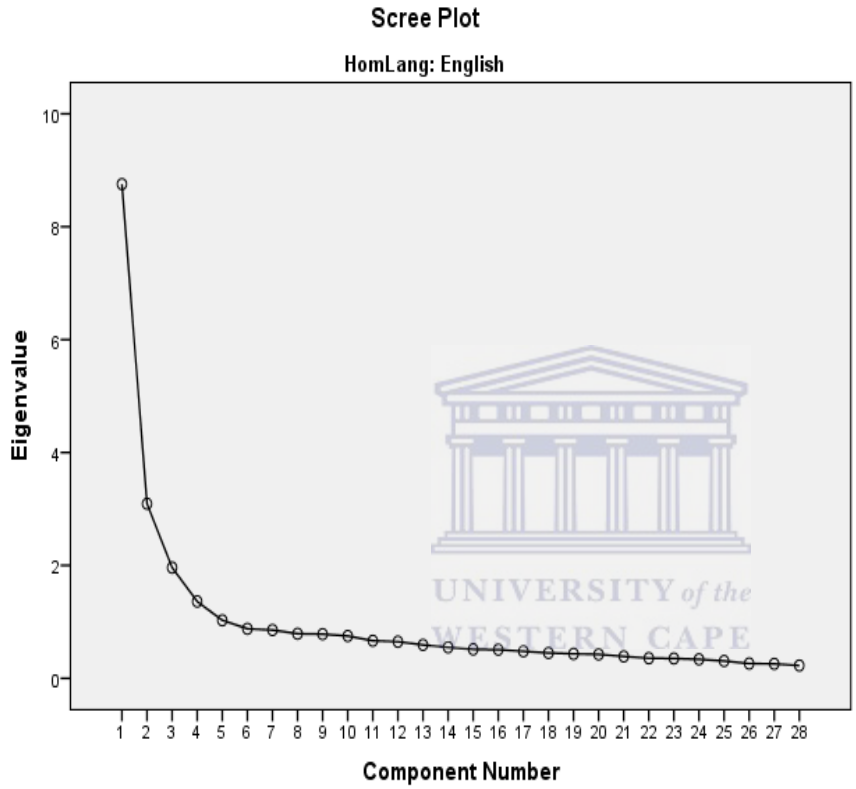

Figure 2: Scree plot for the Micro (family) systems level

5.4.2.1 Results of the follow up for the Micro (family) systems level

The following table reports the item loadings on the five factor structure as recommended by the eigenvalues and scree plot results.

Table 15: Five structure of re-specified Micro (family) systems level for English group

	1	2	3	4	5
Communication and social support 62	**0.737**	0.056	-0.075	-0.056	0.141
Communication and social support 61	**0.716**	0.078	-0.001	0.087	0.007
Communication and social support 60	**0.681**	0.104	-0.002	0.114	0.118
Communication and social support 58	**0.655**	0.006	0.087	0.196	-0.052
Communication and social support 63	**0.63**	0.027	0.087	0.077	0.081
Communication and social support 59	**0.583**	0.065	0.126	0.187	0.051
Family functioning50	**0.523**	0.083	-0.031	**0.395**	-0.095
Communication and social support 56	**0.49**	0.13	**0.465**	0.042	-0.137
Economic pressure in	-0.01	**0.814**	-0.124	0.017	0.068

family 71					
Economic pressure in family 70	-0.054	**0.811**	-0.092	0.108	0.071
Economic pressure in family 67	0.116	**0.796**	-0.062	-0.054	0.061
Economic pressure in family 66	0.1	**0.744**	0.073	-0.086	-0.167
Economic pressure in family 64	0.118	**0.732**	-0.048	-0.021	-0.094
Economic pressure in family 65	-0.102	**0.667**	**0.304**	0.022	-0.156
Economic pressure in family 68	0.06	**0.655**	-0.117	0.036	0.191
Economic pressure in family 69	-0.078	**0.592**	0.075	0.064	0.112
Parental monitoring 51	-0.025	-0.011	**0.773**	0.062	-0.124
Parental monitoring 52	**0.354**	-0.106	**0.592**	-0.013	0.142
Parental monitoring 54	-0.106	0.033	**0.59**	0.063	0.21
Parental monitoring 53	0.273	0.025	**0.491**	-0.076	0.288
Family functioning47	0.148	-0.035	0.029	**0.748**	-0.019
Family functioning44	-0.123	0.085	0.173	**0.727**	0.005

Family functioning 48	0.133	0.034	-0.121	**0.697**	-0.008
Family functioning 46	0.182	0.037	-0.09	**0.67**	-0.083
Family functioning 49	**0.342**	-0.033	-0.087	**0.606**	-0.075
Family functioning 45	-0.13	0.014	0.109	**0.565**	0.255
Parental monitoring 55	-0.011	0.019	0.206	0.129	**0.701**
Communication and social support 57	0.281	0.111	-0.052	-0.036	**0.641**

Whilst the eigenvalues and the scree plot indicated for five factors for the data, Table 14 report that the fifth factor was not a stable factor, had two loading from different scales ("Parent monitoring" 55 and "Communication and social support" 57). Additionally, "Family functioning item" 50, "Communication and social support" item 56, "Economic pressure in family" 65, "Parental monitoring" 52 and "Family functioning" 49 all cross loaded on two factors It was therefore decided that the four factor solution proved to be a better model thus would be retained.

The following tables reports the final four structures with the factor names for the two language groups.

Table 16: Final four structure of Micro (family) systems level for English and isiXhosa groups

English					IsiXhosa				
	Communication and social support	**Economic pressure in family**	**Parental Monitoring**	**Family functioning**		**Family functioning**	**Economic pressure in family**	**Parental Monitoring**	**Communication and social support**
Communication and social support 62	**0.758**	0.056	-0.03	-0.036	**Family functioning47**	**0.694**	0.137	0.011	0.036
Communication and social support 61	**0.701**	0.071	-0.023	0.126	**Family functioning48**	**0.693**	0.103	0.076	0.119
Communication and social support 60	**0.69**	0.104	0.034	0.135	**Family functioning44**	**0.692**	-0.002	0.063	0.089
Communication and social support 63	**0.627**	0.022	0.101	0.103	**Family functioning49**	**0.689**	-0.095	-0.011	-0.099
Communication and social support 58	**0.622**	-0.005	0.036	0.242	**Family functioning46**	**0.665**	0.044	-0.078	-0.1
Communication and social support 59	**0.57**	0.059	0.127	0.215	**Family functioning50**	**0.609**	-0.005	-0.078	-0.302
Family functioning50	**0.486**	0.077	-0.088	0.435	**Family functioning45**	**0.479**	-0.054	-0.005	-0.013
Communication and social support 56	**0.419**	0.106	**0.353**	0.101	**Economic pressure in family66**	0.026	**0.791**	0.056	0.033
Communication and social support 57	**0.414**	0.144	0.262	-0.113	**Economic pressure in family70**	0.084	**0.736**	-0.114	-0.038
Economic pressure in family71	0.004	**0.827**	-0.098	-0.001	**Economic pressure in family64**	-0.058	**0.699**	0.124	0.164
Economic	-0.042	**0.825**	-0.063	0.088	**Economic**	0.042	**0.688**	0.047	-0.078

pressure in fam70					**pressure in family67**				
Economic pressure in family67	0.124	**0.804**	-0.05	-0.062	**Economic pressure in family69**	-0.056	**0.684**	0.002	-0.045
Economic pressure in family66	0.052	**0.736**	-0.036	-0.058	**Economic pressure in family68**	-0.086	**0.635**	-0.07	-0.251
Economic pressure in family64	0.092	**0.731**	-0.113	-0.006	**Economic pressure in family71**	0.031	**0.625**	-0.17	-0.245
Economic pressure in family68	0.099	**0.673**	-0.028	0.006	**Economic pressure in family65**	0.145	**0.607**	0.132	0.203
Economic pressure in family65	-0.161	**0.657**	0.2	0.043	**Parental monitoring54**	0.058	0.083	**0.763**	**0.367**
Economic pressure in family69	-0.065	**0.602**	0.121	0.042	**Parental monitoring52**	0.138	-0.052	**0.646**	-0.092
Parental monitoring51	-0.103	-0.036	**0.674**	0.098	**Parental monitoring53**	-0.126	-0.012	**0.6**	-0.23
Parental monitoring54	-0.101	0.032	**0.672**	0.042	**Parental monitoring55**	-0.074	0.171	**0.567**	-0.095
Parental monitoring52	0.339	-0.118	**0.623**	0.003	**Parental monitoring51**	0.118	-0.053	**0.49**	-0.121
Parental monitoring53	0.297	0.025	**0.6**	-0.088	**Communication and social support56**	0.017	-0.081	**0.435**	**-0.372**
Parental monitoring55	0.121	0.054	**0.555**	0.034	**Communication and social support 58**	0.142	0.104	0.024	**-0.661**
Family functioning47	0.125	-0.031	0.033	**0.757**	**Communication and social support60**	0.198	0.085	0.035	**-0.616**
Family functioning44	-0.146	0.091	0.189	**0.72**	**Communication and social support62**	-0.057	0.058	0.018	**-0.609**
Family functioning48	0.124	0.043	-0.106	**0.699**	**Communication and social support61**	0.25	0.057	0.127	**-0.484**
Family functioni	0.154	0.04	-0.117	**0.687**	**Communication**	-0.006	0.05	0.14	**-0.414**

ng46					**and social support63**				
Family functioning49	0.314	-0.033	-0.116	**0.631**	**Communication and social support57**	0.194	-0.002	0.137	**-0.394**
Family functioning45	-0.092	0.034	0.253	**0.521**	**Communication and social support59**	0.213	0.154	0.222	**-0.356**

Based on the results of the final four structure it can be concluded that factor one represents "Communication and Social support", factor two; "Economic pressure" in family, factor three; "Parental monitoring" and factor four; "Family functioning" for the English group. In comparison the first factor for the isiXhosa group differs with the English group with Family functioning being the first factor, similar to the English group, the second factor was "Economic pressure" in family, the third; "Parental monitoring" for this group and "Communication" and "social support" was the fourth factor. This is an indication that the items load similarly across the two groups. There were cross loadings for one item; "Communication and social support" 56 for the English group and for the isiXhosa group there were cross loadings for items; "Parental monitoring" 54 and "Communication and social support" 56.

The results of the Tuckers Phi were; .37 for "Family functioning", .50 for "Communication and social support", .96 for "Parental monitoring" and .98 for "Economic pressure in family". These results reveal that the construct measured across the two groups is not the same for the scales Family functioning and Communication and support however they do reveal structural equivalence for Parental monitoring and Economic pressure in family.

5.4.3. Micro (community) systems level

This section reports the findings of the exploratory factor analysis for the Micro (community) systems level. Five factors were specified as the systems level has five subscales. Further,

various approaches were explored to reach a decision regarding the number that should be extracted from a suitable solution for the Micro (community) systems level.

Table 16 reports the item loadings on the original five factor structure of the Micro (community) systems level. Five factors were specified as the systems level has five sub scales.

Table 17: Five structure of original Micro (community) systems level for the English group

	1	2	3	4	5
Peer influence79	**0.784**	-0.055	-0.079	0.041	-0.052
Peer influence80	**0.781**	0.002	-0.018	0.096	0.033
Peer influence82	**0.772**	0.058	-0.017	0.031	-0.046
Peer influence78	**0.715**	-0.176	-0.135	-0.046	0.001
Peer influence81	**0.714**	0.212	0.067	0.07	0.002
School as a stressor91	**0.364**	0.172	-0.019	0.048	-0.32
Peer support73	-0.049	**0.824**	-0.016	-0.02	-0.053
Peer support74	0.044	**0.807**	0.067	0.148	0.009
Peer suppoert75	-0.006	**0.77**	-0.001	-0.066	-0.022
Peer support72	-0.136	**0.636**	0.006	0.009	-0.01
Peer support77	0.004	**0.468**	-0.145	-0.402	-0.037
Peer support76	0.124	0.298	0.005	-0.052	0.066
Neighbourhood99	-0.115	-0.071	**0.824**	0.045	-0.01
Neighbourhood101	-0.074	0.06	**0.767**	0.101	0.07
Neighbourhood100	0.012	-0.012	**0.713**	0.095	-0.043
Neighbourhood97	-0.079	0.017	**0.706**	-0.027	-0.191
School as a support85	-0.023	0.056	-0.035	**-0.722**	0.029
School as a suport84	-0.067	-0.088	0.021	**-0.686**	-0.041
School as a suport83	-0.084	-0.037	-0.01	**-0.68**	-0.028
School as a support86	0.115	0.148	-0.083	**-0.501**	-0.037
School as a support87	-0.243	0.076	-0.154	**-0.445**	0.017
Neighbourhood96	0.094	0.014	0.177	-0.022	**-0.586**
Neighbourhood98	0.035	0.002	0.27	-0.073	**-0.546**
School as a support88	0.252	-0.067	0.288	-0.258	**0.54**
School as a support89	0.174	0.052	0.263	-0.414	**0.445**
School as a stressor90	0.291	-0.031	0.058	-0.047	**-0.443**
School as a stressor93	0.348	0.003	-0.089	0.049	**-0.422**
School as a stressor95	0.111	-0.149	0.077	-0.243	**-0.404**
School as a stressor94	0.019	0.012	0.21	-0.268	**-0.368**
School as a stressor92	0.276	-0.049	0.125	-0.101	**-0.365**

Table 16 illustrates the item loading of the Micro (community) systems level for the initial five factor structure.

The following tables and figure report the suggested number of factors that should be extracted from a suitable solution for the Micro (community) systems level. Eigenvalues greater than one, cumulative variance and the scree plot were explored.

Table 17 reports the Eigenvalues and variance explained for the original five factor structure of Micro (community) systems level.

Table 18: Eigenvalues and variance explained for the original Micro (community) systems level

Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	4.388	14.628	14.628	4.388	14.628	14.628	3.885
2	3.331	11.103	25.732	3.331	11.103	25.732	2.982
3	2.755	9.183	34.915	2.755	9.183	34.915	2.85
4	1.932	6.44	41.354	1.932	6.44	41.354	2.645
5	1.524	5.079	46.433	1.524	5.079	46.433	2.607
Non-redundant residuals with absolute value greater than .05						**156**	**35%**

Appendix 9 reveals that the model had 35% non-redundant residuals with an absolute value greater than .05. Table 17 revealed that there were 5 eigenvalues greater than one, however, the scree plot (see figure 3) indicates 7 factors represented the data. Based on the scree plot results it was decided that a 7 factor solution would be re specified.

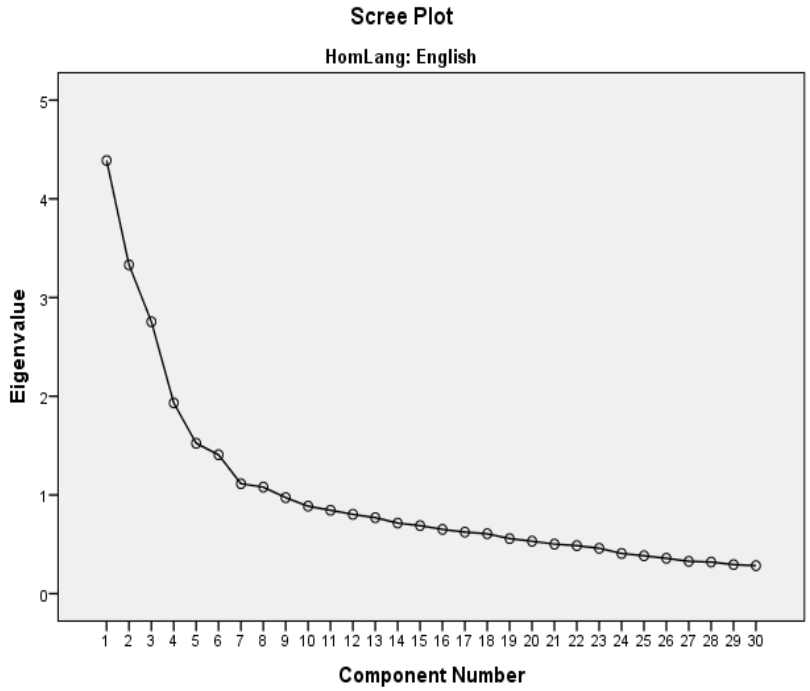

Figure 3: Scree plot for the Micro (community) systems level

5.4.3.1 Results of the follow up for the Micro (community) systems level

This section reports the recommended seven factor structure findings.

Table 18 reports the item loadings on the suggested seven structure for the Micro (community) systems level.

Table 19: Seven structure of re-specified Micro (community) systems level for English group

	1	2	3	4	5	6	7
Peer influence79	**0.795**	-0.084	-0.061	-0.15	0.011	-0.002	-0.007
Peer influence80	**0.786**	-0.034	0.021	-0.007	0.027	-0.012	-0.022
Peer influence78	**0.74**	-0.212	-0.101	-0.117	0.032	0.044	0.079
Peer influence82	**0.726**	0.023	0.03	0.089	0.023	-0.218	0.037
Peer influence81	**0.691**	0.177	0.102	0.065	0.038	-0.129	0.01
Peer support73	-0.095	**0.832**	-0.064	0.02	0.032	-0.109	0.002
Peer support74	0.037	**0.813**	0.023	-0.017	0.004	0.03	-0.122
Peer support75	-0.041	**0.781**	-0.071	-0.058	0.093	-0.04	0.007
Peer support72	-0.104	**0.614**	0.031	0.052	-0.087	0.03	0.097
Peer support76	0.187	0.287	-0.032	-0.215	0.072	0.247	0.035
Neighbourhood101	-0.012	0.018	**0.813**	0.118	0.011	-0.009	0.065
Neighbourhood99	-0.068	-0.089	**0.806**	-0.073	0.077	-0.013	0.008
Neighbourhood100	0.042	-0.032	**0.711**	-0.034	0.029	-0.071	-0.018
Neighbourhood97	-0.009	0.009	**0.634**	**-0.418**	0.035	0.057	0.009
Neighbourhood98	0.087	0.016	0.167	**-0.771**	-0.149	-0.033	-0.015
Neighbourhood96	0.103	0.041	0.069	**-0.719**	-0.165	-0.138	-0.086
School as a support89	0.035	0.101	0.07	0.107	**0.76**	-0.009	0.008
School as a support88	0.131	-0.02	0.116	0.181	**0.739**	0.074	-0.103
School as support83	-0.162	-0.013	-0.149	-0.251	**0.421**	-0.118	0.343
School as a	0.048	0.004	0.026	0.009	0.128	**-0.711**	-0.117

stressor92							
School as a stressor90	0.145	-0.005	0.01	-0.116	-0.05	**-0.573**	-0.053
School as a stressor94	-0.12	0.031	0.154	-0.065	0.064	**-0.564**	0.135
School as a stressor93	0.228	0.007	-0.064	0.016	-0.186	**-0.554**	-0.027
School as a stressor91	0.252	0.161	0.029	0.144	-0.154	**-0.535**	0.026
School as a stressors95	-0.025	-0.104	-0.04	-0.296	0.1	**-0.449**	0.003
School as a support85	0.027	-0.023	0.046	0.045	0.137	-0.056	**0.761**
School as support87	-0.083	-0.032	0.039	0.113	-0.205	0.145	**0.726**
School as a support86	0.195	0.065	0.016	-0.027	-0.009	0.007	**0.62**
Peer support77	0.023	0.421	-0.104	0.02	0.029	-0.063	**0.448**
School as a support84	-0.126	-0.078	-0.09	-0.234	0.379	-0.119	**0.398**

Table 19 indicates that factor four only had two salient loadings; factor five had three salient loadings of the eight items of School support with Neighbourhood item 97 cross loading on two factors. It was decided that the five factor model is a better model than the 7 factor model

as two of the factors do not appear to be good/ valid factors. The five factor model was therefore retained.

