ILLNESS BELIEF, PERSONALITY TRAITS AND TREATMENT COMPLIANCE AMONG ADOLESCENTS WITH SICKLE CELL DISEASE IN GHANA.

BY

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DECLARATION

This is to certify that this thesis is the result of the research undertaken by PRINCE ATORKEY towards the award of Master of Philosophy in Clinical Psychology in the Department of Psychology, University of Ghana.

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ABSTRACT

Sickle cell disease is a genetic condition that has both physical and psychological impact on individuals who have the condition. The aim of this study was to investigate the influence of illness belief and personality traits on treatment compliance among adolescents with sickle cell disease as well as the moderating role of belief about medicine between illness belief and treatment compliance. A total sample of 120 adolescents with sickle cell disease (68 SC genotype, 49 SS genotype and 3 with other genotypes) were recruited from two hospitals (Korle-Bu Teaching Hospital and Tema General Hospitals) all in the Greater Accra Region of Ghana. The study was purely quantitative and the cross sectional survey method was adopted. The Illness Perception Questionnaire-Revised (IPQ-R), The Big Five Inventory (BFI), The Belief about Medicine Questionnaire (BMQ) and the Medication Adherence Report Scale (MARS-5) were administered to the participants to measure participants illness belief, personality traits, belief about medicine and compliance to treatment respectively. Results of the Analysis using the Pearson correlation indicated that apart from the illness identity dimension, all the other illness belief dimensions (timeline-acute and chronic, consequences, personal control, treatment control, illness coherence, timeline cyclical and emotional representation) were significantly related to treatment compliance. Further analysis using the multiple regression analysis showed that timeline cyclical was a significant predictor of treatment compliance than the other dimensions followed by emotional representation, timeline-acute and chronic, treatment control and illness coherence. The pearson correlation analysis also showed a significant relationship between neuroticism, agreeableness, conscientiousness and treatment compliance. Multiple regression analysis showed that agreeableness was a major significant predictor of treatment compliance followed by conscientiousness then neuroticism. A hierarchical regression analysis indicated that belief about medicine significantly moderated the relationship between illness belief and treatment compliance. Some of the findings from the study were consistent with earlier studies while others were not. The findings and limitations were discussed in relation to theories and earlier studies. It was concluded that illness belief as well as personality traits influence compliance to treatment in adolescents with sickle cell disease and belief about medicine also plays a role in explaining the relationship between illness belief and treatment compliance. The outcomes of this study have significant implications for clinical management and research design in psychological researches involving adolescents with sickle cell disease.

DEDICATION

This thesis is dedicated to my mother Mrs. Nancy Katako. You sacrificed all you had to get me this far. God richly bless you.

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Through it all the Lord has been faithful. He has really done what no man can do. Thanks be to His name. My first most acknowledgement goes to the almighty God for His grace that has brought me this far in life. I owe every achievement in my life to Him.

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LIST OF ABBREVIATIONS

ACEI-	Angiotensin-Converting-Enzyme inhibitors
ACL-	Anterior cruciate ligament
BFI-	Big Five Inventory
BIPQ-	Brief Illness Perception Questionnaire
BMQ-	Belief about Medicine Questionnaire
CHD-	Coronary Heart Disease
CSM-	Common Sense Model
DFX-	Desferoxamine
ECH-	Ethics Committee for the Humanities
HBM-	Health Belief Model
HU-	Hydroxyurea
IPQ-	Revised Illness Perception Questionnaire
MARS-	Medication Adherence Report Scale
MDD-	Major Depressive Disorder
MDKT-	Michigan diabetes Knowledge Test
MMSA-8	Morisky Medication Adherence Scale
NCD-	Necessity-Concerns Differential
NEO-	Neuroticism, Extraversion, Openness to experience
NIH-	National Institute of Health
SACE-	serum levels of angiotensin-converting-enzyme
SCA-	Sickle Cell Anaemia
SCD-	Sickle Cell Disease
SRM-	Self Regulatory Model
WHO-	World Health Organization

CHAPTER ONE

INTRODUCTION

Background to the study

Sickle cell disease (SCD) also known as sickle-cell anaemia or sickle cell disorder is a genetically inherited blood disorder that causes red blood cells to become sticky and sickle shape and it has affected thousands and millions people worldwide. It is one of the commonest but preventable genetic diseases. One is said to have a sickle cell disease when the person inherits two sets of abnormal recessive genes (e.g. Hb S and S or C, D, E or β thalassaemia) one from each parent. Parents of such individuals are known to be healthy carriers of the abnormal gene and do not have the sickle cell disease (Ohene-Frempong & Dennis-Antwi 1995, Anionwu & Atkin, 2001). There are some individuals who are referred to as carriers because they inherited a normal Hb A gene from one parent and an abnormal Hb gene from the other parent (Sears, 1994). It is likely these individuals may have one of these combinations: Hb AS, Hb AC, Hb AE, Hb Aβ thalassaemia etc.