Table 19 reports the item loadings on the final five structure of the Micro (community) systems level for the English and isiXhosa groups.

Table 20: Final five structure of Micro (community) systems level for the English and isiXhosa groups

English						**IsiXhosa**					
	Peer influence	**Peer support**	**Neighbourhood**	**School as a support**	**School as a stressor**		**Peer influence**	**School as a stressor**	**Peer support**	**Neighbourhood**	**School as a support**
Peer influence79	**0.784**	-0.055	-0.079	0.041	-0.052	**Peer influence79**	**0.729**	0.031	0.006	-0.19	0.277
Peer influence80	**0.781**	0.002	-0.018	0.096	0.033	**Peer influence80**	**0.718**	-0.004	0.008	-0.045	0.282
Peer inflence82	**0.772**	0.058	-0.017	0.031	-0.046	**Peer influence78**	**0.706**	-0.046	0.003	-0.063	0.303
Peer influence78	**0.715**	-0.176	-0.135	-0.046	0.001	**Peer influence81**	**0.671**	-0.009	-0.014	0.068	0.075
Peer influence81	**0.714**	0.212	0.067	0.07	0.002	**Peer influence82**	**0.654**	0.136	0.062	-0.072	-0.082
School as a stressor 91	**0.364**	0.172	-0.019	0.048	-0.32	**School as a stressor93**	**0.646**	-0.05	-0.038	0.089	-0.156
Peer support73	-0.049	**0.824**	-0.016	-0.02	-0.053	**School as a stressor91**	**0.591**	0.097	0.06	-0.065	-0.199
Peer support74	0.044	**0.807**	0.067	0.148	0.009	**School as a stressor95**	**0.497**	0.033	0.063	0.022	-0.262
Peer support75	-0.006	**0.77**	-0.001	-0.066	-0.022	**School as a stressor90**	**0.486**	0.034	-0.009	0.043	-0.431
Peer support72	-0.136	**0.636**	0.006	0.009	-0.01	**Peer support73**	0.059	**0.814**	0.068	0.098	-0.097
Peer support77	0.004	**0.468**	-0.145	-0.402	-0.037	**Peer support74**	0.082	**0.811**	0.03	-0.115	-0.139
Peer support76	0.124	0.298	0.005	-0.052	0.066	**Peer support75**	0.013	**0.76**	0.114	0.106	-0.059

Neighbourhood99	-0.115	-0.071	**0.824**	0.045	-0.01	**Peer support72**	0.025	**0.694**	-0.065	-0.027	0.011
Neighbourhood101	-0.074	0.06	**0.767**	0.101	0.07	**Peer support77**	-0.015	**0.446**	0.094	**0.384**	-0.144
Neighbourhood100	0.012	-0.012	**0.713**	0.095	-0.043	**Peer support76**	0.048	**0.428**	-0.099	-0.075	0.23
Neighbourhood97	-0.079	0.017	**0.706**	-0.027	-0.191	**Neighbourhood99**	-0.022	-0.143	**0.77**	0.062	0.031
School as a support 85	-0.023	0.056	-0.035	**-0.722**	0.029	**Neighbourhood101**	-0.067	0.038	**0.742**	-0.011	0.003
School as a support84	-0.067	-0.088	0.021	**-0.686**	-0.041	**Neighbourhood97**	-0.025	0.027	**0.707**	0.141	0.125
School as a support83	-0.084	-0.037	-0.01	**-0.68**	-0.028	**Neighbourhood100**	-0.087	-0.073	**0.658**	0.086	-0.087
School as a support86	0.115	0.148	-0.083	**-0.501**	-0.037	**Neighbourhood96**	0.078	0.093	**0.502**	-0.1	0.033
School as a support87	-0.243	0.076	-0.154	**-0.445**	0.017	**Neighbourhood98**	0.219	0.158	**0.443**	-0.077	0.023
Neighbourhood96	0.094	0.014	0.177	-0.022	**-0.586**	**School as a support85**	-0.003	0.216	-0.043	**0.644**	0.229
Neighbourhood98	0.035	0.002	0.27	-0.073	**-0.546**	**School as a support87**	-0.177	0.053	0.013	**0.611**	0.2
School as a support88	0.252	-0.067	0.288	-0.258	**0.54**	**School as a support84**	-0.017	-0.031	0.055	**0.607**	-0.182
School as a support89	0.174	0.052	0.263	-0.414	**0.445**	**School as a support83**	-0.027	-0.095	0.114	**0.603**	-0.11
School as a stressor90	0.291	-0.031	0.058	-0.047	**-0.443**	**School as a stressor94**	0.217	-0.238	-0.098	**0.35**	-0.122
School as a stressor93	**0.348**	0.003	-0.089	0.049	**-0.422**	**School as a stressor92**	0.276	-0.059	-0.05	0.136	**-0.586**
School as a stressor95	0.111	-0.149	0.077	-0.243	**-0.404**	**School as a support88**	-0.178	**0.328**	-0.14	-0.031	**-0.47**
School as a stressor94	0.019	0.012	0.21	-0.268	**-0.368**	**School as a support89**	-0.175	0.2	-0.155	0.059	**-0.421**
School as a stressor92	0.276	-0.049	0.125	-0.101	**-0.365**	**School as a suppport86**	0.018	0.268	-0.179	**0.321**	**0.343**

In the third systems level; the Micro (community) systems level all items loaded on at least one factor except for “Peer support” item 76 which did not load on any of the factors for the English group. This group also had cross-loadings for “School as a stressor” item 93. Further the isiXhosa group had cross loadings for “Peer support” item 77, “School as a support” item 88 and “School as a support” 86. Factor1 was “Peer influence”, 2; “Peer support”, 3; “Neighbourhood”, 4; “School as a support” and 5; “School as a stressor” for the English group. The loadings for the isiXhosa group were similar to those of the English group with factor structure of 1-4 factors loading the same and the last factor not being a solid factor. Therefore one can suggest that the English model would be a better model as a four factor model. Based on these results it could be assumed that the items loaded differently between the two groups on the Micro (community) systems level are somewhat similar.

The results of the Tucker’s Phi for the scales within this systems level were as follows: “Peer support”; .95, “Peer influence”; .94, “School as a support”; .92, “School as a stressor”; .67 and “Neighbourhood”; .91. These results indicate that the construct being measure is the same across the two groups for all the Micro (community) systems level scales except for the School as a stressor scale which had a coefficient less than 90 thus indicating that there is no structural equivalence in this scale for these two groups.

5.4.4. Meso-systems level

This section reports on the findings of the exploratory factor analysis for the Meso - systems level.

The following table reports the item loadings of the Meso-systems level on two specified factors. Two factors were specified since the systems level has two sub scales.

Table 21: Two factor structure of the original Meso-systems level

	1	2
Mixed messages108	**0.926**	-0.078
Mixed messages109	**0.922**	-0.064
Mixed messages110	**0.888**	-0.006
Mixed messages107	**0.574**	0.031
Mixed messages104	**0.467**	**0.418**
Mixed messages105	**0.467**	**0.434**
Contradictions103	-0.114	**0.932**
Contradictions102	-0.035	**0.895**
Mixed messages106	0.086	**0.66**

Table 21 indicates that all items loadings on the two specified factor structure of the Meso-systems level.

Table 22 and figure 4 recommend the number of factors that should be extracted to have a more suitable factor structure for the Meso-systems level

Table 22: Eigenvalues and variance explained for the original Meso-systems level

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**
1	4.486	49.843	49.843	4.486	49.843	49.843	3.945
2	1.452	16.131	65.973	1.452	16.131	65.973	3.299
Non-redundant residuals with absolute value greater than .05						**23**	**63 %**

Appendix 10 reveals that the model had 63% non-redundant residuals with an absolute value greater than .05. This means that the model is not a good model as the model has more than 50% non-redundant residuals.

Table 21 revealed that there were 2 eigenvalues greater than one however the scree plot (see figure 4) indicates 2 factors represented the data. Based on the scree plot and eigenvalues results it was decided that a 2 factor solution would be retained. Mixed messages item 106 will have to be revised.

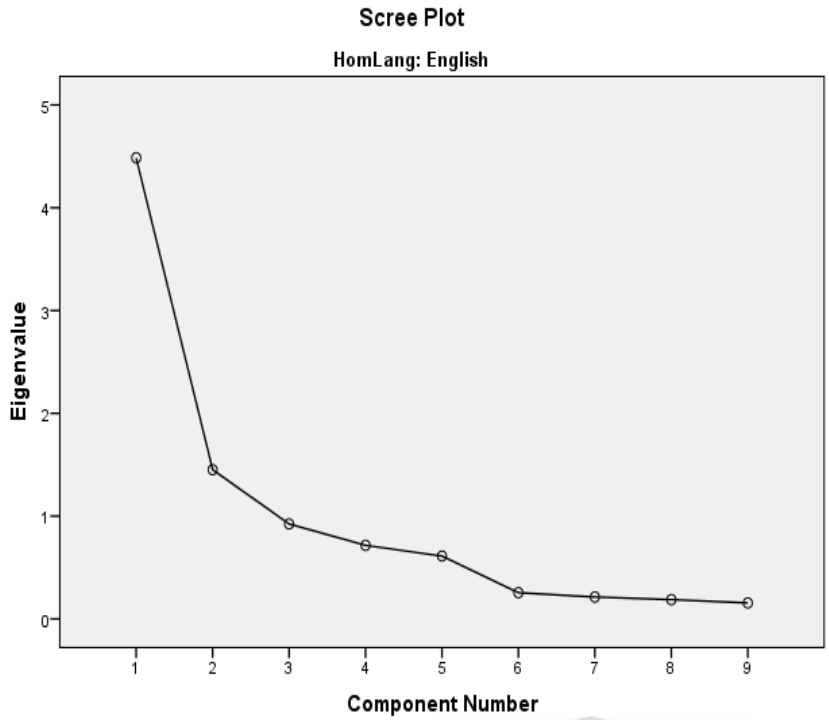

Figure 4: Scree plot for the Meso- systems level

5.4.4.1 Final two factor structure for the Meso- systems level.

Table 23 and figure 4 report the final two factor structure of the Meso- systems level for the English and isiXhosa groups

Table 23: Final structure of the Meso- systems level for the English and isiXhosa groups

English			IsiXhosa		
	Mixed messages	Contradictions		Contradictions	Mixed messages
Mixed messages108	**0.926**	-0.078	**Contradictions102**	**0.926**	0.162
Mixed messages109	**0.922**	-0.064	**Contradictions103**	**0.879**	0.058
Mixed messages110	**0.888**	-0.006	**Mixed messages106**	**0.693**	-0.087
Mixed messages107	**0.574**	0.031	**Mixed messages104**	**0.676**	-0.255
Mixed messages104	**0.467**	**0.418**	**Mixed messages105**	**0.659**	-0.284
Mixed messages105	**0.467**	**0.434**	**Mixed messages108**	-0.041	**-0.892**
Contradictions103	-0.114	**0.932**	**Mixed messages109**	0.02	**-0.866**
Contradictions102	-0.035	**0.895**	**Mixed messages110**	0.046	**-0.858**
Mixed messages106	0.086	**0.66**	**Mixed messages107**	0.027	**-0.702**

The first factor was “Mixed messages” and the second factor was “Contradictions” for the English group. Contrary to the English factor structure the structure for the isiXhosa group was the opposite with; “Contradictions” being the first factor and “Mixed messages” being the second factor. All items had salient loadings on at least one of the factors. Mixed messages item 104 and 105 cross loaded for the English group. The results of the Tuckers Phi were .24 for “Contradictions” scale and also .30 for the “Mixed messages” scale. These results reveal that there are incongruencies across the groups for this systems level.

5.4.5. Macro-systems levels

This section reports on the exploratory factor analysis for the Macro-systems level. The suitable number of factors that should be extracted to have an appropriate structure for the Macro systems level is explored using various approaches to reach the decision.

The following table reports the item loading on the two factors structure of the Macro-systems level. Two factors were specified since there are two subscales in the systems level.

Table 24: The original two factor structure for the Macro-systems level for English group

	Component	
	1	2
Tolerance of child and adolescent drug use115	**0.946**	-0.127
Tolerance of child and adolescent drug use114	**0.908**	-0.117
Tolerance of child and adolescent drug use113	**0.711**	0.119
Tolerance of child and adolescent drug use112	**0.633**	0.231
Tolerance of child and adolescents drug use111	**0.565**	0.267
Tolerance of soft drugs116	-0.024	**0.898**
Tolerance of soft drugs117	-0.015	**0.875**
Tolerance of softdrugs118	0.229	**0.355**

Two factors were specified for the Macro-systems level since there are two subscales.

Table 25: Eigenvalues and variance explained for the original Macro-systems level

Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	4.095	51.182	51.182	4.095	51.182	51.182	3.726
2	0.981	12.267	63.449	0.981	12.267	63.449	2.907
Non-redundant residuals with absolute value greater than .05						**21**	**75 %**

Appendix 11 revealed 75% non-redundant residuals with an absolute value greater than .05. This is an indication that the model is not a good model as the residuals. According to Field (2009), Good model values should be small, values should be less than 50% and not greater than that. However, this could be due to the two factor extraction. Table 24 indicates that one Eigen value greater than one however the scree plot figure 5 revealed that two factors represent the data. Based on the salient loading of all items on the factors as expected and the results of the scree plot the two factor structure will be retained with factor one representing Tolerance of child and adolescent drug use and factor two representing Tolerance of soft drugs.

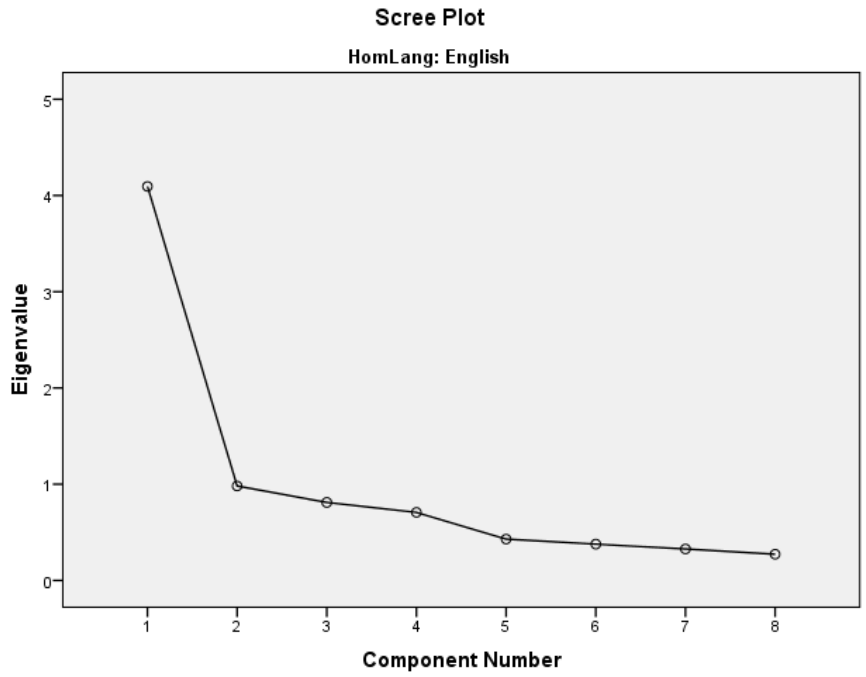

Figure 5: Scree plot for the Macro- systems level

5.4.5.1 The final factor structure for Macro- systems level

The following tables report the item loadings on the final two factor structure of the Meso-systems level for both English and isiXhosa groups.

Table 26: Final two structure of the Macro - systems level for the English and isiXhosa groups

English			IsiXhosa		
	Tolerance for child and adolescent drug use	Tolerance for soft drugs		Tolerance for child and adolescent drug use	Tolerance for soft drugs
Tolerance of child and adolescent drug use115	**0.946**	-0.127	**Tolerance of child and adolescent drug use113**	**0.933**	-0.112
Tolerance of child and adolescent drug use114	**0.908**	-0.117	**Tolerance of child and adolescent drug use115**	**0.895**	-0.029
Tolerance of child and adolescent drug use113	**0.711**	0.119	**Tolerance of child and adolescent drug use114**	**0.881**	-0.009
Tolerance of child and adolescent drug use112	**0.633**	0.231	**Tolerance of child and adolescent drug use112**	**0.749**	0.089
Tolerance of child and adolescent drug use111	**0.565**	0.267	**Tolerance of child and adolescent drug use111**	**0.688**	0.132
Tolerance of soft drugs116	-0.024	**0.898**	**Tolerance of soft drugs 116**	-0.069	**0.899**
Tolerance of soft drugs117	-0.015	**0.875**	**Tolerance of soft drugs117**	-0.001	**0.882**
Tolerance of soft drugs118	0.229	**0.355**	**Tolerance of soft drugs 118**	0.256	**0.466**

Table 25 is the final two structure of the Macro-systems level for the English and isiXhosa groups. The English and isiXhosa groups loaded the same for the Macro-systems level. For both groups Factor one represents Tolerance for child and adolescent drug use and factor two represents Tolerance for soft drugs. This is an indication that there are similarities between the groups in terms of the construct being measured.

Tolerance of child and adolescent drug use results for the Tuckers's Phi was .99 indicating that the same construct is being measured across these groups in this scale however the results for Tolerance of drugs were 0.98 indicating that the construct being measured across the two groups on this scale is also the same. One can conclude that the scales on Macro-systems level measure the same construct across the groups.

5.4.6 Chrono-systems level

This section reports the exploratory factor analysis findings for the Chrono- systems level. The initial factor structure had three factors since the systems level has three subscales. The decision regarding the number of factors that should be extracted is also explored in this section and findings are reported about the final suitable structure.

Table 26 reports the item loadings on the three specified factors for the Chrono- systems level.

Table 27: Three structure of the original Chrono -systems level for the English group

	1	2	3
Hope for the future127	**0.73**	0.068	0
Hope for the future129	**0.724**	0.142	-0.076
Hope for the future128	**0.72**	0.075	-0.108
Hope for the future131	**0.671**	0.125	-0.035
Hope for the future132	**0.52**	-0.197	-0.061
Hope for the future126	**0.501**	-0.19	0.19
Hopeless individual121	0.008	**0.834**	0.036
Hopeless individual120	-0.05	**0.792**	0.059
Hope for the future130	0.077	**0.647**	0.041
Hopeless community124	0.048	0.061	**0.687**
Hopeless community123	-0.037	0.064	**0.686**
Hopeless 1community125	-0.002	-0.081	**0.674**
Hopeless individual119	0.057	0.112	**0.579**
Hopeless community122	-0.134	-0.03	**0.544**

The following section reports the Eigenvalues, cumulative variance and the scree plot recommendations for the number of factors that should be extracted for Chrono-systems level.

Table 28: Eigenvalues and variance explained for the original Chrono -systems level

Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadingsb**
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**
1	2.852	20.375	20.375	2.852	20.375	20.375	2.641
2	2.245	16.036	36.411	2.245	16.036	36.411	1.956
3	1.527	10.909	47.32	1.527	10.909	47.32	2.224
Non-redundant residuals with absolute value greater than .05						**42**	**46%**

Appendix 12 revealed 46% non-redundant residuals with an absolute value greater than .05. Table 27 revealed that three eigenvalues greater than. The scree plot (figure 6) revealed that 5 factors represent the data. Based on the scree plot results it was decided that a five factor model would be specified.

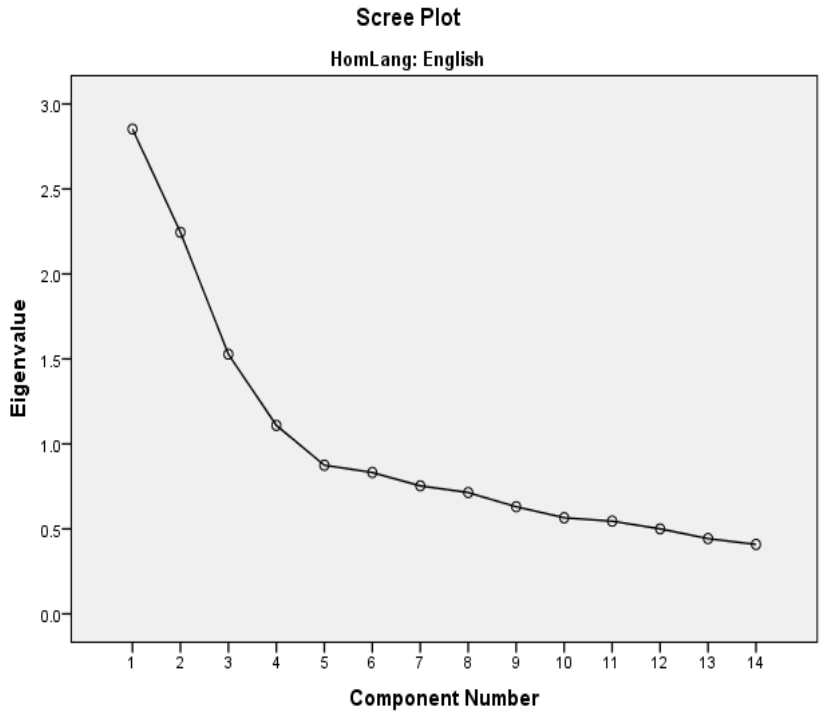

Figure 6: Scree plot for the Chrono systems level

5.4.6.1 Results of the follow up for the Chrono- systems level with five factors specified.

Table 28 reports the item loadings for the Chrono- systems level on the five factor structure as recommended by the scree plot.

Table 29: Five structure of re-specified Chrono -systems level for English group

	1	2	3	4	5
Hope for the future126	**0.799**	-0.138	0.187	-0.071	0.278
Hope for the future127	**0.663**	0.055	-0.124	0.275	-0.08
Hope for the future128	**0.54**	0.032	-0.282	**0.353**	-0.239
Hopeless individual121	-0.018	**0.82**	-0.085	-0.041	-0.181
Hopeless individual120	-0.092	**0.801**	0.046	-0.02	0.011
Hope for the future130	0.031	**0.688**	0.147	0.058	0.283
Hopeless community123	0.024	0.105	**0.729**	-0.027	0.021
Hopeless community124	-0.077	0.075	**0.693**	0.155	-0.148
Hopeless community125	0.07	-0.048	**0.685**	-0.025	-0.042
Hope for the future132	-0.114	-0.198	0.168	**0.781**	0.224
Hope for the future129	0.147	0.096	-0.104	**0.727**	-0.177
Hope for the future131	0.112	0.101	0.02	**0.715**	-0.018
Hopeless community122	-0.219	-0.09	0.298	0.002	**-0.692**
Hopeless individual119	0.332	0.098	**0.313**	-0.255	**-0.443**

Two items loaded on factor five thus indicating that the factor is not a salient factor. This solution did not prove to be the best solution and the initial three factor structure proved to be a better model. It was thus decided that the initial three structure would be retained.

Table 30: Final three structure of the Chrono - systems level for the English and isiXhosa group

English				**isiXhosa**			
	Hope for the future	**Hopeless individual**	**Hopeless community**		**Hope for the future**	**Hopeless community**	**Hopeless individual**
Hope for the future127	**0.73**	0.068	0	**Hope for the future127**	**0.693**	-0.105	-0.123
Hope for the future129	**0.724**	0.142	-0.076	**Hope for the future129**	**0.689**	0.058	-0.025
Hope for the future128	**0.72**	0.075	-0.108	**Hope for the future126**	**0.636**	0.121	0.086
Hope for the future131	**0.671**	0.125	-0.035	**Hope for the future131**	**0.492**	-0.076	0.042
Hope for the future132	**0.52**	-0.197	-0.061	**Hope for the future132**	**0.418**	0.029	-0.012
Hope for the future126	**0.501**	-0.19	0.19	**Hope for the future128**	**0.39**	-0.297	**-0.328**
Hopeless individual121	0.008	**0.834**	0.036	**Hopeless community124**	0.241	**0.686**	0.005
Hopeless individual120	-0.05	**0.792**	0.059	**Hopeless community123**	-0.055	**0.684**	-0.061
Hope for the future130	0.077	**0.647**	0.041	**Hopeless community125**	-0.136	**0.664**	-0.019
Hopeless community124	0.048	0.061	**0.687**	**Hopeless individual119**	-0.095	**0.663**	-0.237
Hopeless community123	-0.037	0.064	**0.686**	**Hopeless community122**	0.15	**0.414**	**0.348**
Hopeless community125	-0.002	-0.081	**0.674**	**Hopeless individual121**	0.132	-0.063	**-0.766**
Hopeless individual119	0.057	0.112	**0.579**	**Hopeless individual120**	-0.013	0.095	**-0.728**
Hopeless community122	-0.134	-0.03	**0.544**	**Hope for the future130**	-0.021	0.187	**-0.61**

Table 29 are the final three structure of the Chrono-systems level for the English and isiXhosa groups. In the English group factor one represents “Hope for the future”, factor two; “Hopeless individual” and factor three “Hopeless community”. Similarly, for the isiXhosa group, the first factor is “Hope for the future” however unlike with the English group; Factor two represents “Hopeless community” and factor three represents “Hopeless individual”. All

items loaded on at least one of the factors with Hope for the future item 128 and Hopeless community 122 cross loading on two factors for the isiXhosa group.

The Tucker's Phi results were .27 for "Hope for the future", .27 for "Hopelessness individual" and .95 for "Hopelessness community" indicating that the same construct is being measured for the two groups in the "Hopeless individual" scale however the construct measured by the "Hopeless individual" and "Hope for the future" scale did not prove to be measuring the same construct between the two groups.

Below is the table with all the tuckers phi coefficients.

Table 31: Tuckers Phi coefficient per factor

Systems level	Scales	Tucker's Phi coefficient
Individual systems level	Social Identity	.21
	Sense of belonging	.40
	Self-efficacy	.28
	Effect of drugs	.11
	Religiosity	.24
Micro (family) systems level	Family functioning	.37
	Communication and social support	.50
	Parental monitoring	.96
	Economic pressure in family	.98
Micro (community) systems level	Peer support	.95
	Peer influence	.94
	School as a support	.92
	School as a stressor	.67
	Neighbourhood	.91
Meso-systems level	Contradictions	.24
	Mixed messages	.30
Macro-systems level	Tolerance for child and adolescent drug use	.99
	Tolerance of soft drugs	. 98
Chrono-systems level	Hopeless individual	.27

	Hopeless community	.27
	Hope for the future	.95

5.5 Identity lines

Appendix 13 reveals the results of the identity plots for the relation of factor loadings between the English and isiXhosa groups for each of the scales within the six systems level. The tuckers phi (see table 31) revealed that there is structural equivalence for the identity plots on appendix 13 support the findings of the tuckers phi which revealed that there is structural equivalence for the "Parent monitoring" , "Economic pressure in family", "Peer support", "Peer influence", "School as a support", "Neighbourhood" and "Tolerance for child and adolescent drug use" . The scatter plots fall close to the identity line for these scales which confirms that there is structural equivalence for these scales. No structural equivalence could be confirmed for any of the other scales.

Based on these results it can be concluded that there is structural equivalence for the " Parental monitoring" "Economic pressure in family" "Peer support" "Neighbourhood" "Tolerance for child and adolescent drug use" "Peer influence" "School as support" Tolerance for child and adolescent drug use" "Tolerance of soft drugs" "Hope for the future" scales for the English and isiXhosa mother tongue speakers.

5.6 Conclusion

The following chapter presents the results obtained from the analysis for each of the objectives. The next chapter will discuss in detail what the results mean, provide the limitations of this study and conclude with recommendations.

CHAPTER SIX

DISCUSSION

6.1. Introduction

The study is part of a larger study that developed an instrument to assess the individual and contextual risk factors associated with adolescents in low socio-economic status communities in South Africa. The instrument was initially developed in English. In the initial validation study by Florence (2014), it was realised that some of the participants who identified themselves as English first language learners were isiXhosa mother tongue speakers. The data could not be used as there were uncertainties on the construct equivalence of the measure between the isiXhosa and English sample. Florence (2014) thus recommended that the data be used to assess the equivalence of the English version of the instrument between the English and isiXhosa mother tongue speakers. This was important in order to adapt the measure for valid and reliable use amongst the language group. In the case that the measure does not present equivalence, then a motivation to adapt or develop an isiXhosa version will be recommended by this study.

This study is based on the above mentioned recommendations by Florence (2014). It aimed to assess the scalar equivalence of the English version of the SASUCRI across the English mother tongue speakers and the isiXhosa mother tongue speakers. It is important to investigate that the construct measured across groups in monolingual testing are similar or the same (Matsumuto & van de Vijver, 2011). Such assessments are very important to ensure that the measurement is fair for all groups that utilise the instruments. Among other uses, psychological measures are used to diagnose individuals Foxcroft, Paterson, le Roux & Herbst, (2004) and make decisions regarding employment amongst others (Coetzee &

Schreuder, 2010). Inappropriate diagnosis can have immense consequences for individuals as this means they will receive inappropriate intervention which may in turn cause other problems rather than benefit the client (Coetzee & Schreuder, 2010). In this study particularly, if there are groups that are assessed using this instrument and the instrument does not measure what it intends to measure for all groups then interventions developed based on the findings of this instrument will not be beneficial to these groups. The interventions may not show the intended results or they may further cause other unforeseen problems. This is why it is important to ensure that the instrument used to assess humans really assess what it was designed to measure consistently under different conditions (Kaplan & Saccuzzo, 2009).

To address the overall aim of the study three objectives were explored. First it was assessed if there are any significant mean scale totals differences across the two groups specific to the English version of the instrument, secondly; the reliability coefficients of the scale totals for the two groups were compared to establish if there are any significant differences in the reliability coefficients of the scale totals and the last objective assessed if there was structural equivalence across the two groups. This chapter gives a detailed discussion of the findings of the study. The implications and recommendations are discussed at the end of the chapter.

The researcher discusses the results in this chapter by addressing each objective for each of the systems levels (see 4.4 for systems levels).

6.2 Mean differences

The results of differences between the groups mean scale totals revealed that there was a significant difference between the two group mean scale totals. Language had a significant effect on the performance of the two groups for the SASUCRI. Thus the null hypothesis that there are no significant mean differences between the English and isiXhosa mother tongue

speakers on the English version of the SASUCRI was rejected. According to Huysaman (2002) when mean differences are found between two groups there is a possibility of construct in-equivalence or structural equivalence meaning that the constructs being measured across the groups are not the same or similar. Some of the explanations for structural in-equivalence across groups may be due to the fact that some constructs are cultural specific thus not identified by other cultures (van de Vijver & Tanzer, 2004), Huysaman (2002) further provides an example of the HSRC's Group Test for Five- and Six-year-olds in which the examinees are shown line drawings of a lion, a dog, a deer and a cow and are required to identify the tame animal that 'we do not eat'. The Indian children of the Hindu religion may fail this item because as their religion would prohibit the slaughter of cows whilst other religions and cultures may allow this. van de Vijver and Tanzer (2004) further add that educational level or background also plays a significant role in structural in-equivalence as participants with higher levels of education may perform better than those with lower. Additionally, language plays a significant role. In a country like South Africa that has 11 official languages home language represents a potential source of construct-irrelevant variance that cannot be taken for granted Huysaman (2002). There for when there are differences between means of groups that have some pre-existing differences (like language in this case) further investigation should be conducted on the construct relevance as a possible reason for the differences in the means of the groups (Matsumoto & van de Vijver, 2011) It is therefore essential to further investigate the structural equivalence of the measure when a researcher discovers that there are differences in the performance of groups in the particular measure (Matsumoto & van de Vijver, 2011).

Observing the mean scores of the scale totals for both groups the English had higher mean scores for Social identity, Self-efficacy and Effects of drugs within the Individual systems level. When assessing if there were any significant language effects between the two groups

for the individual systems level it was discovered that there was no significant language effect for “Religiosity”, however, there was a significant language effect for Social identity, Sense of belonging, Self – efficacy and Effect of drugs.

In the Micro (family) systems level high means were obtained by the isiXhosa group for “School as a support” and “Neighbourhood” scales when compared to the English group however the English group had higher mean scores for most of the scales (“Peer support” , “Peer influence”, and “School as a stressor”) meaning that the English group performed better than the isiXhosa group for most of the scales in this systems level.

The mean scores for the isiXhosa group were high for both scales in the Meso-systems level. This is an indication that the isiXhosa group performed better than the English group in this systems level. The results however revealed that there was a significant language effect in the way that the groups performed in the measure. When looking at language effect per scale there was a significant language effect for both Contradictions and Mixed messages scales. This is an indication that there could be differences in the understanding of the construct being measured across these groups for these scales.

The English group had higher mean scores for Tolerance of child and adolescent substance use scale however the isiXhosa group had higher mean scores for the Tolerance of drugs. When the effect of language was assessed between the two groups specific to the Macro - systems level both scales had a significant language effect thus suggesting that the way that the two groups understand the constructs measured by the two scales may be different due to the language differences of the groups.

High means were obtained by the English group for the Hopeless individual and Hopeless community compared to the isiXhosa group however the isiXhosa group obtained higher mean scores for the Hope for the future scale. There were no significant language effects

found for the Hopeless community and Hope for the future scale but the Hopeless individual scale proved to have a significant language effect.

It could be suggested that the English group performed better since the instrument is in their mother tongue language and it's also their language of instruction at the school. The isiXhosa group may have not been familiar with the concepts in these scales due to the language that the instrument is available in or due to the fact that these concepts are not relevant in their culture. However note must be taken that the isiXhosa group performed better than the English group on a number of scales as discussed in chapter five. While the isiXhosa had lower mean scores for some scales indicating that there is some in-equivalence it's important to note that this is not the case for the entire instrument as they performed better in some of the scales compared to the English group which could mean that they had a good understanding of the construct being measured on these scales and that the constructs being measured by these scales are culturally relevant to them. Similar to this study, Haupt and Koch (2012) investigated the scalar equivalence of the WMLS English version across English first-language speakers and Xhosa first-language speakers. When investigating the mean differences between the two groups they found that there were significant mean differences between the two groups with the English group performing significantly higher than the isiXhosa group thus indicating that the subscale had some biases and was somewhat unfair for the isiXhosa group. Despite the fact that the isiXhosa group's language of instruction at schools was Emglish, it appears that their mother tongue language plays a significant role in the way that they interpret these measures. Additionally, Ismail and Koch also found that there were some biases in some of the items in the WMLS verbal anologies subscale of the adapted English version of the measure. It appears that there were some biases and that the measure was somewhat unfair for the isiXhosa group. Huysanan (2002) stresses that language is an important context that needs to be taken into consideration when testing a

multilingual person as they may have English as the medium of communication at school and yet isiXhosa at home thus leaving a possibility that they might be more proficient in their home language rather than that they use at the school environment. He further suggests that the test should be made available to the test taker in both languages if it is available to ensure that the participant understands what is asked by the measure. Based on these results no conclusions could be made regarding the structural equivalence of this measure between the two groups therefore the reliability coefficient differences were assessed.

6.3 Reliability

When informing life changing decisions about individuals, researchers need to ensure that the measure used to assess individuals are accurate and consistent in measuring what it is intended to measure in order to obtain accurate results (Coetzee & Schreuder, 2010). Reliability aims to measure the consistency aspect of the measure. In cross cultural tests reliability is important as the measure needs to measure the construct it is designed to measure consistently across groups (Kaplan & Saccuzzo, 2009). However, note should be taken that there is always a certain amount of error such as random and systematic error originating from respondent error or administrative error (Foxcroft & Roodt, 2009).

When assessing reliability .70 is regarded as the fair reliability coefficient to be used for research purposes (Hair, Black, Babin, & Anderson , 2010).

The English sample revealed more than .70 reliability coefficients (ranging from .70 to .93) for most of the scales however six of the scales; “School as a support”, “School as a stressor”, “Tolerance of soft drugs”, “Hopeless individual”, “Hopeless community” and “Hope for the future” had low reliability coefficients for this group ranging between 0.53 and 0.66. The

isiXhosa group had 7 reliability coefficients lower than .70.five of which were the same as the English ones. The low reliability scales for the isiXhosa group were: “Social identity”, “Parental monitoring”, “School as a support”, “School as a stressor”, “Hopeless individual”, “Hopeless community” and “Hope for the future”. The fact that five of the scales had low reliability coefficients for both groups is an indication that these scales do not consistently measure what they are intended to measure for both groups.

The English sample generally had higher reliability coefficients than the isiXhosa group with the isiXhosa group having six reliability coefficients higher than the English group for the scales: “Effects of drugs”, “Religiosity”, “Peer support”, “Mixed messages” and “Tolerance of child adolescent drug use” and “Tolerance of soft drugs”. When investigating if there were any significant reliability differences between the groups the results revealed that there were no significant reliability differences between the two groups for all the scales except for “Hopeless individual” and “Hope for the future” scales which are both scales of the Chrono - systems level.

The reliability results are an indication of the quality of the measurements consistency (Foxcroft & Roodt, 2009). The possibility of these differences may be due to diverse variables such as the conceptualisation of the constructs. Therefore indicating that the possibility of construct irrelevance which would mean that the measure has biases concerning the isiXhosa group and thus favouring the English group which in turn means that the two groups cannot be compared as far as the two scales are concerned. As previously mentioned; Van de Vijver and Tanzer (2004) clearly state that when the construct being measured across the groups is not the same or similar it means that the scores for the two groups are incomparable, it is like comparing oranges and apple as the measure is not equivalent across the two groups. According to Foxcroft and Roodt (2009) when measuring reliability, scores obtained cannot completely and accurately reveal the amount of trait possessed by the

participant. Systematic; respondent and administration errors have to be taken into consideration. Therefore no conclusions can be made regarding differences in the construct being measured across these groups based on these findings.

6.4 Structural Equivalence

When the construct equivalence was measured it was discovered that 12 of the scales did not display structural equivalence.