Sickle cell anaemia is believed to be particularly common among people whose ancestors originated from sub-Saharan Africa, India, Saudi Arabia and Mediterranean countries and it also believed that about five percent (5%) of the world's population carries genes responsible for haemoglobinopathies. According to Diallo and Tchemia (2002), over 300,000 babies are born worldwide with Sickle cell disease and they are mostly born in countries which have been classified as low and middle income countries with majority of these births found in Africa. In some part of sub- Saharan Africa, close to 2% of most children are born with sickle cell. It is estimated that 10% to 40% of people are healthy carriers and are found across Equatorial Africa. In the North African coast, the rate is between 1% and 2 % and less than 1% in South Africa. For Ghana and Nigeria, the range of sickle cell trait is 15 to 30% (WHO, 2006).

In Ghana alone about 25,000 SCD children and adults have been registered with the sickle cell clinic at Korle-Bu Teaching Hospital (Adult Sickle Cell Clinic, Korle-Bu Records, 2013). Also 2% of children born every year have SCD and about 25% to 30% of Ghanaians are carriers of SCD according to Ohene-Frmpong, Oduro, Tetteh and Nkrumah (2008).

Having a sickle cell disease comes with some complications or challenges such as serious infections, damage to vital organs, stroke, kidney damage, respiratory problems, bone marrow failure, growth failure, cognitive impairment, maturational delay in children as well as high maternal and foetal morbidity and mortality (Zemel, Kwachak, Ohene-Frimpong & Stallings, 2007; Ocheni, Onah, Ibegbulam & Eze, 2007).In addition to that, individuals with sickle cell disease also manifest acute and chronic pain in their bones and joints. Acute pain which is the most predominant symptom can be very severe and last from hours to days. Whethers (2000) indicated that the painful crisis is the most distressing symptom in patients with SCD. Children and adolescents with SCD usually require hospitalization for acute complications such as painful episodes, acute chest syndrome, splenic sequestration, infection, stroke, aplastic crisis, and priapism. Management of these complications may require hospitalization or treatment at home in an ambulatory setting, or in the emergency department (ED), which consequently affects attendance at school and normal play activities for children (Okpala et al. 2002; Ramsey et al. 2001; Serjeant, 1993; Wethers, 2000; Strickland, Jackson, Gilead, McGuire & Quarles, 2001; Thomas & Taylor, 2002). As it stands now, no cure for sickle cell disease has be found and individuals with this condition are expected to comply with treatment regimens that are lifelong in nature. Treatment regimen can be pharmacological or non-pharmacological in nature. Non-pharmacological treatment may include but not limited to some alterations in lifestyle such as changes in diet and fluid intake, reducing one's stress level, engaging in moderate exercise instead of vigorous exercise. Pharmacological treatment requires the taking of medications such as hydroxyurea, folic acid, analgesics to relieve pains and prophylactic

penicillin in children under 5 years of age in other to prevent them from dying as a result of overwhelming infection. Prospective and non-randomized studies have shown that hydroxyurea is safe and efficacious for reducing the number of pain crises and episodes of acute chest syndrome in children with sickle cell anaemia (SCA) (Hankins et al., 2005; Zimmerman et al., 2004). Despite the availability of drugs to help manage sickle cell disease, it has been reported that the most common barrier to the prescription of HU for SCD is compliance from the patients and their families (Brandow, Jirovec & Panepinto, 2010; Zumberg, Reddy & Boyette, 2005).

The use of the term compliance in health issues was first done by Sacket (1976). Haynes (1979) subsequently used the term compliance and he defined it as "the extent to which a person's behaviour (in terms of taking medication, following diets, or executing life-style changes) coincides with medical or health advice" (pp. 1-2).

With increasing numbers of medication shown to do more good than harm when taken as prescribed, low or non-compliance is a problem or challenge which tends to undermine the benefits of current medical care (Horne, 1997; Haynes, Mckibbon, Kanani, Brouvers & Oliver, 1997). Non-compliance to treatment regimen can be classified as intentional or unintentional. Unintentional non-compliance happens when a patient wants to comply with treatment but is unable to because they lack the capacity or resources. For instance, patients not understanding the instructions given about how a medication should be taken, inability to afford costs of treatment, difficulty in following treatment schedules, difficulty in administering or remembering the treatment, lack of mutual goal setting between patient and healthcare provider (Danquah & Asare, 2009). Intentional non-compliance on the other hand occurs when the patient decides not to do the requirement of the recommendations. Perceptual factors such as one's beliefs and one's preferences which determines motivation to start may best explain the intentional non-compliance. Treatment non-compliance or non- adherence has been identified

as a major public health problem that imposes a considerable financial burden upon modern health care systems (Horne, 1997; Haynes et al.,1997; Donovan, 1995; Donovan & Blake, 1992). According to Melnikow and Kiefe (1994) poor compliance with a therapeutic regimen may have a major impact on clinical outcome. In individuals with sickle cell anaemia (SCA), compliance to prescribed regimens of penicillin prophylaxis, iron chelation, and pain medication has been described as suboptimal (Elliot, Morgan, Day, Mollerup & Wang, 2001; Day, Brunson & Wang, 1992; Treadwell et al., 2005). Adherence with penicillin, desferoxamine, and pain medication is challenging for patients with SCA (Elliot, Morgan, Day, Mollerup & Wang, 2001; Barakat, Lutz, Smith-Whitley & Ohene-Frempong, 2005).Research on adherence or compliance to treatment among sickle cell patients have remained inconsistent. Olivieri and Vichinsky (1998) in their research reported a 4% non-adherence in a series of 17 patients starting hydroxyurea. In a two larger clinical studies, about 10-20% of children stopped hydroxyurea due to nonadherence (Zimmerman et al, 2004; de Montalembert et al. 2006).