The tuckers phi results revealed in-congruencies for all the scales at the individual systems level. Two scales in the Micro (family) revealed structural equivalence. The "Parental monitoring" and "Economic pressure in family" scales. In the Micro (community) four of the scales ""Peer support, "Peer influence", "School as a support" and "Neighbourehood" revealed structural equivalence in this systems level. None of the Meso systems level scales indicated any structural equivalence. Both Macro systems level's scales ("Contradictions"and "Mixed messages) revealed structural equivalence. Only one of the Chrono-systems level revealed structural equivalence; "Hope for the future". No structural equivalence was achieved across the English and the isiXhosa mother tongue groups eleven of the scales ("Social Identity" "Sense of belonging", Self-efficacy", "Effect of drugs", "Religiosity", Family functioning", "Communication and social support", "School as a stressor", "Contradictions", Mixed messages and "Hopeless individual"). The constructs measured by these scales are not the same across the groups. As indicated by objective one results, there is a language effect on how the two groups performed on the English version of the SASUCRI. The understanding and conceptualisation of constructs are different for these two groups for these systems levels.

However, in the Macro-systems level structural equivalence was achieved for both scales in this systems level; "Tolerance of child and adolescent drug use" and "Tolerance of drugs"

scales. This was also indicated by the reliability differences assessment which revealed that there were no significant reliability differences between the two groups. It can thus be concluded that the construct measured across these groups in relation to this systems level are indeed the same.

Further in the Chrono-systems level Hope for the future is the only scale that proved to be structural equivalent across the two groups. This is the same scale that indicated that there was no language effect in the performance of the two groups when the first objective was assessed, however the reliability results had revealed that there were significant reliability differences across the two groups for this scale. According to Foxcroft and Roodt (2009) reliability shows the quality of the scale therefore one cannot argue construct in-equivalence based on those results. The constructs being measured by this scale are the same across both the English and the isiXhosa groups.

The identity lines confirmed the findings of the tuckers phi indicating that there is structural equivalence for “Parent monitoring” , “Economic pressure in family”, “Peer support”, “Peer influence”, “School as a support”, “Neighbourhood” and “Tolerance for child and adolescent drug use”. A conclusion was reached that the instrument as a whole is does not display scalar equivalence and thus some of the scales should be further validated.

The limitations of this study are discussed in the next section.

6.5 Limitations

The first important limitation of the study is in relation to the sample. The initial validation sample consisted of adolescents that considered English as their first language; both the English and the isiXhosa mother tongue samples however the additional sample recruited for the current study were isiXhosa first language. They are taught in isiXhosa at school and they

speak isiXhosa at home. While both isiXhosa samples used to reach the conclusion of this study are isiXhosa mother tongue speakers, the way that they understood the constructs in this measure may somewhat be different as the initial isiXhosa sample is most familiar with English compared to the additional isiXhosa sample recruited for this study.

Additionally, the sample used in both the initial validation and the current study were at school adolescents and the out of school adolescents are not taken into consideration whilst they were part of the community members that were consulted in the development of the scales and items of the study.

The third limitation of this study is the use of factor analysis. No analysis and discussion of the factor analysis is a limitation as it would have assisted in identifying and dealing with problematic items.

Equivalence studies in South Africa are becoming more and more popular and the focus is on language equivalence however the assessment of gender equivalence may have been useful in this study as the contextual risk factors for these adolescents may be different at the gender level and not only cultural and language contexts

6.6 Recommendations

The researcher recommends further validation of the SASUCRI in order for the instrument to be fair on all groups that can benefit from this measure.

The researcher recommends that factor analysis is done, analysing how the factors load in the factors and which and why are the problematic items. The validation of the factor analysis through confirmatory factor analysis is also recommended.

The researcher also recommends that the structural equivalence between isiXhosa mother tongue speakers that consider English as their first language and those that consider English

as a second language be assessed. A good example of this is the study by Koch and Dornbrack (2008) discussed on the literature review of this study. The way that the two groups understand the constructs may also not ne the same even though they have the same mother tongue, they are educated in different languages.

The researcher highly recommends that the measure be adapted into a better and fair measure for isiXhosa mother tongue speakers so that fair testing can be done. In this way the instrument can inform for preventative intervention that will be fair and effective for different groups.

6.7 Conclusion

The results for the three objectives gave direction that there are some in-equivalences across the two groups, with mean scale totals being higher for most of the scales for the English group, also when it was assessed at the scale level if there was a language effect in the performance of the two groups only three scales had no language effect while the rest did. The reliability results were also similar to that of the mean score, with the English having higher coefficients than the isiXhosa group but surprisingly there were only two significant reliability differences across the two groups.

While the factor analysis was only conducted to inform the tuckers phi, the factors loaded differently for most of the systems level, giving a clear indication that the measure does not measure the same construct across the two groups.

The tuckers phi results were a confirmation that the measure does not measure the same construct across the two groups. These results are not surprising. As discussed in the Theoretical framework and literature review, when different language groups are assessed there is a possibility of construct irrelevance (van de Vijver & Tanzer, 2004). Foxcroft and

Roodt (2009) state that when developing an instrument, it is developed within a particular cultural context, it is cultural specific therefore there is a need for the assessment of construct equivalence if the measure is going to be used by various groups. Constructs in measures may not be relevant for some cultural groups as these constructs may not exist in their cultures or the conceptualisation may be completely different (Laher & Cockcroft, 2014).

Similar findings have been found psychological and educational testing. Taliep and Florence (2012) found that language and geographical context may have an impact in the way that adolescents conceptualise or understand the concepts used in the KIDSCREEN instrument and thus instrument cannot be used by South African adolescents as the scale was not developed with this population in mind.

Language plays a significant role in cross cultural studies. Unfair decisions about individuals lives can be made based on the results of measurements it is therefore important to take language as an important factor in psychological measures.

The incongruent scales as identified earlier in this section cannot be used for the isiXhosa group to make any decision regarding the motivation of substance use amongst these adolescents nor can they be used to inform treatment as they do not measure what they are intended to measure by the instrument for this group.

When the measure does not prove to be equivalent the researcher can, assemble, translate or adapt the measure. The researcher in this study highly recommends that the measure is adapted into one that will be fair for the isiXhosa mother speakers.

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APPENDICES

Appendix 1: Permission letter from main researcher to use the data

UNIVERSITY *of the* WESTERN CAPE

DEPARTMENT OF PSYCHOLOGY
Private Bag X 17, Bellville 7535, South Africa, Telephone: (021) 959-2283/2453
Fax: (021) 959-3515 Telex: 52 6661

20 April 2015

TO WHOM IT MAY CONCERN

RE: Permission to conduct study

I hereby grant permission to Musa Masiza (student number 2852844) to do secondary data analysis on data collected for a project title "Adolescent substance abuse: The development and validation of a measure of perceived individual and contextual factors" – registration number 10/8/14. The study by Ms Masiza is titled "Investigating the scalar equivalence of the English version of the South African Substance Use Contextual Risk Instrument across the English and IsiXhosa mother-tongue speakers" and forms part of the validation of an instrument to measure the factors associated with adolescent substance use in low socio-economic status communities. The analysis to be conducted by Ms Masiza is based on a recommendation from the larger study and is a continuation of the process of validating the instrument.

Yours sincerely

M.A. Florence
mflorence@uwc.ac.za

Appendix 2: UWC Ethics Approval Letter

UNIVERSITY of the
WESTERN CAPE

OFFICE OF THE DEAN
DEPARTMENT OF RESEARCH DEVELOPMENT

13 June 2012

To Whom It May Concern

I hereby certify that the Senate Research Committee of the University of the Western Cape has approved the methodology and ethics of the following research project by:
Ms M Florence (Psychology)

Research Project: Adolescent substance abuse: The development and validation of a measure of perceived individual and contextual factors.

Registration no: 10/8/14

Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

Private Bag X17, Bellville 7535, South Africa
T: +27 21 959 2988/2948 . F: +27 21 959 3170
E: pjosias@uwc.ac.za
www.uwc.ac.za

Appendix 3: Information sheet - Parents

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2283 Fax: 27 21-959 3515

Title of Research Project: Adolescent substance use: The development and validation of a measure of perceived individual and contextual wellness factors.

What is this study about?

This research is being conducted by Maria Florence of the Psychology Department at the University of the Western Cape. This project has been approved by the University of the Western Cape's Senate Research and Ethics Committee. Your child has been invited to participate in the research because s/he is between the ages of 13 and 18 years and living in the Western Cape. The purpose of this research is to develop a questionnaire that will help us find out what factors in the community could lead to drug and alcohol use amongst young people. This will contribute to a better understanding of the problem in this area of the Western Cape, and could lead to better programmes being implemented.

What will your child be asked to do if s/he agrees to participate?

Your child will be asked to answer questions on a questionnaire. The kind of questions that will be asked is, for example, "How often have you felt like you are able to improve your own situation?". Your child will be given the questionnaire by trained researchers during class time (previously arranged with teachers and the school principal), and s/he will be given a chance to fill in the questionnaire and hand it back during that session. Participation in the research is NOT a requirement of the class that s/he would have attended in this slot.

Would my child's participation in this study be kept confidential?

We will ensure that your child's personal information is kept confidential. We will need to record information like his/her age and gender, but his/her name will not appear on the questionnaire or the record that will be kept of the information. The researchers will be the only people who will have access to the results. If we write a report or article about this research, your child's identity (as well as the name of the school and community) will be protected.

What are the risks of this research?

There are no known risks associated with participating in this research. We are not doing research on your child as a person or to affect her/him in any way. Your child is filling in this questionnaire so that we can collect information about drug and alcohol use in general. At this stage we are only interested in the development of the questionnaire so the information that will be collected will be used to ensure that it is a valid questionnaire.

Does my child have to be in this research and may s/he stop participating at any time?

If your child decides to participate in this research, s/he may stop at any time. If your child decides not to participate in this research (or you decide not to grant permission for him/her to participate in the research) or if s/he stops participating at any time, there will not be any consequences.

Is any assistance available if my child is negatively affected by participating in this study?

Should your child be negatively affected by this research, you can contact Maria Florence who will do everything possible to refer you for support and assistance.

What if I have questions?

If you have any questions about the research itself, please contact Maria Florence (021-9592827) mflorence@uwc.ac.za. Should you have any questions regarding this research and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact: The Head of the Psychology Department: Prof K. Mwaba (021-959 2839) kmwaba@uwc.ac.za OR The Dean of the Faculty of Community and Health Sciences: Prof H. Klopper (021-959 2631) hklopper@uwc.ac.za.

This research has been approved by the University of the Western Cape's Senate Research Committee and Ethics Committee.

Appendix 4: Information sheet – Children

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2283 Fax: 27 21-959 3515

Title of Research Project: Adolescent substance use: The development and validation of a measure of perceived individual and contextual wellness factors.

What is this study about?

This research is being conducted by Maria Florence of the Psychology Department at the University of the Western Cape. This project has been approved by the University of the Western Cape's Senate Research and Ethics Committee. You have been invited to participate in the research because you are between the ages of 13 and 18 years and living in the Western Cape. The purpose of this research is to develop a questionnaire that will help us find out what factors in the community could lead to drug and alcohol use amongst young people. This will contribute to a better understanding of the problem in this area of the Western Cape, and could lead to better programmes being implemented.

What will you be asked to do if you agree to participate?

You will be asked to answer questions on a questionnaire. The kind of questions that will be asked is, for example, "How often have you felt like you are able to improve your own situation?". You will be given the questionnaire by trained researchers during class time (previously arranged with teachers and the school principal), and you will be given a chance to fill in the questionnaire and hand it back during that session. Participation in the research is NOT a requirement of the class that you would have attended in this slot.

Would your participation in this study be kept confidential?

We will ensure that your personal information is kept confidential. We will need to record information like your age and gender, but your name will not appear on the questionnaire or

the record that will be kept of the information. The researchers will be the only people who will have access to the results. If we write a report or article about this research, your identity (as well as the name of the school and community) will be protected.

What are the risks of this research?

There are no known risks associated with participating in this research. We are not doing research on you as a person or to affect you in any way. You are filling in this questionnaire so that we can collect information about drug and alcohol use in general. At this stage we are only interested in the development of the questionnaire so the information that will be collected will be used to ensure that it is a valid questionnaire.

Do I have to be in this research and may I stop participating at any time?

If you decide to participate in this research, you may stop at any time. If you decide not to participate in this research or if you stop participating at any time, there will not be any consequences.

Is any assistance available if I am negatively affected by participating in this study?

Should you be negatively affected by this research, you can contact Maria Florence who will do everything possible to refer you for support and assistance.

What if I have questions?

If you have any questions about the research itself, please contact Maria Florence (021-9592827) mflorence@uwc.ac.za. Should you have any questions regarding this research and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact: The Head of the Psychology Department: Prof K. Mwaba (021-959 2839) kmwaba@uwc.ac.za OR The Dean of the Faculty of Community and Health Sciences: Prof H. Klopper (021-959 2631) hklopper@uwc.ac.za.chs-deansoffice@uwc.ac.za

This research has been approved by the University of the Western Cape's Senate Research Committee and Ethics Committee.

Appendix 5: Assent forms

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2283 Fax: 27 21-959 3515

Title of Research Project: Adolescent substance use: The development and validation of a measure of perceived individual and contextual wellness factors.

The research has been described to me in language that I understand and I freely and voluntarily agree to participate. My questions about the research have been answered. I understand that my identity will not be disclosed and that I may withdraw from the research at any time without giving a reason and this will not negatively affect me in any way.

Participant's name……..

Participant's signature……

Date……

Witness' name:……..

Witness' signature: ……

Date: …….

Should you have any questions regarding this research or wish to report any problems you have experienced related to the research, please contact the research coordinator:

Research Coordinator's Name: Maria Florence

University of the Western Cape

Private Bag X17, Bellville 7535

Telephone: (021)959-2283/2453/2827

Fax: (021)959-3515

Email: mflorence@uwc.ac.za

THANK YOU FOR YOUR CONTRIBUTION TO THIS RESEARCH.

Appendix 6: Consent Form

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2283 Fax: 27 21-959 3515

CONSENT FORM

Title of Research Project: Adolescent substance use: The development and validation of a measure of perceived individual and contextual wellness factors.

The research has been described to me in language that I understand and I freely and voluntarily give permission for my child to participate. My questions about the research have been answered. I understand that my child's identity will not be disclosed and that s/he may withdraw from the research at any time without giving a reason and this will not negatively affect him/her in any way.

Participant/child's name……..

Parent/guardian's signature……

Date……

Witness' name:……

Witness' signature: ……

Date: …….

Should you have any questions regarding this research or wish to report any problems you have experienced related to the research, please contact the research coordinator:

Research Coordinator's Name: Maria Florence

University of the Western Cape

Private Bag X17, Bellville 7535

Telephone: (021)959-2283/2453/2827

Fax: (021)959-3515

Email: mflorence@uwc.ac.za

THANK YOU FOR YOUR CONTRIBUTION TO THIS RESEARCH.

Appendix 7: Residual Matrices of the original Individual systems level for the English mother tongue speakers

Reproduced Correlations[a]

		SocID1	SocID2	SocID3	SocID4	SocID5	SocID6	SocID7	SocID8	SocID9	Senseofbel10	Senseofbel11	Senseofbel12
Reproduced Correlation	SocID1	.226[b]	.281	.289	.311	.264	.248	.207	.216	.184	-.075	-.172	-.154
	SocID2	.281	.469[b]	.407	.510	.357	.310	.267	.254	.232	-.042	-.024	.016
	SocID3	.289	.407	.413[b]	.453	.367	.350	.269	.260	.251	-.056	-.151	-.127
	SocID4	.311	.510	.453	.563[b]	.401	.363	.314	.302	.295	-.022	-.035	.006
	SocID5	.264	.357	.367	.401	.340[b]	.328	.245	.241	.276	-.060	-.156	-.146
	SocID6	.248	.310	.350	.363	.328	.346[b]	.265	.264	.317	-.013	-.181	-.176
	SocID7	.207	.267	.269	.314	.245	.265	.283[b]	.299	.261	.051	-.112	-.079
	SocID8	.216	.254	.260	.302	.241	.264	.299	.326[b]	.271	.044	-.147	-.113
	SocID9	.184	.232	.251	.295	.276	.317	.261	.271	.444[b]	.057	-.105	-.121
	Senseofbel10	-.075	-.042	-.056	-.022	-.060	-.013	.051	.044	.057	.196[b]	.161	.177
	Senseofbel11	-.172	-.024	-.151	-.035	-.156	-.181	-.112	-.147	-.105	.161	.434[b]	.453

		SocID1	SocID2	SocID3	SocID4	SocID5	SocID6	SocID7	SocID8	SocID9	Senseofbel10	Senseofbel11	Senseofbel12	Senseofbel13	Senseofbel14	Senseofbel15	Senseofbel16	Senseofbel17	Senseofbel18	Senseofbel19
Residual[c]	Religios40	.015	-.029	-.023	-.043	-.034	.013	.022	.099	.013	.030	.016	.040	-.016	-.002	.006	-.006	.019	-.037	.023
	Religios41	-.012	-.022	-.016	.008	-.042	-.026	.090	.077	-.023	.026	-.050	-.054	-.031	-.023	.017	-.001	-.028	.042	.051
	Religios42	.021	-.015	-.041	-.042	-.012	.009	.049	.059	-.045	.018	-.082	-.056	.050	-.033	-.037	-.030	.000	.044	.086
	Religios43	.017	-.034	-.023	-.004	.034	-.047	.101	.052	-.013	-.003	-.014	-.001	-.044	-.042	-.029	.047	.031	.066	-.016

Extraction Method: Principal Component Analysis.

a. HomLang = English

b. Reproduced communalities

c. Residuals are computed between observed and reproduced correlations. There are 230 (25.0%) nonredundant residuals with absolute values greater than 0.05.

Appendix 8: Residual Matrices of original Micro (family) systems level for the English mother speakers

Reproduced Correlations[a]

		Famfun44	Famfun45	Famfun46	Famfun47	Famfun48	Famfun49	Famfun50	Parentmon51	Parentmon52	Parentmon53	Parentmon54	Parentmon55	Commun56	Commun57	Commun58	Commun59	Commun60	Commun61	Commun62	Commun63	Econfam64	Econfam65	Econfam66	Econfam67	Econfam68	Econfam69	Econfam70	Econfam71
Reproduced Correlation	Famfun44	.571[b]	.451	.506	.581	.512	.483	.420	.263	.258	.213	.241	.253	.318	.141	.331	.347	.298	.266	.155	.261	.177	.239	.157	.185	.200	.219	.256	.192
	Famfun45	.451	.364[b]	.373	.446	.378	.361	.318	.267	.269	.229	.248	.250	.284	.141	.268	.267	.243	.213	.130	.221	.112	.187	.104	.125	.140	.167	.173	.121
	Famfun46	.506	.373	.572[b]	.605	.569	.581	.542	.074	.169	.119	.051	.136	.310	.154	.447	.429	.425	.410	.311	.380	.212	.146	.164	.209	.216	.166	.251	.204
	Famfun47	.581	.446	.605	.668[b]	.605	.615	.564	.180	.270	.203	.150	.220	.371	.184	.479	.468	.446	.423	.312	.389	.171	.154	.129	.170	.190	.165	.219	.161
	Famfun48	.512	.378	.569	.605	.567[b]	.575	.531	.081	.167	.116	.058	.137	.304	.146	.435	.418	.411	.395	.295	.347	.208	.150	.161	.204	.213	.168	.251	.202
	Famfun49	.483	.361	.581	.615	.575	.612[b]	.590	.072	.220	.160	.047	.155	.358	.200	.517	.491	.499	.486	.395	.431	.195	.107	.144	.194	.203	.139	.216	.174
	Famfun50	.420	.318	.542	.564	.531	.590	.621[b]	.074	.277	.235	.062	.197	.432	.292	.579	.560	.592	.575	.504	.511	.289	.168	.241	.308	.294	.203	.297	.268
	Parentmon51	.263	.267	.074	.180	.081	.072	.074	.457[b]	.435	.408	.450	.390	.298	.197	.124	.179	.115	.073	.040	.142	-.014	.178	.024	.025	.041	.128	.034	-.004
	Parentmon52	.258	.269	.169	.270	.167	.220	.277	.435	.565[b]	.521	.427	.446	.464	.349	.364	.402	.376	.337	.314	.378	.037	.143	.059	.087	.095	.125	.045	.019
	Parentmon53	.213	.229	.119	.203	.116	.160	.235	.408	.521	.501[b]	.412	.428	.441	.348	.320	.366	.348	.307	.294	.345	.111	.206	.136	.170	.159	.182	.125	.105
	Parentmon54	.241	.248	.051	.150	.058	.047	.062	.450	.427	.412	.448[b]	.391	.299	.209	.114	.174	.115	.072	.045	.139	.025	.210	.065	.070	.076	.158	.074	.041
	Parentmon55	.253	.250	.136	.220	.137	.155	.197	.390	.446	.428	.391	.385[b]	.373	.277	.250	.297	.266	.226	.198	.265	.102	.216	.126	.151	.146	.184	.135	.107
	Commun56	.318	.284	.310	.371	.304	.358	.432	.298	.464	.441	.299	.373	.490[b]	.373	.470	.495	.502	.466	.428	.480	.238	.240	.234	.290	.269	.238	.252	.228
	Commun57	.141	.141	.154	.184	.146	.200	.292	.197	.349	.348	.209	.277	.373	.315[b]	.346	.368	.392	.366	.360	.357	.218	.196	.219	.268	.236	.197	.215	.210
	Commun58	.331	.268	.447	.479	.435	.517	.579	.124	.364	.320	.114	.250	.470	.346	.586[b]	.573	.610	.591	.544	.542	.234	.128	.198	.264	.250	.165	.221	.202
	Commun59	.347	.287	.429	.468	.418	.491	.560	.179	.402	.366	.174	.297	.495	.368	.573	.572[b]	.602	.576	.529	.536	.264	.185	.235	.303	.283	.209	.262	.240
	Commun60	.298	.243	.425	.446	.411	.499	.592	.115	.376	.348	.115	.266	.502	.392	.610	.602	.654[b]	.632	.595	.576	.314	.186	.278	.356	.324	.221	.298	.286
	Commun61	.266	.213	.410	.423	.395	.486	.575	.073	.337	.307	.072	.226	.466	.366	.591	.576	.632	.616[b]	.583	.555	.288	.147	.250	.324	.296	.188	.266	.257
	Commun62	.155	.130	.311	.312	.295	.395	.504	.040	.314	.294	.045	.198	.428	.360	.544	.529	.595	.583	.573[b]	.525	.261	.110	.228	.299	.266	.154	.222	.226
	Commun63	.261	.221	.360	.389	.347	.431	.511	.142	.378	.345	.139	.265	.460	.357	.542	.536	.576	.555	.525	.515[b]	.230	.138	.204	.268	.247	.168	.212	.201
	Econfam64	.177	.112	.212	.171	.208	.195	.289	-.014	.037	.111	.025	.102	.238	.218	.234	.264	.314	.288	.261	.230	.563[b]	.453	.547	.618	.528	.439	.613	.609
	Econfam65	.239	.187	.146	.154	.150	.107	.168	.178	.143	.206	.210	.216	.240	.196	.128	.185	.186	.147	.110	.138	.453	.475[b]	.464	.512	.443	.428	.532	.511
	Econfam66	.157	.104	.164	.129	.161	.144	.241	.024	.059	.136	.065	.126	.234	.219	.198	.235	.278	.250	.228	.204	.547	.464	.539[b]	.606	.516	.441	.600	.597
	Econfam67	.185	.125	.209	.170	.204	.194	.308	.025	.087	.170	.070	.151	.290	.268	.264	.303	.356	.324	.299	.268	.618	.512	.606	.685[b]	.584	.492	.672	.669
	Econfam68	.200	.140	.216	.190	.213	.203	.294	.041	.095	.159	.076	.146	.269	.236	.250	.283	.324	.296	.266	.247	.528	.443	.516	.584	.502[b]	.425	.578	.571
	Econfam69	.219	.167	.166	.165	.168	.139	.203	.128	.125	.182	.158	.184	.238	.197	.165	.209	.221	.188	.154	.168	.439	.428	.441	.492	.425	.393[b]	.503	.486
	Econfam70	.256	.173	.251	.219	.251	.216	.297	.034	.045	.125	.074	.135	.252	.215	.221	.262	.298	.266	.222	.212	.613	.532	.600	.672	.578	.503	.687[b]	.673
	Econfam71	.192	.121	.204	.161	.202	.174	.268	-.004	.019	.105	.041	.107	.228	.210	.202	.240	.286	.257	.226	.201	.609	.511	.597	.669	.571	.486	.673	.667[b]
Residual[c]	Famfun44		-.091	-.058	-.077	-.121	-.066	-.045	-.041	-.032	.011	-.066	-.021	.009	.070	.013	-.029	.001	.027	.059	.060	-.006	-.020	.018	-.011	-.027	-.053	.006	.012
	Famfun45	-.091		-.078	-.095	-.109	-.057	-.052	-.096	-.077	.002	-.053	.003	-.073	.006	.005	.020	.043	.026	.100	.032	-.004	-.072	-.009	-.001	-.018	.063	-.002	.011
	Famfun46	-.058	-.078		-.051	-.079	-.123	-.048	.000	.007	.008	-.055	-.003	.011	.039	-.008	-.026	.005	-.046	.040	-.014	.013	-.003	.005	-.002	.014	.003	-.021	-.021
	Famfun47	-.077	-.095	-.051		-.051	-.048	-.061	.005	.045	.044	-.037	-.003	-.074	.022	-.032	.002	.004	.013	-.006	-.006	.001	.017	-.019	.022	.030	-.040	.023	.007
	Famfun48	-.121	-.109	-.079	-.051		-.030	-.038	-.007	.039	-.008	.000	.060	.041	.047	-.067	-.018	-.041	-.036	-.008	.017	-.020	-.015	-.010	.033	.033	.007	-.027	-.004
	Famfun49	-.066	-.057	-.123	-.048	-.030		.052	.000	.044	.074	-.014	.019	-.004	.015	-.055	-.054	-.037	-.016	-.045	-.072	.007	.007	.034	.027	-.015	.005	-.004	-.014
	Famfun50	-.045	-.052	-.048	-.061	-.038	.052		-.004	.041	.032	.084	-.038	-.016	-.023	-.008	-.053	-.052	-.037	-.069	-.058	.005	.030	.021	-.012	.002	-.038	-.034	.030
	Parentmon51	-.041	-.096	.000	.005	-.007	.000	-.004		-.082	-.134	-.148	-.160	.083	-.100	.003	.011	-.008	.071	.043	.035	.043	-.036	-.001	.029	-.008	-.034	.010	.024
	Parentmon52	-.032	-.077	.007	.045	.039	.044	.041	-.082		.001	-.104	-.133	.015	-.065	-.062	-.062	-.035	-.049	-.038	-.048	-.008	-.003	.020	.007	.039	-.014	.034	.031
	Parentmon53	.011	.002	.008	.044	-.008	.074	.032	-.134	.001		-.109	-.097	-.109	-.051	-.068	-.026	-.010	-.013	-.062	-.048	.027	-.008	-.003	.020	.016	-.052	-.013	.027
	Parentmon54	-.066	-.053	.055	-.037	.000	-.014	.084	-.148	-.104	-.109		-.058	-.086	-.077	.064	-.004	.056	.041	.031	-.017	.057	-.045	.005	-.013	-.021	-.031	-.001	.008
	Parentmon55	-.021	.003	-.003	-.003	.080	.019	-.038	-.160	-.133	-.097	-.058		-.109	.101	-.033	-.040	.003	-.009	.021	-.005	-.041	-.082	-.026	.028	.026	-.053	.030	.024
	Commun56	.009	-.073	.011	-.074	.041	-.004	-.016	.083	.015	-.109	-.086	-.109		-.129	.041	-.046	-.058	-.024	-.028	-.053	-.042	-.004	.018	.018	-.001	.011	.014	-.024
	Commun57	.070	.006	.039	.022	.047	.015	-.023	-.100	-.065	-.051	-.077	.101	-.129		-.030	-.031	-.052	-.078	-.062	-.073	-.004	-.015	-.065	-.013	.030	.009	-.019	-.033
	Commun58	.013	.005	-.008	-.032	-.067	-.055	-.008	.003	-.062	-.066	.064	-.033	.041	.030		.005	-.016	-.054	-.076	-.079	.041	.075	.021	-.051	-.024	.013	-.024	-.021
	Commun59	-.029	.020	-.026	.002	-.018	-.054	-.053	.011	-.062	-.026	-.004	-.040	.046	.031	.005		.006	-.012	-.120	-.026	.004	.038	.013	-.031	-.029	.091	-.031	-.035
	Commun60	.001	.043	.005	.004	-.041	-.037	-.052	-.008	-.035	-.010	.056	.003	-.058	-.052	-.016	.006		.002	-.077	-.094	-.023	-.015	.004	-.040	.002	.005	.032	.006
	Commun61	.027	.026	-.046	.013	-.036	-.016	-.037	.071	-.049	-.013	.041	-.009	-.024	-.076	-.054	-.012	.002		-.084	-.093	.009	-.030	.010	.018	-.030	-.015	.014	.001
	Commun62	.059	.100	.040	-.006	-.008	-.045	-.069	.043	-.038	-.062	.031	.021	-.028	-.062	-.076	-.120	-.077	-.084		.076	-.024	.001	-.030	-.001	-.020	.034	.012	.024
	Commun63	.060	.032	-.014	-.006	.017	-.072	-.058	.035	-.048	-.048	-.017	-.005	-.053	-.073	-.079	-.026	-.094	-.093	.076		-.006	.074	-.021	-.003	-.048	-.007	.019	.007
	Econfam64	-.006	-.004	.013	.001	-.020	.007	.005	.043	-.008	.027	.057	-.041	-.042	-.004	.041	.004	-.023	.009	-.024	-.006		.007	-.032	-.085	-.074	-.083	-.060	-.088
	Econfam65	-.020	-.072	-.003	.017	-.015	.007	.030	-.036	-.003	-.008	-.045	-.082	-.004	-.015	.075	.038	-.015	-.030	.001	.074	.007		.056	-.089	-.128	-.071	-.105	-.114
	Econfam66	.018	-.009	.005	-.019	-.010	.034	.021	-.001	.020	-.003	.005	-.026	.018	-.065	.021	.013	.004	.010	-.030	-.021	-.032	.056		-.024	-.116	-.059	-.141	-.114
	Econfam67	-.011	-.001	-.002	.022	.033	.027	-.012	.029	.007	.020	-.013	.028	.018	-.013	-.051	-.031	-.040	.018	-.001	-.003	-.085	-.089	-.024		-.075	-.086	-.005	-.002
	Econfam68	-.027	-.018	.014	.030	.033	-.015	.002	-.008	.039	.016	-.021	.026	-.001	.030	-.024	-.029	.002	-.030	-.020	-.048	-.074	-.128	-.116	-.075		.015	-.030	-.036
	Econfam69	-.053	.063	.003	-.040	.007	.005	-.038	-.034	-.014	-.052	-.031	-.053	.011	.009	.013	.091	.005	-.015	.034	-.007	-.083	-.071	-.059	-.086	.015		-.090	-.102
	Econfam70	.006	-.002	-.021	.023	-.027	-.004	-.034	.010	.034	-.013	-.001	.030	.014	-.019	-.024	-.031	.032	.014	.012	.019	-.060	-.105	-.141	-.005	-.030	-.090		.051
	Econfam71	.012	.011	-.021	.007	-.004	-.014	.030	.024	.031	.027	.008	.024	-.024	-.033	-.021	-.035	.006	.001	.024	.007	-.088	-.114	-.114	-.002	-.036	-.102	.051	

Extraction Method: Principal Component Analysis.

a. HomLang = English

b. Reproduced communalities

c. Residuals are computed between observed and reproduced correlations. There are 111 (29.0%) nonredundant residuals with absolute values greater than 0.05.

Appendix 9: Residual Matrices of original Micro (community) systems level for the English mother tongue speakers