Adolescence is a moment marked by transition from dependence to independence characterised by social, biological and psychological changes. During this period of one's life, an individual experiences some bodily changes alongside other emotional and social changes he or she must learn to adjust with. Adolescents with chronic illness or condition are mostly seen to be struggling with independence as their ill condition make them cling physically, emotionally and financially to their families. The chronic disease such as sickle cell is likely to cause a delay in the normal process of growth of the adolescents.

According to Eiser, 1990, chronic illness is an illness or handicap that is medically long-term and requires at least 6 months of continuous medical care. Having a chronic illness can lead to decreased physical ability, changes in physical appearance, a long reliance on medical specialists, physical assistance and changes in life's prospects (Petermann & Kroll, 1995). The treatments that accompany chronic disease place a heavy behavioural requirement on

adolescents. For example adolescents are required to follow precisely scheduled daily medications, consumption of special foods, regular physical exercise, regular and consistent visit to the hospital which most of them find very challenging. For sickle cell disease, moments of intense crisis and other unpredictable situations are more likely to worsen the situation. The requirements that come with the treatment of the chronic disease interferes with most aspect of adolescents' lives such as school, sports, works, eating, travel and dating (Wysocki, Hough, Ward &Green, 1992; Burroughs, Pontious & Santiago, 1993). Despite the burden that comes with having chronic disease, compliance to treatment has been a major problem. Some studies (LaGreca, 1990; Hentinen & Kyngas, 1992; Chigier, 1992) have provided evidence that approximately 50% of adolescents with chronic conditions do not comply with care recommendations. A pilot study was conducted at the Department of Haematology, sickle cell unit at a national hospital in Accra by Okraku, Ofori-Atta, Ekem & Acquaye, 2007. In this pilot study, 71 patients seeing a psychologist at the sickle cell unit were given a questionnaire to measure their psychosocial problems they encounter as a result of living with sickle cell disease. Various responses were obtained from this pilot study. Some of them are lost of a job due to sickle cell disease status, fear of having crisis and fear of not having money to finance health care. Approximately 35% were found to be non-compliant to treatment and management skills. When patients were interviewed to examine their perceptions, it was observed that patients showed poor understanding of SCD and they had other myths of their condition which affected their compliance to treatment. An attempt to investigate factors that influence compliance to treatment in adolescent with chronic disease have produced findings that are inconclusive (Cameron, 1996). Factors range from cognitive-emotional factors, family support, and peer support, developmental issues, medical and demographic factors to quality of interaction with health care providers. One of the focus of this study is to investigate whether cognitive factors (illness perception or belief) influences treatment compliance. In a study

conducted by (Burroughs et al., 1993; Graue, Hanestadt, Sovik, 1994), it was discovered that for adolescents with diabetes, a poor diabetic balance is associated with lack of illness and treatment-related knowledge. In other related studies, Burroughs et al., 1993; Berry, 1993 found out that a good knowledge about diabetes and treatment may show poor diabetic balance. For the adolescents with chronic illness, personal meaning (DiMatteo & DiNicola, 1986; Bosley, Fosbury & Cochrane, 1995) and the significance (Price, 1996; deBenedictis, 1990) of illness and treatment (DiMatteo & DiNicola, 1986) are the most central or important factors affecting compliance. Adolescents are more likely to comply with treatment when they have the belief that treatment will be effective and when their beliefs are explored and matched with treatment. Berry, Hayford, Ross, Pachman & Lavigne (1993) in their study using 54 children and adolescents with juvenile rheumatoid arthritis between the ages of 6 and 17 years discovered that an understanding of the disease was accompanied by developmental progression. It is in the light of this inconsistencies that the current research is being conducted to find out what the story is like for adolescents with sickle cell disease and whether their belief about the illness or will predict their compliance to treatment.