		Peersup72	Peersup73	Peersup74	Peersup75	Peersup76	Peersup77	Peerinf78	Peerinf79	Peerinf80	Peerinf81	Peerinf82	Schsup83	Schsup84	Schsup85	Schsup86	Schsup87	Schsup88	Schsup89	Schstrs90	Schstrs91	Schstrs92	Schstrs93	Schstrs94	Schstrs95	Neighb96	Neighb97	Neighb98	Neighb99	Neighb100	Neighb101
Reproduced Correlation	Peersup72	.411[b]	.522	.484	.488	.181	.336	-.169	-.114	-.084	.049	-.046	.040	.004	.100	.127	.122	-.047	.046	-.069	.054	-.076	-.049	-.005	-.108	-.038	-.044	-.041	-.103	-.075	-.021
	Peersup73	.522	.685[b]	.638	.645	.252	.459	-.122	-.039	-.008	.161	.048	.067	.023	.152	.202	.140	-.056	.068	-.018	.142	-.033	.012	.031	-.090	.005	-.054	-.008	-.152	-.097	-.046
	Peersup74	.484	.638	.634[b]	.599	.243	.363	-.075	.024	.068	.223	.109	-.047	-.087	.031	.118	.037	-.036	.047	-.010	.160	-.027	.027	-.007	-.120	.003	-.020	-.015	-.091	-.030	.019
	Peersup75	.488	.645	.599	.612[b]	.247	.450	-.089	-.013	.017	.176	.071	.093	.052	.178	.218	.142	-.016	.104	-.010	.140	-.019	.013	.042	-.074	.004	-.040	-.006	-.132	-.082	-.033
	Peersup76	.181	.252	.243	.247	.117[b]	.190	.041	.076	.090	.148	.110	.047	.033	.091	.112	.042	.057	.097	.011	.081	.012	.022	.015	-.026	-.010	-.020	-.015	-.053	-.024	-.008
	Peersup77	.336	.459	.363	.450	.190	.462[b]	-.027	-.007	-.011	.100	.049	.291	.262	.366	.328	.259	.042	.180	.012	.091	.015	.010	.103	.028	.001	-.086	.001	-.188	-.157	-.133
	Peerinf78	-.169	-.122	-.075	-.089	.041	-.027	.520[b]	.557	.530	.463	.534	-.021	-.002	.002	.090	-.159	.096	.051	.279	.283	.258	.311	.079	.169	.157	-.040	.112	-.090	-.003	-.092
	Peerinf79	-.114	-.039	.024	-.013	.076	-.007	.557	.626[b]	.604	.558	.614	-.072	-.054	-.041	.085	-.208	.072	.028	.335	.359	.305	.372	.103	.183	.217	.001	.163	-.064	.040	-.054
	Peerinf80	-.084	-.008	.088	.017	.090	-.011	.530	.604	.591[b]	.561	.601	-.102	-.087	-.066	.062	-.224	.110	.057	.293	.335	.269	.330	.070	.134	.174	.014	.126	-.032	.068	-.010
	Peerinf81	.049	.161	.223	.176	.148	.100	.463	.558	.561	.576[b]	.581	-.063	-.057	-.011	.116	-.180	.111	.095	.290	.358	.270	.316	.108	.129	.196	.068	.155	.005	.102	.043
	Peerinf82	-.046	.048	.109	.071	.110	.049	.534	.614	.601	.581	.618[b]	-.054	-.040	-.012	.113	-.193	.091	.063	.333	.373	.307	.364	.121	.176	.225	.037	.176	-.033	.070	-.013
	Schsup83	.040	.067	-.047	.093	.047	.291	-.021	-.072	-.102	-.063	-.054	.451[b]	.459	.485	.335	.305	.166	.261	.025	-.036	.064	-.049	.196	.158	.029	.065	.070	.017	-.024	-.018
	Schsup84	.004	.023	-.087	.052	.033	.262	-.002	-.054	-.087	-.057	-.040	.459	.466[b]	.482	.329	.290	.175	.284	.045	-.031	.085	-.036	.213	.181	.050	.095	.093	.052	.006	.007
	Schsup85	.100	.152	.031	.178	.091	.366	.002	-.041	-.066	-.011	-.012	.485	.462	.533[b]	.385	.331	.203	.332	.016	-.016	.057	-.051	.190	.140	.003	.034	.042	-.023	-.054	-.040
	Schsup86	.127	.202	.118	.218	.112	.328	.090	.085	.062	.116	.113	.335	.329	.385	.318[b]	.218	.116	.221	.083	.087	.098	.052	.160	.128	.056	-.004	.066	-.081	-.070	-.076
	Schsup87	.122	.140	.037	.142	.042	.259	-.159	-.208	-.224	-.180	-.193	.305	.290	.331	.218	.285[b]	.047	.145	-.105	-.110	-.083	-.131	.047	.006	-.092	-.090	-.068	-.126	-.155	-.124
	Schsup88	-.047	-.056	-.036	-.016	.057	.042	.096	.072	.110	.111	.091	.166	.175	.203	.116	.047	.440[b]	.419	-.117	-.106	-.049	-.170	-.022	-.064	-.186	.117	-.136	.208	.166	.214
	Schsup89	.046	.068	.047	.104	.097	.180	.051	.028	.057	.095	.063	.261	.264	.332	.221	.145	.419	.452[b]	-.096	-.084	-.028	-.162	.046	-.022	-.147	.126	-.092	.179	.135	.187
	Schstrs90	-.069	-.018	-.010	-.010	.011	.012	.279	.335	.293	.290	.333	.025	.045	.016	.083	-.105	-.117	-.096	.364[b]	.305	.331	.346	.249	.288	.373	.175	.346	.082	.129	.041
	Schstrs91	.054	.142	.160	.140	.081	.091	.283	.359	.335	.358	.373	-.036	-.031	-.016	.087	-.110	-.106	-.084	.305	.321[b]	.266	.323	.165	.188	.287	.071	.246	-.029	.048	-.022
	Schstrs92	-.076	-.033	-.027	-.019	.012	.015	.258	.305	.269	.270	.307	.064	.085	.057	.098	-.083	-.049	-.028	.331	.266	.312[b]	.298	.250	.277	.340	.210	.326	.135	.166	.090
	Schstrs93	-.049	.012	.027	.013	.022	.010	.311	.372	.330	.316	.364	-.049	-.036	-.051	.052	-.131	-.170	-.162	.346	.323	.298	.365[b]	.180	.238	.331	.056	.283	-.049	.026	-.067
	Schstrs94	-.005	.031	-.007	.042	.015	.103	.079	.103	.070	.108	.121	.196	.213	.190	.160	.047	-.022	.046	.249	.165	.250	.180	.281[b]	.267	.303	.269	.319	.202	.189	.146
	Schstrs95	-.108	-.090	-.120	-.074	-.026	.028	.169	.183	.134	.128	.176	.158	.181	.140	.128	.006	-.064	-.022	.288	.188	.277	.238	.267	.295[b]	.317	.196	.316	.122	.126	.055
	Neighb96	-.038	.005	.003	.004	-.010	.001	.157	.217	.174	.196	.225	.029	.050	.003	.056	-.092	-.186	-.147	.373	.287	.340	.331	.303	.317	.438[b]	.279	.424	.184	.206	.125
	Neighb97	-.044	-.054	-.020	-.040	-.020	-.086	-.040	.001	.014	.068	.037	.065	.095	.034	-.004	-.090	.117	.126	.175	.071	.210	.056	.269	.196	.279	.551[b]	.338	.588	.514	.515
	Neighb98	-.041	-.008	-.015	-.006	-.015	.001	.112	.163	.126	.155	.176	.070	.093	.042	.066	-.068	-.136	-.092	.346	.246	.326	.283	.319	.316	.424	.338	.421[b]	.261	.261	.193
	Neighb99	-.103	-.152	-.091	-.132	-.053	-.188	-.090	-.064	-.032	.005	-.033	.017	.052	-.023	-.081	-.126	.208	.179	.082	-.029	.135	-.049	.202	.122	.184	.588	.261	.685[b]	.583	.607
	Neighb100	-.075	-.097	-.030	-.082	-.024	-.157	-.003	.040	.068	.102	.070	-.024	.006	-.054	-.070	-.155	.166	.135	.129	.048	.166	.026	.189	.126	.206	.514	.261	.583	.516[b]	.524
	Neighb101	-.021	-.046	.019	-.033	-.008	-.133	-.092	-.054	-.010	.043	-.013	-.018	.007	-.040	-.076	-.124	.214	.187	.041	-.022	.090	-.067	.146	.055	.125	.515	.193	.607	.524	.562[b]
Residual[c]	Peersup72		-.112	-.090	-.178	-.034	-.060	.060	.056	.018	-.031	.010	-.002	.013	-.007	-.060	.055	-.002	.051	.026	-.014	-.044	.035	.030	.048	-.004	-.022	-.012	.026	-.003	-.009
	Peersup73	-.112		-.075	-.026	-.146	-.052	.025	7.522E-5	-.018	-.005	.002	.038	.024	-.034	-.077	-.023	.053	.015	.049	-.017	.034	-.023	.011	.030	-.025	-.007	-.018	.007	-.014	-.025
	Peersup74	-.090	-.075		-.086	.021	-.138	.027	-.005	.027	-.040	-.048	.025	.106	.000	.012	-.016	.021	-.022	-.027	-.071	.055	.015	.012	.047	.002	-.004	-.009	-.010	.008	-.062
	Peersup75	-.178	-.026	-.086		-.095	-.032	.053	.012	1.236E-5	-.050	-.031	.036	.021	-.040	-.026	-.100	-.001	.020	-.006	-.041	.019	-.030	-.014	.032	-.004	-.023	.028	-.005	-.012	.009
	Peersup76	-.034	-.146	.021	-.095		-.105	-.012	.046	-.049	-.027	-.041	.060	-.012	-.006	.035	-.010	-.039	-.077	-.004	-.056	-.036	-.045	-.034	.007	.064	.014	.059	.011	-.017	-.021
	Peersup77	-.060	-.052	-.138	-.032	-.105		.001	.034	.022	-.024	-.007	-.085	-.089	-.034	-.055	-.004	-.002	-.037	-.033	-.005	-.017	.035	-.077	-.019	.007	.059	-.009	.020	.038	.050
	Peerinf78	.060	.025	.027	.053	-.012	.001		.046	-.060	-.062	-.109	-.001	.024	.021	-.023	.049	-.105	-.065	-.049	-.140	-.120	-.043	-.017	-.048	.034	.064	.063	.052	.028	.014
	Peerinf79	.056	7.522E-5	-.005	.012	.046	.034	.046		.004	-.110	-.099	.026	.035	-.013	-.010	.039	-.054	-.099	-.074	-.076	-.123	-.109	-.014	.013	.039	.057	.049	.052	-.015	.013
	Peerinf80	.018	-.018	.027	1.236E-5	-.049	.022	-.060	.004		-.080	-.090	.003	.034	.001	.002	.117	-.080	-.055	-.056	-.079	-.027	-.088	-.029	-.004	.031	.010	.062	.017	.028	-.001
	Peerinf81	-.031	-.005	-.040	-.050	-.027	-.024	-.062	-.110	-.080		.031	.074	.046	.013	-.014	.026	-.109	-.070	-.055	-.031	-.091	-.020	.013	.009	-.012	.016	-.027	-.034	.003	.048
	Peerinf82	.010	.002	-.048	-.031	-.041	-.007	-.109	-.099	-.090	.031		.011	.005	.013	-.023	.079	-.093	.000	-.030	.015	-.029	-.034	.004	-.035	-.013	.023	-.029	.026	-.017	.013
	Schsup83	-.002	.038	.025	.036	.060	-.085	-.001	.026	.003	.074	.011		.058	-.194	-.148	-.159	-.065	-.097	-.041	-.023	-.025	-5.206E-6	-.055	-.007	.001	-.025	-.059	.015	.002	.033
	Schsup84	.013	.024	.106	.021	-.012	-.089	.024	.035	.034	.046	.005	.058		-.162	-.185	-.089	-.081	-.099	-.024	.005	-.041	-.009	-.077	-.029	-.049	-.012	-.023	.036	.016	-.008
	Schsup85	-.007	-.034	.000	-.040	-.006	-.034	.021	-.013	.001	.013	.013	-.194	-.162		.037	.008	-.084	-.081	-.008	.064	-.032	-.019	-.032	-.079	.011	.003	-.022	.028	.028	.051
	Schsup86	-.060	-.077	.012	-.026	.035	-.055	-.023	-.010	.002	-.014	-.023	-.148	-.185	.037		.032	-.023	-.124	-.034	-.048	-.069	.030	-.051	-.074	-.035	.014	.075	-.004	.067	.055
	Schsup87	.055	-.023	-.016	-.100	-.010	-.004	.049	.039	.117	.026	.079	-.159	-.089	.008	-.032		-.076	-.091	.002	9.025E-5	-.029	.001	-.069	-.102	.011	.050	.007	.072	.053	.071
	Schsup88	-.002	.053	.021	-.001	-.039	-.002	-.105	-.054	-.080	-.109	-.093	-.065	-.081	-.084	-.023	-.076		-.014	.108	.073	.113	.123	.026	.039	.103	-.017	.092	-.116	-.107	-.083
	Schsup89	.051	.015	-.022	.020	-.077	-.037	-.065	-.099	-.055	-.070	.000	-.097	-.099	-.081	-.124	-.091	-.014		.082	.025	.113	.036	.061	.064	.099	-.046	.064	-.066	-.057	-.162
	Schstrs90	.026	.049	-.027	-.006	-.004	-.033	-.049	-.074	-.056	-.055	-.030	-.041	-.024	-.008	-.034	.002	.106	.082		.024	.083	-.078	-.013	-.112	-.116	-.067	-.102	.032	-.046	-.011
	Schstrs91	-.014	-.017	-.071	-.041	-.056	-.005	-.140	-.076	-.079	-.031	.015	-.023	.005	.064	-.048	9.025E-5	.073	.025	.024		-.015	-.031	.026	-.007	-.118	-.070	-.146	.034	.011	.039
	Schstrs92	-.044	.034	.055	.019	-.036	-.017	-.120	-.123	-.027	-.091	-.029	.025	-.041	-.032	-.069	-.029	.113	.113	.083	-.015		.108	.014	-.048	-.129	-.102	-.191	-.021	.014	-.034
	Schstrs93	.035	-.023	.015	-.030	-.045	.035	-.043	-.109	-.088	-.020	-.034	-5.206E-6	-.009	-.019	.030	.001	.123	.036	-.078	-.031	.108		-.028	-.037	-.135	-.043	-.114	.013	.015	.085
	Schstrs94	.030	.011	.012	-.014	-.034	-.077	-.017	-.014	-.029	.013	.004	-.055	-.077	-.032	-.051	-.069	.026	.061	-.013	.026	.014	-.028		-.029	-.132	-.101	-.187	-.038	-.042	.001
	Schstrs95	.048	.030	.047	.032	.007	-.019	-.048	.013	-.004	.009	-.035	-.007	-.029	-.079	-.074	-.102	.039	.064	-.112	-.007	-.048	-.037	-.029		-.125	-.068	-.096	-.050	.020	.026
	Neighb96	-.004	-.025	.002	-.004	.064	.007	.034	.039	.031	-.012	-.013	.001	.049	.011	-.035	.011	.103	.099	-.116	-.118	-.129	-.135	-.132	-.125		.024	.119	-.043	-.069	-.084
	Neighb97	-.022	-.007	-.004	-.023	.014	.059	.064	.057	.010	.016	.023	-.025	-.012	.003	.014	.050	-.017	-.046	-.067	-.070	-.102	-.043	-.101	-.068	.024		.073	-.071	-.147	-.120
	Neighb98	-.012	-.016	-.009	.028	.059	-.009	.063	.049	.062	-.027	-.029	-.059	-.023	-.022	.075	.007	.092	.064	-.102	-.146	-.191	-.114	-.187	-.096	.119	.073		-.088	-.053	-.100
	Neighb99	.026	.007	-.010	-.005	.011	.020	.052	.052	.017	-.034	.026	.015	.036	.028	-.004	.072	.116	-.066	.032	.034	-.021	.013	-.038	-.050	-.043	-.071	-.088		-.075	.040
	Neighb100	-.003	-.014	.008	-.012	-.017	.038	.028	-.015	.028	.003	-.017	.002	.016	.028	.067	.053	-.107	-.057	-.046	.011	.014	.015	-.042	.020	-.069	-.147	-.053	-.075		-.098
	Neighb101	-.009	-.025	-.062	.009	-.021	.050	.014	.013	-.001	.048	.013	.033	-.008	.051	.055	.071	-.083	-.162	-.011	.039	-.034	.085	.001	.026	-.084	-.120	-.100	-.040	-.098	

Reproduced Correlations[a]

Extraction Method: Principal Component Analysis.

a. HomLang = English

b. Reproduced communalities

c. Residuals are computed between observed and reproduced correlations. There are 166 (35.0%) nonredundant residuals with absolute values greater than 0.05.

Appendix 10: Residual Matrices of original Meso- systems level for the English mother tongue speakers

Reproduced Correlations[a]

		Contr102	Contr103	Mixmes104	Mixmes105	Mixmes106	Mixmes107	Mixmes108	Mixmes109	Mixmes110
Reproduced Correlation	Contr102	.774[b]	.778	.536	.550	.611	.234	.266	.276	.315
	Contr103	.778	.788[b]	.508	.523	.608	.199	.208	.219	.260
	Mixmes104	.536	.508	.565[b]	.576	.468	.394	.555	.561	.575
	Mixmes105	.550	.523	.576	.586[b]	.480	.398	.560	.567	.581
	Mixmes106	.611	.608	.468	.480	.493[b]	.239	.296	.304	.332
	Mixmes107	.234	.199	.394	.398	.239	.346[b]	.522	.524	.520
	Mixmes108	.266	.208	.555	.560	.296	.522	.800[b]	.801	.789
	Mixmes109	.276	.219	.561	.567	.304	.524	.801	.802[b]	.791
	Mixmes110	.315	.260	.575	.581	.332	.520	.789	.791	.783[b]
Residual[c]	Contr102		.037	-.151	-.128	-.168	.028	.054	.054	.045
	Contr103	.037		-.131	-.151	-.154	.019	.053	.085	.036
	Mixmes104	-.151	-.131		.229	-.053	-.091	-.078	-.110	-.112
	Mixmes105	-.128	-.151	.229		-.049	-.092	-.093	-.106	-.090
	Mixmes106	-.168	-.154	-.053	-.049		-.001	-.009	-.029	.019
	Mixmes107	.028	.019	-.091	-.092	-.001		-.099	-.114	-.102
	Mixmes108	.054	.053	-.078	-.093	-.009	-.099		-.004	-.040
	Mixmes109	.054	.085	-.110	-.106	-.029	-.114	-.004		.002
	Mixmes110	.045	.036	-.112	-.090	.019	-.102	-.040	.002	

Extraction Method: Principal Component Analysis.

a. HomLang = English

b. Reproduced communalities

c. Residuals are computed between observed and reproduced correlations. There are 23 (63.0%) nonredundant residuals with absolute values greater than 0.05.

Appendix 11: Residual Matrices of original Macro- systems level for the English mother tongue speakers

Reproduced Correlations[a]

		TolernsCH111	TolernsCH112	TolernsCH113	TolernsCH114	TolernsCH115	TolernsDR116	TolernsDR117	TolernsDR118
Reproduced Correlation	TolernsCH111	.549[b]	.576	.569	.575	.596	.489	.483	.362
	TolernsCH112	.576	.607[b]	.603	.619	.642	.487	.482	.373
	TolernsCH113	.569	.603	.609[b]	.645	.669	.424	.420	.353
	TolernsCH114	.575	.619	.645	.727[b]	.755	.303	.302	.322
	TolernsCH115	.596	.642	.669	.755	.784[b]	.311	.311	.333
	TolernsDR116	.489	.487	.424	.303	.311	.783[b]	.767	.417
	TolernsDR117	.483	.482	.420	.302	.311	.767	.752[b]	.410
	TolernsDR118	.362	.373	.353	.322	.333	.417	.410	.264[b]
Residual[c]	TolernsCH111		.075	-.130	-.135	-.077	-.057	-.081	-.073
	TolernsCH112	.075		-.148	-.076	-.108	-.056	-.045	-.072
	TolernsCH113	-.130	-.148		-.072	-.043	-.003	.020	-.020
	TolernsCH114	-.135	-.076	-.072		-.060	.051	.070	-.058
	TolernsCH115	-.077	-.108	-.043	-.060		.054	.035	-.022
	TolernsDR116	-.057	-.056	-.003	.051	.054		-.132	-.105
	TolernsDR117	-.081	-.045	.020	.070	.035	-.132		-.157
	TolernsDR118	-.073	-.072	-.020	-.058	-.022	-.105	-.157	

Extraction Method: Principal Component Analysis.

a. HomLang = English

b. Reproduced communalities

c. Residuals are computed between observed and reproduced correlations. There are 21 (75.0%) nonredundant residuals with absolute values greater than 0.05.

Appendix 12: Residual Matrices of original Chrono systems level for the English mother tongue speakers

Reproduced Correlations[a]

		HopelesslN119	HopelesslN120	HopelesslN121	HopelessCOM122	HopelessCOM123	HopelessCOM124	HopelessCOM125	Hope126	Hope127	Hope128	Hope129	Hope130	Hope131	Hope132
Reproduced Correlation	HopelesslN119	.360[b]	.182	.176	.316	.415	.413	.380	.068	.001	-.062	-.031	.143	-.009	-.081
	HopelesslN120	.182	.647[b]	.673	.076	.168	.160	.048	-.157	.001	-.011	.049	.519	.046	-.206
	HopelesslN121	.176	.673	.704[b]	.054	.151	.148	.028	-.139	.048	.038	.099	.548	.092	-.180
	HopelessCOM122	.316	.076	.054	.328[b]	.392	.375	.372	-.002	-.143	-.201	-.181	.035	-.148	-.146
	HopelessCOM123	.415	.168	.151	.392	.494[b]	.483	.459	.042	-.079	-.152	-.120	.118	-.088	-.136
	HopelessCOM124	.413	.160	.148	.375	.483	.480[b]	.452	.084	-.017	-.090	-.058	.121	-.030	-.091
	HopelessCOM125	.380	.048	.028	.372	.459	.452	.447[b]	.083	-.060	-.131	-.110	.024	-.078	-.085
	Hope126	.068	-.157	-.139	-.002	.042	.084	.083	.294[b]	.340	.322	.315	-.073	.297	.279
	Hope127	.001	.001	.048	-.143	-.079	-.017	-.060	.340	.536[b]	.538	.541	.087	.499	.373
	Hope128	-.062	-.011	.038	-.201	-.152	-.090	-.131	.322	.538	.551[b]	.551	.078	.504	.383
	Hope129	-.031	.049	.099	-.181	-.120	-.058	-.110	.315	.541	.551	.557[b]	.126	.510	.366
	Hope130	.143	.519	.548	.035	.118	.121	.024	-.073	.087	.078	.126	.431[b]	.117	-.105
	Hope131	-.009	.046	.092	-.148	-.088	-.030	-.078	.297	.499	.504	.510	.117	.469[b]	.335
	Hope132	-.081	-.206	-.180	-.146	-.136	-.091	-.085	.279	.373	.383	.366	-.105	.335	.328[b]
Residual[c]	HopelesslN119		-.029	.000	-.108	-.176	-.183	-.089	-.016	.025	.073	-.046	-.072	-.057	-.067
	HopelesslN120	-.029		-.134	-.038	-.016	-.002	.043	.063	-.004	-.045	-.023	-.198	.013	.081
	HopelesslN121	.000	-.134		.042	-.028	-.015	-.001	.061	-.004	.013	-.020	-.183	-.025	.008
	HopelessCOM122	-.108	-.038	.042		-.137	-.124	-.140	-.077	.009	.038	.094	-.011	.054	-.007
	HopelessCOM123	-.176	-.016	-.028	-.137		-.069	-.177	-.005	-.026	-.020	.030	.011	.024	.018
	HopelessCOM124	-.183	-.002	-.015	-.124	-.069		-.162	-.106	-.041	-.007	.030	-.033	.011	.053
	HopelessCOM125	-.089	.043	-.001	-.140	-.177	-.162		-.077	.000	.002	-.016	.062	-.001	.068
	Hope126	-.016	.063	.061	-.077	-.005	-.106	-.077		-.011	-.089	-.155	.054	-.102	-.206
	Hope127	.025	-.004	-.004	.009	-.026	-.041	.000	-.011		.000	-.163	-.014	-.194	-.160
	Hope128	.073	-.045	.013	.038	-.020	-.007	.002	-.089	.000		-.097	-.048	-.169	-.179
	Hope129	-.046	-.023	-.020	.094	.030	.030	-.016	-.155	-.163	-.097		-.052	-.044	-.012
	Hope130	-.072	-.198	-.183	-.011	.011	-.033	.062	.054	-.014	-.048	-.052		-.054	.085
	Hope131	-.057	.013	-.025	.054	.024	.011	-.001	-.102	-.194	-.169	-.044	-.054		.011
	Hope132	-.067	.081	.008	-.007	.018	.053	.068	-.206	-.160	-.179	-.012	.085	.011	

Extraction Method: Principal Component Analysis.

a. HomLang = English

b. Reproduced communalities

c. Residuals are computed between observed and reproduced correlations. There are 42 (46.0%) nonredundant residuals with absolute values greater than 0.05.

Appendix 13: Scatter plots of factor pattern coefficients for all scales per systems level

Individual systems level scatter plots

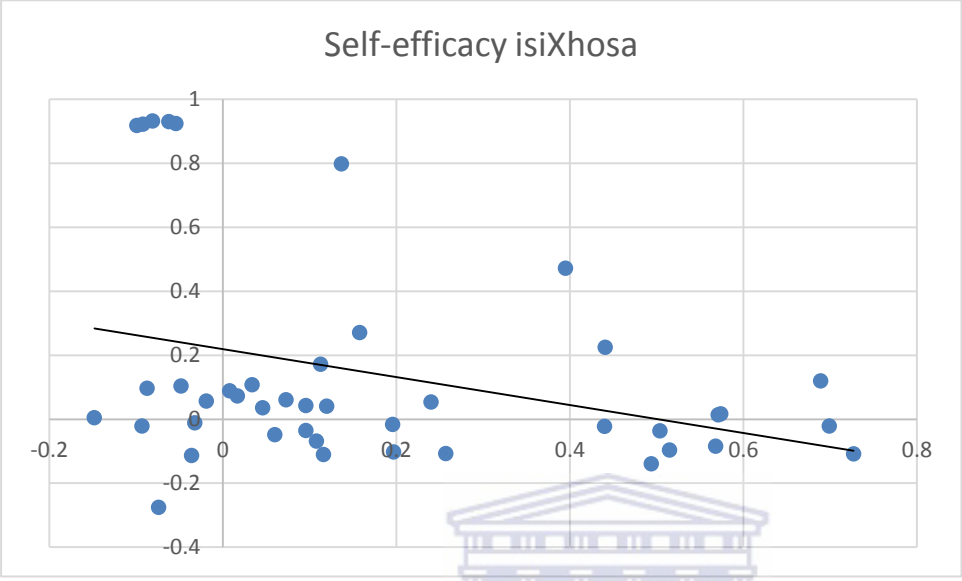

Figure 7: Scatter plot for Social identity

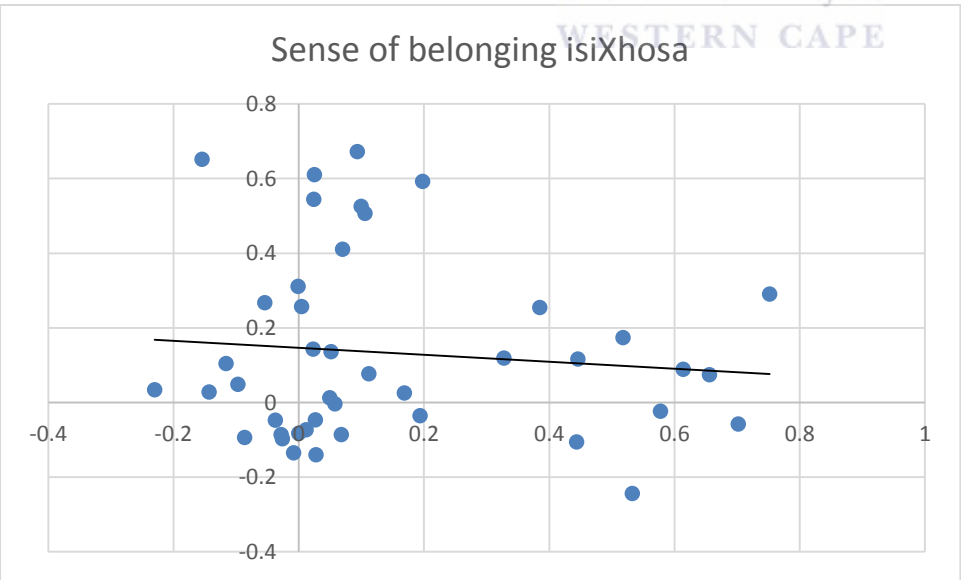

Figure 8: Scatter plot for Sense of belonging

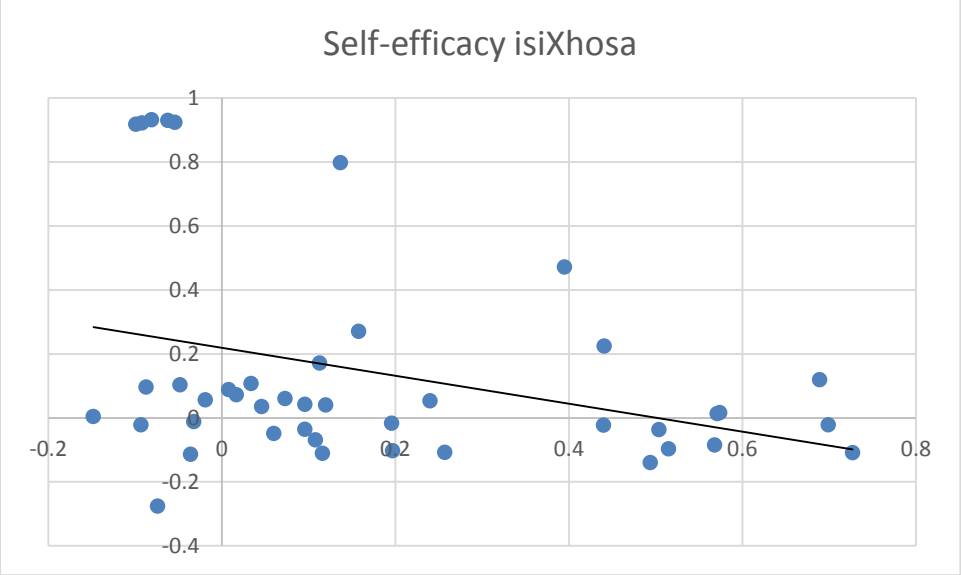

Figure 9: Scatter plot for Self-efficacy

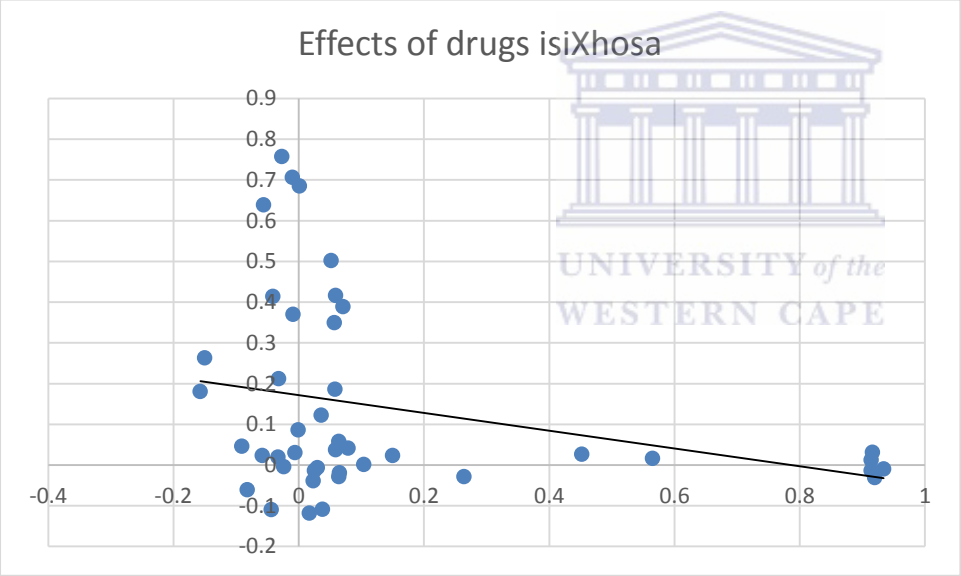

Figure 10: Scatter plot for Effect of drugs

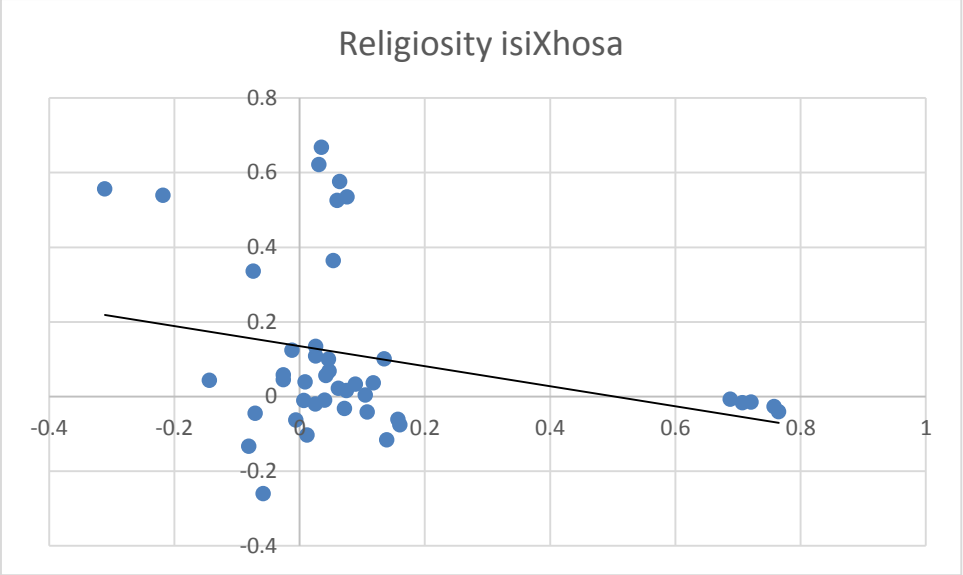

Figure 11: Scatter plot for Religiosity

Macro (family) systems level scatter plots

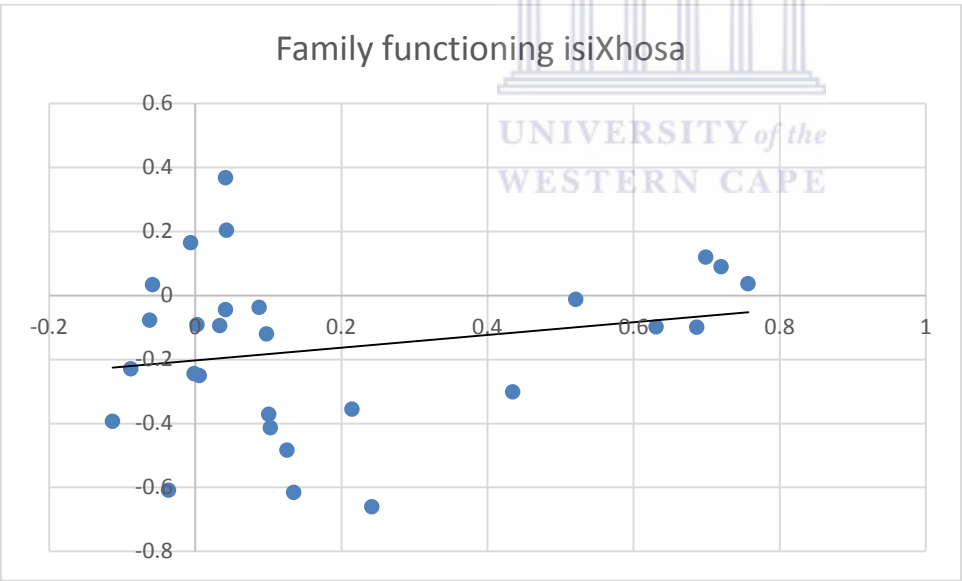

Figure 12: Scatter plot for Family functioning

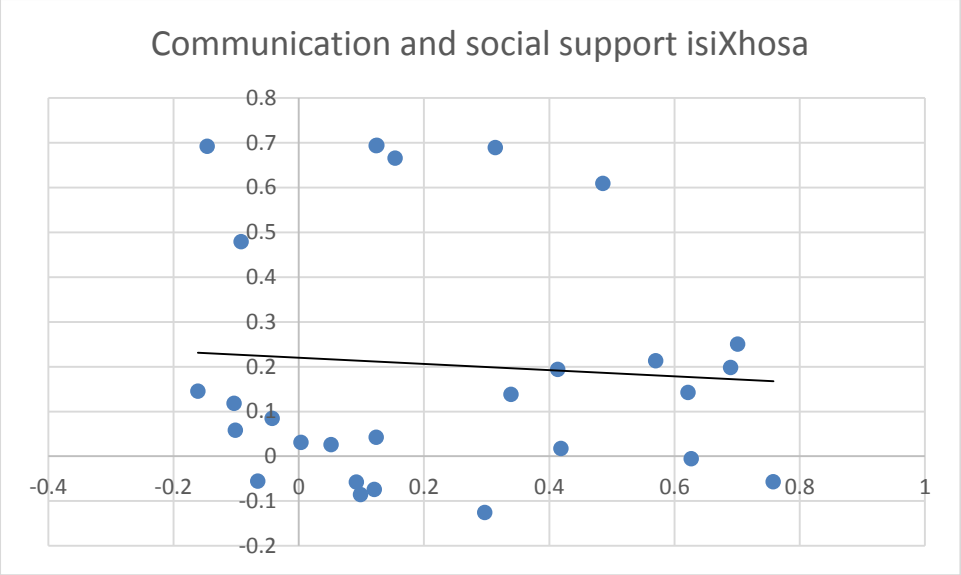

Figure 13: Scatter plot for Communication and social support

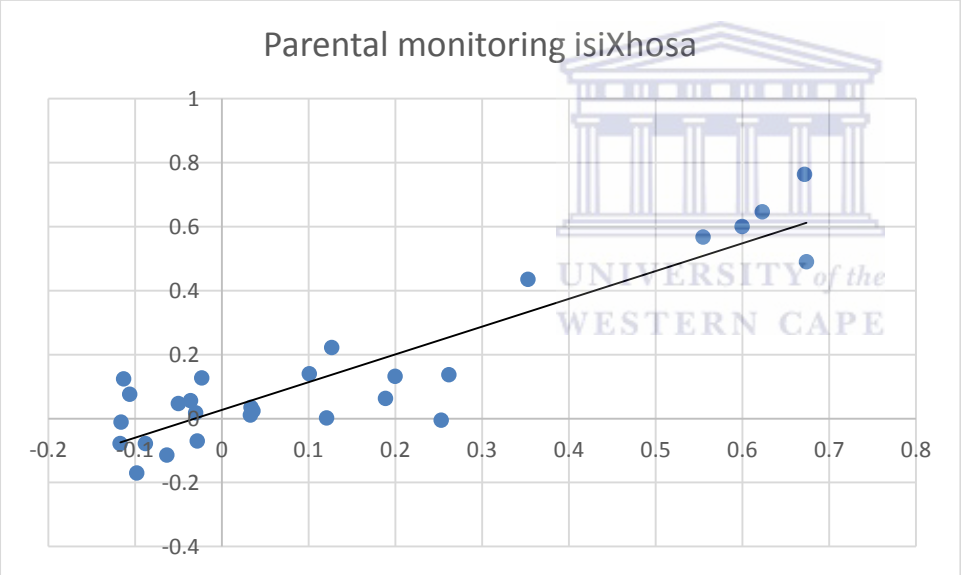

Figure 14: Scatter plot for Parent monitoring

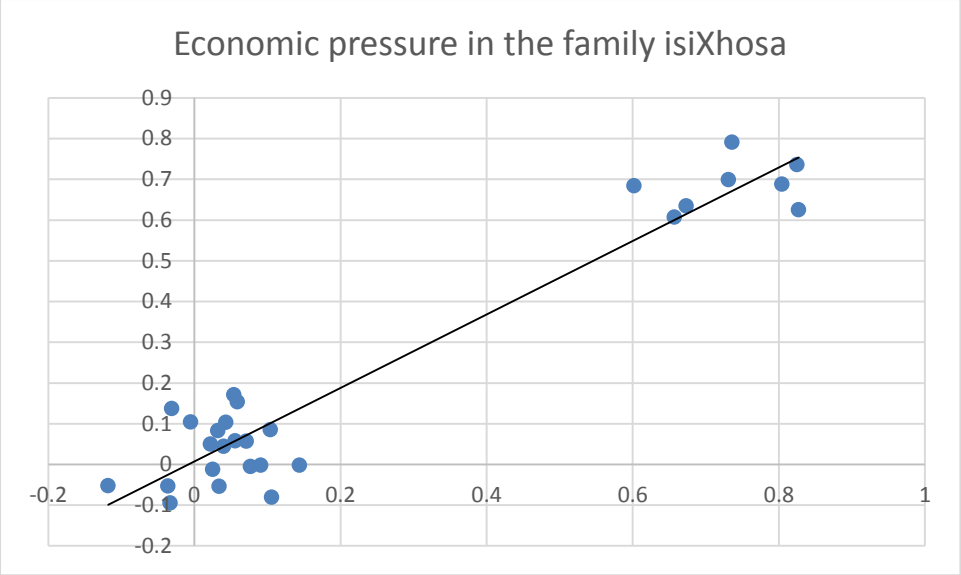

Figure 15: Scatter plot for Economic pressure in family

Micro (community) systems level scatter plots

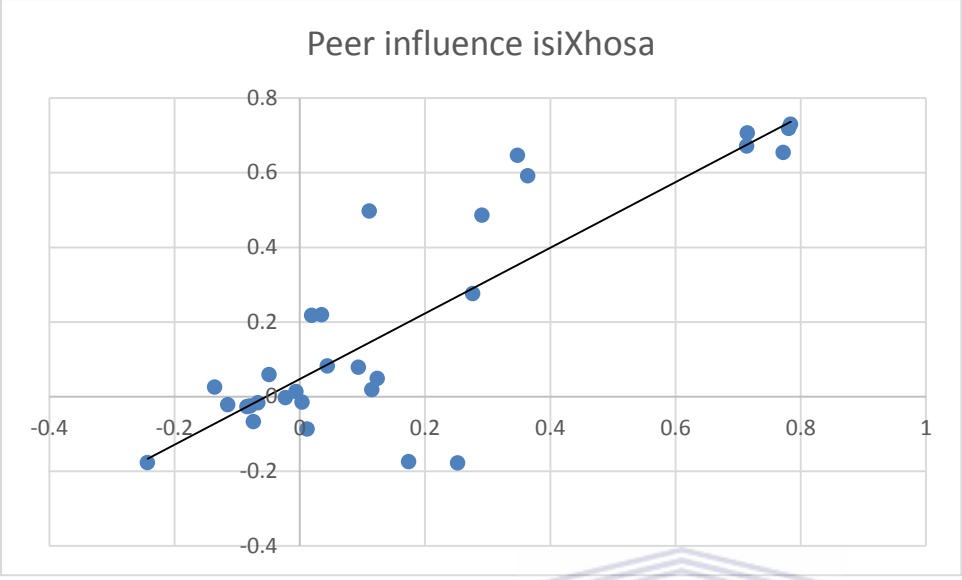

Figure 16: Scatter plot for Peer influence