Various factors associated with non-compliance have been explored. Since 1975, more than 200 variables have been studied but none of them can be said to be a consistent predictor of compliance: neither socio-economic nor pathology-related factors (Sackett &Snow, 1979; Donovan & Blake, 1992; Steiner &Vetter,1994; Donovan, 1995; Marinker, 1997; Haynes,Mckibbon, Kanani, Brouvers & Oliver, 1997) however, one's belief about treatment or medication have been consistently found to be a significant predictor to medication adherence (Horne, 1997, 2003; Horne & Weinman, 1999, 2002). Horne and Weinman (1999) in a study found that for individuals with chronic physical illness, their belief about medication or treatment predicted adherence more strongly than either clinical or demographic variables. Horne (2003) further suggested that for us to have a comprehensive picture so that we can

explain treatment compliance or medication adherence, one's treatment or medications beliefs must be taken into consideration. Beliefs about medication may either be for those prescribed for a specific illness and for a general illness (Horne, 1997, 2003; Horne, Weinman, &Hankins, 1999). There are two things that happen when medication is prescribed or when treatment is recommended, it is perceived as necessary for personal health benefit and the individual may also have concerns about the negative effects (Horne, 2003; Horne &Weinman, 2002; Horne et al., 1999). The concepts of necessity of treatment and concern about medication may then influence an individual's decision to comply or not to their prescribed treatment regimen (Horne & Weinmann, 2002). Phatak and Thomas (2006) found that specific concerns about medications were significantly positively related with non-adherence and medication-specific necessity was positively associated with adherence. The issue of treatment compliance or adherence as well as belief about treatment in adolescents with a chronic disease such as sickle cell disease is of paramount significance although little is known about them. As mentioned earlier, few studies have examined factors that are related to adherence in adolescents. Most of the studies done using adult and paediatric populations have identified a number of possible factors. Some of these are locus of control beliefs (Meyers &Meyers, 1999), Optimism (Czajkowski &Koocher, 1987), family factors (Geiss, Hobbs, Hannersley-Maercklein, Kramer &Henley, 1992). Since there is no known cure for sickle cell disease, it is expected of patients to follow lifelong treatment regimens and probably difficult ones. Due to the lifelong and complex nature of treatment, patients may not comply with this treatment regimen which may possibly bring complications.

Compliance to treatment regimen depends not only on beliefs about treatment but also the beliefs or perception that the patients hold about their condition. One model which has over the years helped to explain how perception about illness influences compliance is the self-regulation model of illness perception. This model describes the cognitive responses that

patients develop about their illness which subsequently determines their way of coping to the illness including compliance to treatment (Leventhal et al. 1997). Five dimensions of illness perceptions were developed by Leventhal et al., 1997. The illness identity dimension describes how people label their disease and the symptoms they identify with it (e.g. sickle cell disease, diabetes, symptoms of pain, breathlessness). The consequences dimension explains the belief patients have about the impact of the illness on their psychological, physical and social lives. The timeline dimension describes the patients beliefs about whether the illness will last for a short time (acute), will last for a long time (chronic) or cyclical in nature. The cause dimension represents a patient's belief of the underlying cause of the illness. The controllability dimension which has been categorized recently into personal control and treatment control examines an individual's belief about whether the illness is curable or controllable and perception whether the efforts of the patients or that of others is able to influence the course of others. Emotional representation and illness coherence which has been added recently aims at identifying patient's emotional response to their illness and their understanding of their condition respectively.

Several researches done using different illness groups such as chronic renal failure, diabetes, hypertension have provided evidence to support the assertion that illness belief or perception is a significant framework for explaining the ability of the patients to cope and for developing interventions to prompt self-management in chronic disease (Baroletti & Dell'Orfano, 2010; Petrie & Weinman, 2012; Hale, Treharne & Kitas, 2004). Hand and Adams, 2002 in their study realized that asthmatic patients adhered well to treatment when the treatment regimen made sense to them and when the patients felt they have the ability to succeed at the regimen. Health belief dimensions such as perceived seriousness of illness, vulnerability to complications and efficacy of treatment can predict better compliance among individuals with hypertension (Ross, Walker &MacLeod, 2004). One study (Thornburg, Calatroni, Telen & Kemper, 2010) has

examined adherence to treatment in sickle cell patients but to the best of my knowledge, no study has examined the relationship between illness belief or perception and treatment compliance among sickle cell patients. It is against this background that the current study is being conducted to investigate the relationship between this two variables of interest.

Personality as a construct contributes to people's thoughts, feelings and behaviour (Pervin &Cervone, 2008). Some past studies have identified relationships between the Big five personality traits and adherence behaviour while others have not. Individuals with multiple sclerosis who were scoring higher on the neuroticism dimension had lower medication adherence (Bruce, Hancock, Arnett & Lynch, 2010). Neuroticism personality is characterised by an individual's tendency to experience negative emotions such as fear, worry, and anxiety. They also have a tendency to show moodiness, irritability, distress and lack of self-confidence. This personality dimension is consistently associated with health and health-related behaviour, such as sensitivity to and frequency in reporting illness symptoms, increased medical encounters, and poor self-reported health (Costa & McCrae, 1987; Friedman, 2001; Mcrae & Costa, 1987; Skinner, Hampson &Fife-Schaw, 2002). A study using cancer survivors, the extraversion personality was found to be positively related to adherence (Courneya, Friedenreich, Sela, Quinney & Rhodes, 2002). The personality traits agreeableness was also identified as a positive correlate of adherence behaviour for patients who underwent liver transplantation (Telles-Correia, Barbosa, Mega & Monterio, 2009). Conscientiousness has been identified as the trait that is mostly associated with adherence. It is characterised by specific traits such as self-discipline, self-control, reliability, and perseverance. According to Friedman, 2001; Skinner et al., 2002 the conscientiousness dimension seems to be consistently related to different kinds of health-related behaviour. Friedman, 2001; McCrae & Costa, 1987 also indicated that it is relevant for achieving health-related goals. This was observed among patients who were undergoing renal dialysis (Christensen & Smith, 1995) and patients with

HIV (O'Cleirigh, Ironson, Weiss, Costa, 2007). Literature on the other personality dimensions with regards to adherence is quite unclear (Friedman, 2001) .One Study like Penedo et al, 2003 found no association between the various personality traits and adherence. Hitherto, there are no studies examining illness beliefs and personality traits and their relation to treatment compliance among adolescents with sickle cell disease in Ghana thus this study will help fill that gap and make literature available to effective management of adolescents with sickle cell disease.

Problem Statement

Patients diagnosed of chronic diseases such as sickle cell disease are strongly required to adhere or comply with treatment regimen. It is known that poor compliance can contribute to substantial worsening of disease, death, and increased healthcare cost. Greater efforts are therefore needed to identify specific patients at increased risk for non-adherence (Aday, et al., 1999; Gardiner &Dvorkin, 2006; Haynes, Ackloo, Sahota, McDonald & Yao, 2008; Julius, Novitsky & Dubin, 2009; Lehane & McCarthy, 2009; Wamboldt, Wamboldt, Wamboldt, Gavin, Roesler & Brugman, 1995). Past research on patients with a wide range of health conditions examined the role patient's illness belief or perception, treatment beliefs and personality traits play in explaining various coping and health outcomes such as compliance or adherence. For example Horne and Weinman, 2002 found out that perceived consequences of the illness and treatment belief was related to adherence. Perceived identity and consequences of the illness and the perceived specific necessity of medications were also found to be a predictor of adherence among haemophilia patients (Llewellyn, Miners, Lee, Harrington, &Weinman, 2003). For adolescents and young adults diabetes patients, perceived consequences and treatment effectiveness was found to be associated with adherence (Skinner et al., 2002). Again for adolescents with cystic fibrosis, treatment beliefs were found to be related to adherence (Bucks et al., 2009). Psychological explanations of compliance in

adolescents with sickle cell disease has not been explored much, for this reason more research is needed. Attempts to explore factors that predict compliance have focused on demographic factors and most of these factors have been found to be unrelated to compliance. Numerous studies have also explored the relationship between illness perception and treatment compliance as well as the relationship between personality traits and treatment compliance in other medical conditions like diabetes and hypertension (Platt, Green Jayasinghe & Morrisey, 2013; Griva, Myers & Newman, 2000). As at the time of conducting this research, no study was found examining the relationship between illness representation, personality traits and treatment compliance in individuals with sickle cell disease. It is therefore not known what role illness beliefs and personality traits play in influencing compliance to treatment in individuals with sickle cell disease. The purpose of this research is to examine adolescent's sickle cell patient's illness beliefs and personality traits and to investigate whether these beliefs could predict compliance to treatment regimen. Again the extent to which belief about medicine moderate the relationship between illness belief and treatment compliance will be examined.

Relevance of the Study

The findings from this study will help inform health workers about the various beliefs adolescents have about sickle cell disease and having an idea about their beliefs will help the health workers plan treatment taking into consideration the beliefs or perceptions adolescents hold. The outcome of this study will also show how these beliefs influence treatment compliance and other treatment related decisions. The research will also help to understand how various personality traits and one's belief about treatment influence treatment compliance which has been under researched in the Ghanaian context. Having an understanding of how various personality traits influence treatment compliance will help plan individualized treatment based plans. Finally, it will also add to existing literature on illness beliefs and

personality traits in relation to medical regimen adherence in sickle cell patients and also propel other researchers in the area of compliance to do conduct more study.

Aims and Objectives

Broad Objective

The broad objective of this research is to investigate factors affecting treatment compliance with sickle cell management guided by the use of the Illness belief components and how personality traits influence treatment compliance among adolescent sickle cell patients attending sickle cell clinic at Korle-Bu Teaching Hospital. The moderating role of belief about medicine is also examined.

The research will be guided by the following specific objectives:

1. To investigate the relationship between sickle cell patients illness belief and their treatment compliance.
2. To find out which of the illness beliefs components will significantly predict treatment compliance
3. To examine whether the personality traits of sickle cell adolescent patients significantly relates to their treatment compliance.
4. To find out which of the personality traits significantly predicted treatment compliance.
5. To find out whether beliefs adolescents hold about treatment (necessity of treatment or concern for treatment) is associated with treatment compliance.
6. To examine whether patient's beliefs about treatment (Concern for treatment and Necessity of treatment) will moderate the relationship between illness belief and treatment compliance significantly.