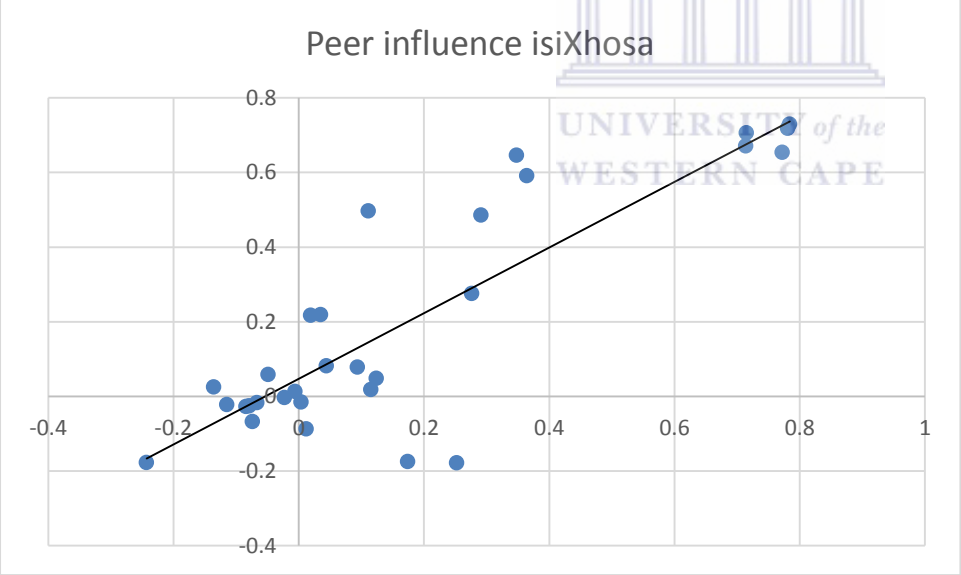

Figure 17: Scatter plot for Peer support

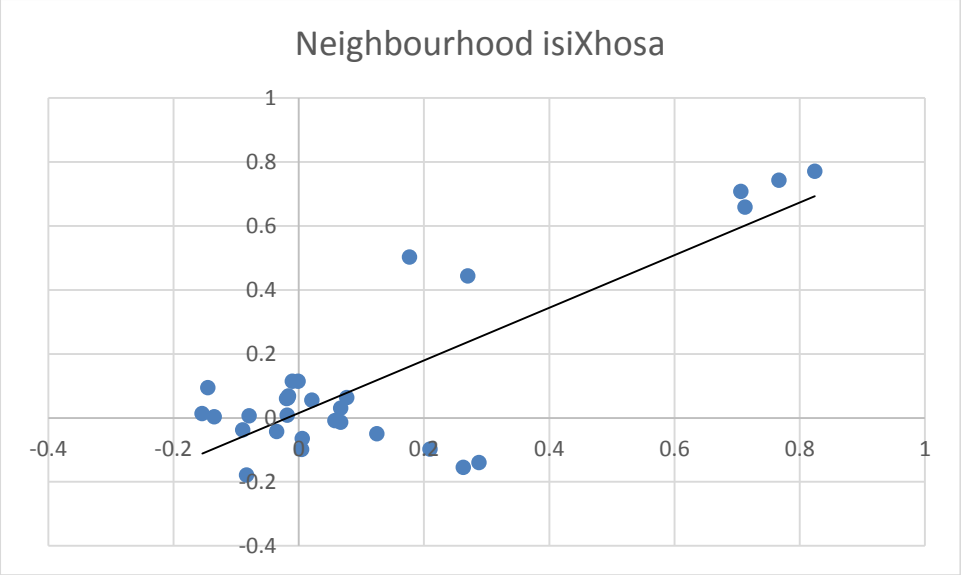

Figure 18: Scatter plot for Neighbourhood

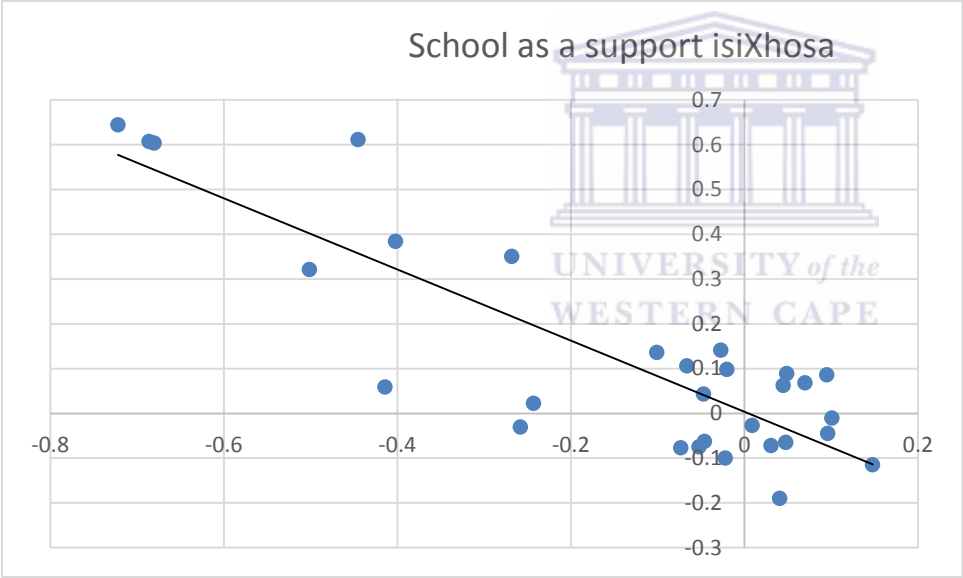

Figure 19: Scatter plot for School as a support

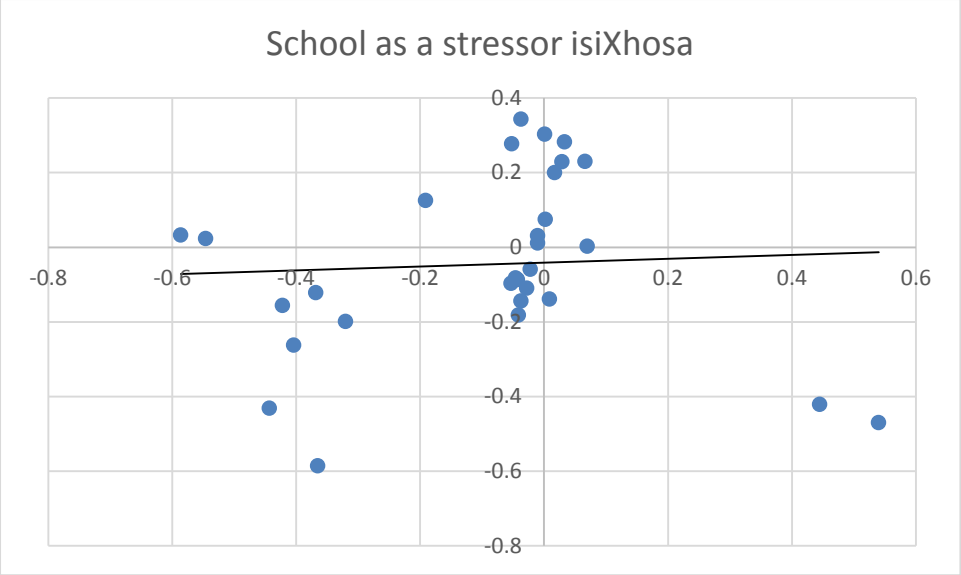

Figure 20: Scatter plot for School as a stressor

Meso-systems level scatter plots

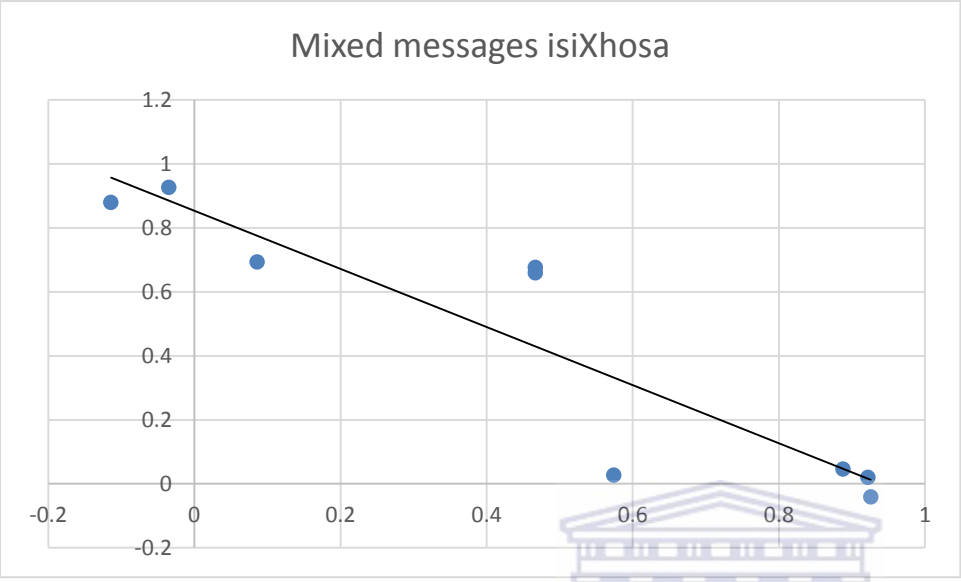

Figure 21: Scatter plot for Mixed messages

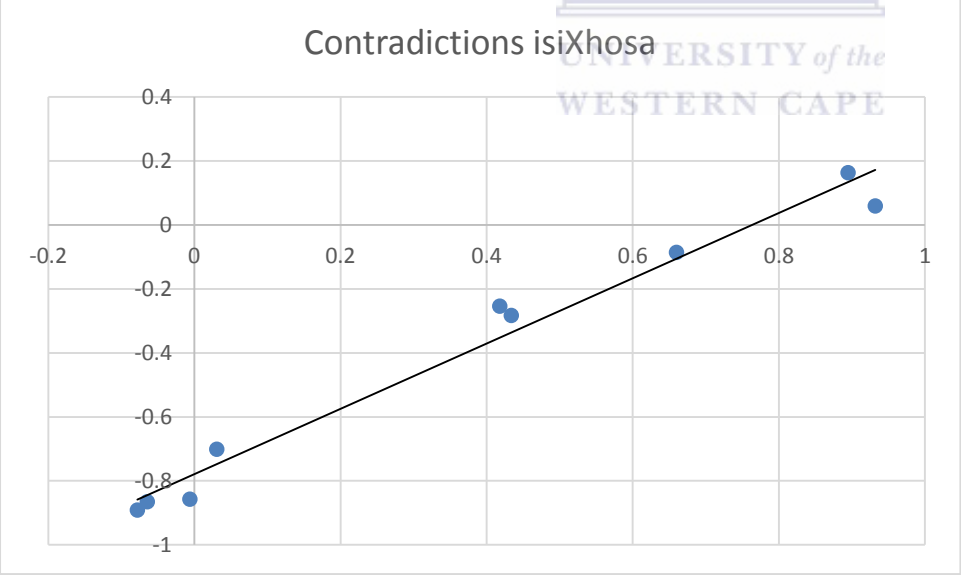

Figure 22: Scatter plot for Contradictions

Macro-systems level scatter plots

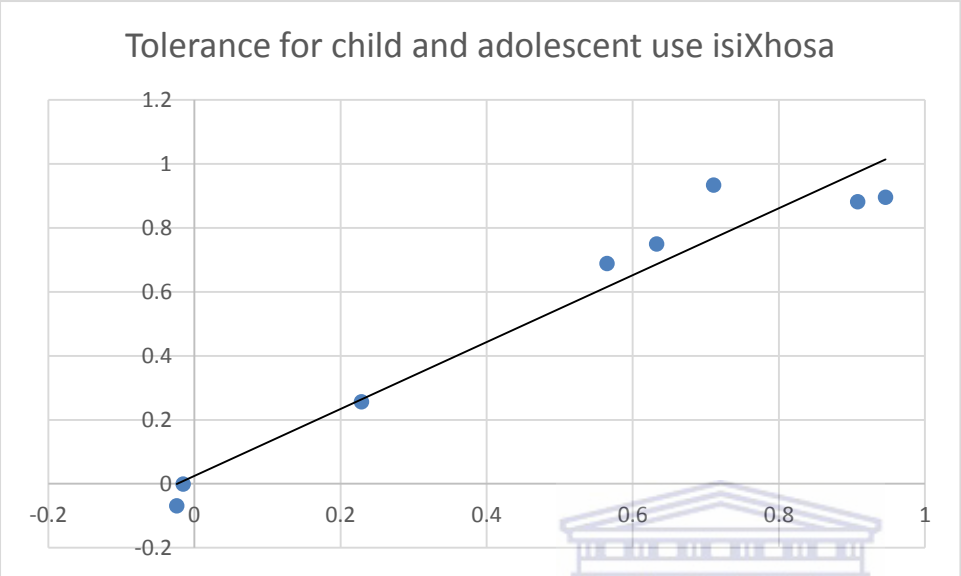

Figure 23: Scatter plot for Tolerance for child and adolescent drug use

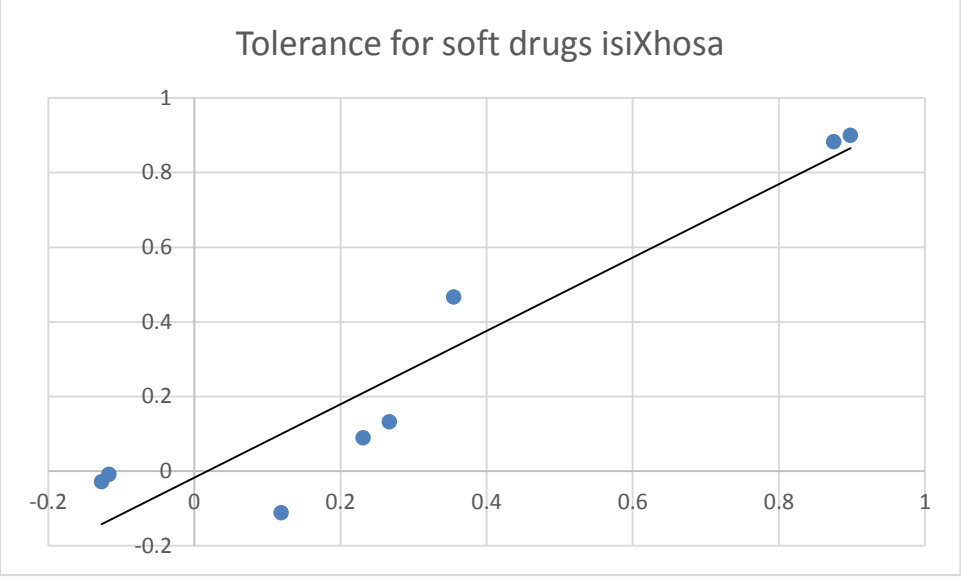

Figure 24: Scatter plot for Tolerance for soft drugs

Chrono-systems level scatter plots

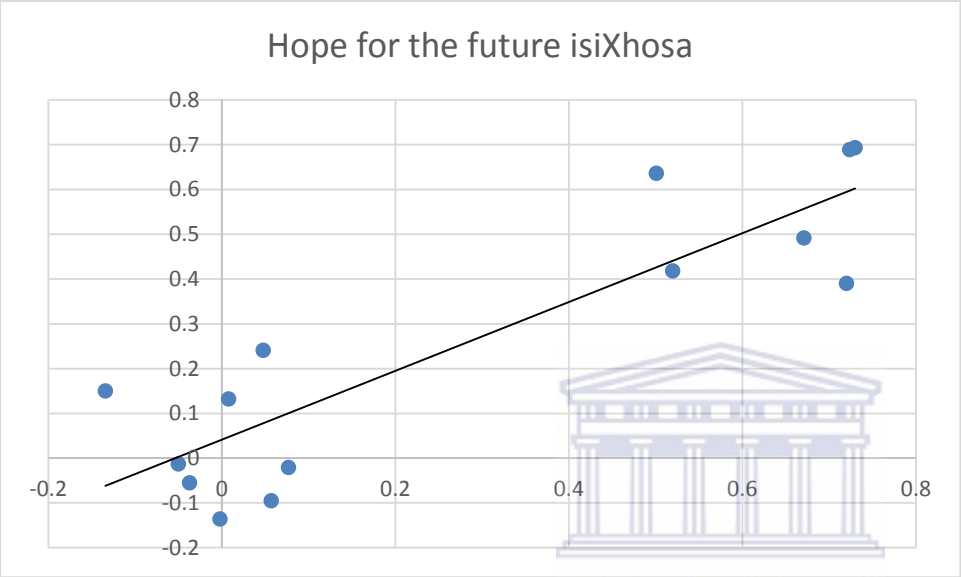

Figure 25: Scatter plot for Hope for the future

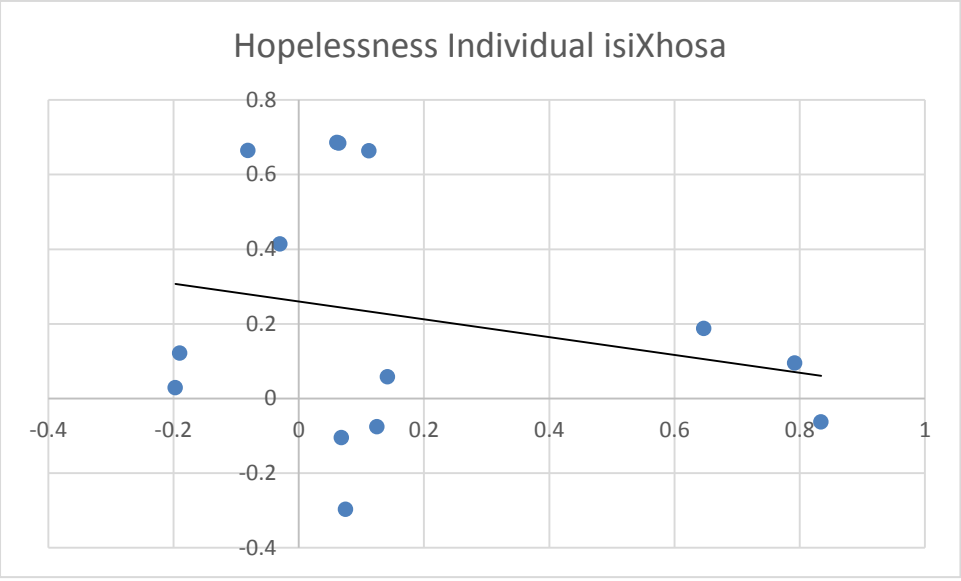

Figure 26: Scatter plot for Hopeless individual

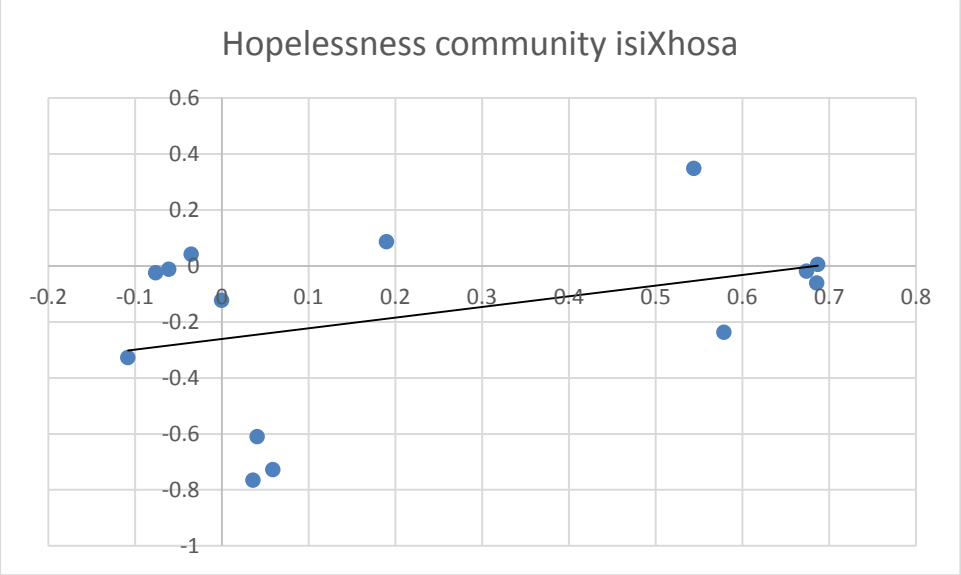

Figure 27: Scatter plot for Hopeless community