CHAPTER TWO

LITERATURE REVIEW

Introduction

The study sought to examine the illness beliefs of sickle cell adolescent patients and how these beliefs influence their compliance to treatment. In addition, the influence of personality on treatment compliance was also examined. The extent to which their treatment beliefs (necessity of treatment and concern for treatment) moderate the relationship between illness belief and treatment compliance was also investigated. The literature review covered the theoretical frameworks underlying the study. The theories of interest that were covered included the Self-Regulatory Model (Leventhal, Meyer &Nerenz, 1984), the five factor model of personality (McCrae & Costa, 1987) and the necessity-concern framework (Horne, 1997). This was followed by the empirical review of literature on the various variables in the study. The first section focused on illness belief and treatment compliance. A review on personality traits and treatment compliance as well as the role of belief about medicine as a moderator between illness belief and treatment compliance was also be examined. The theoretical and empirical reviews was subsequently followed by rationale for the study, the hypotheses that were tested, the proposed model that is been tested and the operational definitions of key terms.

Theoretical Frameworks

Three main theories or models that guided the study are listed and discussed below.

Self-Regulatory Model (SRM)

Leventhal's self-regulatory model (SRM; Leventhal, Meyer & Nerenz, 1984) has been used largely to examine health beliefs. It was initially described as the "common sense model of illness representation" According to this model, patients formulate various illness dimensions once they experience symptoms and these to a large extent determine coping, help-seeking behaviours (including accessing formal and informal support) and compliance with treatment. The SRM has been adopted to evaluate patients' beliefs in various chronic medical conditions, such as atopic dermatitis (Wittkowski, Richards, Griffiths &Main, 2007) and rheumatoid arthritis (Treharne, Lyons, Booth & Kitas, 2005).

According to this model, illness beliefs or cognitions have key dimensions. These are identity, cause, timeline, consequences and cure/control (Ogden, 2004).

Identity: This refers to the label given to the illness, that is the medical diagnosis and the various symptoms experienced (Ogden, 2004). This identity dimension gives an individual a label with its accompanying symptoms which apparently shape how meaning is given to the condition. Example, 'I have sickle cell' which indicates the label and 'I experience pain frequently' representing the symptom.

Time line: Ogden (2004, p50), refers to it as the patients' beliefs about how long the illness will last, whether it acute (short term) or chronic (long term). For example, 'my sickle cell will last forever' and my sickle cell will be over soon'. These items indicate the perceptions of the duration of the illness by the patients.

Consequences: This dimension of the SRM refers to the patient's perception of the possible effects of the illness on their life. Such consequences may be physical, emotional or several interacting factors. Example, my sickle cell prevents me from engaging in my usual lifestyle.

Cure and control: Patients also represent illnesses in terms of whether they believe that the illness can be treated and cured and the degree to which the outcome of their illness is controllable either by themselves or by powerful others such as supernatural being, healers and doctors. For instance, 'If I take my medicine, my symptoms will disappear' and 'if I get my medical treatment from my doctor my illness will be cured'. The cure and control subscale is divided into personal and treatment control. The personal control dimension seeks to assess patient's beliefs about the best way to bring their condition under control. The treatment control dimension is the patients belief that treatment is effective to help manage their condition.

Illness coherence dimension is used to assess the extent to which patients have a clear understanding of their illness. The emotional representation dimension attempts to measures the patient's emotional reactions to the illness.

The SRM has been used to examine compliance with treatment in various chronic illness populations and evidence indicates that the various dimensions are stable across illnesses. Hagger and Orbell (2003) however indicated that the nature of beliefs or perceptions is not the same for all illnesses, as such, they must be explored for different illness groups. This calls for a need to conduct a study to find out if these beliefs or perception are the same for adolescents with sickle cell disease. As mentioned earlier, there is paucity of literature on illness belief or perception and their effects on treatment compliance among sickle cell disease patients. There is the need to find out if the various dimensions of this model will significantly predict compliance to treatment in sickle cell adolescent patients.

Five Factor Model

The five-factor model of personality as propounded by Costa & McCrae, 1992 is a hierarchical organization that puts personality traits into five basic dimensions or categories. The proponents of this model suggest that personality structure can be represented in terms of five broad categories thus the name five factor. Secondly this model suggests that differences that are observed among people on these five dimensions are stable over time. Extraversion, Agreeableness, Conscientiousness, Neuroticism and Openness to experience are the five dimensions in the five factor model. Conscientiousness is characterized by specific traits such as self-discipline, self-control, reliability, and perseverance. The neuroticism and extraversion are arguably the two strongest and most ambiguous personality traits. Individual who score high on neuroticism have the tendency to display moodiness, irritability, distress, caution, apprehension, lack of self-confidence, low self-esteem, and withdrawn behaviour. Individuals who score low on Neuroticism are often calm, even-tempered, self-satisfied and unemotional. The extraversion dimension is characterized by positive emotions, assertiveness, sociability, and the tendency to seek stimulation in the company of others. On the contrary, low scores on the extraversion dimension will reflect a picture of an individual who is reserved, quiet, lonely, passive, and lacking the ability to express strong emotion.

Agreeableness on the other hand manifests itself in characteristics that are perceived as kind, sympathetic, warm, cooperative and considerate. A low score on the agreeableness scale will indicate an individual who is generally suspicious, unfriendly, irritable and criticizes other people.

Openness to experience includes one's tendency to engage in active imagination, aesthetic sensitivity, attentiveness to inner feelings, preference for variety, and intellectual curiosity for those who score high on this scale. On the contrast, individuals with a low score on the openness to experience are typically conventional, down-to earth, conservative and lacking in

curiosity. There is evidence to suggest that some personality characteristics may be related to health and illness through behaviours that are exhibited. Some examples of health behaviour patterns that personality characteristics help to manifest are recognition of health threats and the attainment of health protection actions that like adherence. Personality characteristics may influence the initiation, course, and final outcome of one's illness according to Contrada & Goyal, 2004. The Big Five model comprising of openness to experience, conscientiousness, extraversion, agreeableness and neuroticism as adopted for use in this research presents an integrative framework or model to understand the role of personality in health behaviours such as compliance. Conscientiousness which is associated with specific traits such as self-discipline, self-control, reliability and perseverance has been found to be consistently related to different kinds of health-related behaviour (Friedman, 2001; Skinner et al., 2002). Conscientiousness was found to be related to self-care of renal dialysis patients (Christensen &Smith, 1995) and an indirect relationship through illness representation was also observed with self-care of adolescents and young adults with diabetes (Skinner et al., 2002). The neuroticism trait has also been found to be related to adherence. Some characteristics of neuroticism as listed above are the tendency to experience negative emotions, the possibility of exhibiting negative emotions such as moodiness, irritability, caution. Neuroticism has also been consistently been found to be associated with health and health-related behaviour, such as sensitivity to and frequency in reporting illness symptoms, increased medical encounters, and poor self-reported health (Friedman, 2001; Skinner et al., 2002; Costa & McCrae, 1987). Agreeableness has also been found to be related to positive health behaviours (Ingledew, 1999). The relationship between personality traits and adherence may be indirect- i.e., the association between these characteristics may be of relevance to adherent behaviour (Horne, 2006). Research examining the relationship between these variables are limited in patients with chronic diseases like sickle cell. It is against this background that the current study adopted this

model to help understand how personality traits influences compliance among adolescents with sickle cell disease in a developing country like Ghana. The outcome will help to come up with culturally sensitive interventions for use by health care professionals.

Necessity-Concerns Framework

Theoretical and empirical literature suggests that treatment compliance is a function of both illness representation (Leventhal, Diefenbach & Leventhal, 1992; Meyer, Leventhal & Gutman, 1985; Petrie, Weinman, Sharpe & Buckley, 1996) and treatment beliefs (Horne & Weinman, 1992, 2002). Horne (1997) therefore suggested an addition to Leventhal's self-regulatory model, the Necessity-Concerns Framework. He indicated that people are not passive beings but rather active problem solvers who have their own ideas about their illness, treatment as well as treatment beliefs. One's beliefs about treatment are characterised by the individual's perception of the necessity to comply with the prescribed treatment and their concerns about doing so.

The necessity-Concerns Framework, as Horne explained, postulates that ill persons have ideas regarding the necessity of treatment and whether the prescribed treatment is appropriate or not. Horne and Weinman (1999) proposed that "adherence decisions are influenced by an interaction of personal beliefs about the necessity of the treatment for maintaining or improving health and concerns about the potential adverse effects of adhering to it" (p. 19). The evaluation of the benefits and concerns of the treatment is more or less a cost-benefit analysis. This they referred to as the necessity-concerns differential (NCD). Horne (1997) therefore suggested that to have a better understanding and appreciation of the relationship that exists between illness perception or beliefs and treatment adherence, treatment beliefs must be considered.

From this framework, compliance is been influenced by the individual's cost-benefit analysis. Thus, patients will take their medications based on the belief about the necessity of the

treatment that is how important the treatment will be in curing their condition and their concern about treatment that is any negative concern they have about the treatment. So where a patient believes that the necessity for treatment outweighs any negative concern he or she has, he or she will comply with treatment. On the other hand, where the patient sees the concern for treatment outweighing the necessity for treatment, he or she will not comply. The current research attempted to explore how this cost-benefit analysis influences treatment compliance among adolescents with sickle cell disease in a developing country like Ghana in other to develop interventions that are culturally sensitive for utmost disease management.

Review of Related Studies

In search of empirical evidence to establish the relationships among the variables in the study, many studies were found with varying outcomes. Depending on the objective of this study as well as the methodology that was adopted in these studies those that were relevant were selected and reviewed. Review of related studies are divided into sections as follows; illness belief and treatment compliance, personality traits and treatment compliance, treatment beliefs as a moderator between illness belief and treatment compliance.

Illness beliefs and Treatment compliance

Beliefs patients hold about their health and illness are significant to the way they present their conditions and respond to treatment. Beliefs also affect the way doctors cope and handle the condition patients present (Bates, Rankin-Hill & Sanchez-Ayender, 1997). Not only does it affect the way doctors cope and handle the condition but the beliefs patients have about their health and illness provides a foundation for a number of theoretical models of illness behaviour (Wade& Halligan, 2003), causes of the illness (Srinivasan &Thara, 2001) and medical compliance (Horne, 2006b). Having considerable knowledge of what patients think about their illness is significant for the management of their condition, the prediction of their subjective

experience, their capacity to cope and recover (Diefenbach & Leventhal, 1996), treatment compliance and behaviour (Horne, 2006a; Weinman & Petrie, 1997). Although the variable illness belief or illness perception have received large empirical support in the prediction of compliance to treatment in chronically ill populations, fewer studies exist in the area of sickle cell disease in adolescent patients. Empirical review of literature is delimited to studies done using populations with sickle cell disease. In this study however, due to the paucity of literature examining the relationship between illness belief and compliance in adolescents with sickle, other studies investigating other chronic illness such as diabetes, hypertension and asthma will be included. The reason being that they also need to comply with treatment for a long time.

Okraku, Ofori-Atta, Danquah, Ekem & Acquaye (2007) undertook a study to examine the effects knowledge of sickle cell disease and health beliefs have on coping among adult sickle cell patients. The study also examine the current trend of patient's health beliefs and treatment choice in Ghana. They adopted the pre-test post-test design made up of an experimental group and a control group. A total of 100 participants with sickle cell disease were selected for the study. Participant's knowledge of sickle cell disease, health beliefs and coping were assessed using various standardized instruments. The experimental group was educated on sickle cell disease while the control group received no education. The results of the analysis showed that there was a significant increase in knowledge and coping before and after the education for the experimental group. Another significant observation made was the use of traditional treatment such as herbs, shrines for guidance than medical treatment. A significant positive relationship was obtained between socio-economic status and coping with SCD. Despite the contribution of the study to researches on sickle cell disease, it did not examine illness belief and treatment compliance which this study seeks to examine.

Kretchy (2014) carried a research to investigate adherence behaviour among hypertensive patients from a Biopsychosocial perspective. A mixed method approach was adopted and

quantitative data was collected from 400 patients attending Korle-Bu and Komfo Anokye Teaching Hospital were information on their socio-economic characteristics, personality characteristics, negative emotions, belief systems, complementary and alternative medicine use, economic, pharmacological factors and medication adherence behaviour were obtained. 45 participants were used for the qualitative study. The qualitative study explored adherence in relation to perceptions about belief systems, complementary and alternative therapies and pharmacologically related issues. Results of the study indicated that majority of the patients (about 93%) poorly adhered to their antihypertensive medications. Spirituality was found to be associated with medication non-adherence but religiosity was not related. Stress was found to be significantly associated with medication adherence although patients reported some level of anxiety and depression which was not related to medication adherence. It was also observed that medication side effects and the number of times per day for taking medicines significantly correlated with non-adherence.

Barakat, Smith-Whitley, Ohene-Frempong (2002) conducted a study to identify disease-related risk factors and psychosocial resistance factors that affect adherence to prescribed treatment in the context of admission to a Hematology Acute Care Unit (HACU) designed to provide acute care for children with sickle cell disease (SCD) presenting with pain or fever. A total of 73 primary caregivers and 24 children, 8 years and older responded to standardized forms during the HACU admission. The outcome of their study indicated that treatment adherence variables comprising of rating from medical staff, SCD-related care activities, agreement between treatment recommendations made and care activities, and attendance at haematology clinic showed moderate-to-high adherence. A regression analysis showed the risk variable of disease-related stress and the resistance variables of family flexibility and less reliance on passive coping accounted for significant variance in treatment adherence. Despite the significant contribution of this findings to psychological research and clinical practice, it did not escape

some weaknesses. One of such is the small sample size used by the researchers as this hinders the generalization of the study. The study also failed to consider some psychological constructs such illness beliefs, personality and belief about medicine and how they influence compliance and that is what this study seeks to do.

To investigate whether illness perception and treatment adherence rates in patients on maintenance Haemodialysis were related in anyway and to explore further if illness perception and adherence behaviours influence treatment outcome, a study was carried out by Kim and Evangelista (2010). One hundred and fifty-one (151) patients completed the Revised Illness Perception Questionnaire and the ESRD- Adherence Questionnaire. Their findings revealed that among all the dimensions of illness perception, the only dimension that was correlated with non-adherence to diet restrictions was the treatment control. Out of the 14 symptoms that were given to define the identity dimension, the following symptoms were the most commonly reported by study participants: fatigue, loss of strength and dizziness. Timeline (acute and chronic), consequences, personal and treatment controls, and emotional dimensions had higher means than the others. High mean scores on the dimensions of timeline and consequences means that patients perceived their condition to be more permanent and serious. Again, majority of the patients believed they could control the course of their disease through treatment and most were angry or frustrated at their disease.

In a related cross sectional study of 336 adults with familial hypercholesterolemia (FH), Senior, Marteau and Weinman (2004) examined the associations among demographic and clinical factors, illness representation, and medication adherence. Questionnaires that solicited self-reported adherence to cholesterol lowering therapy, levels of anxiety and depression, and representations of heart disease were employed. They discovered that there were significant differences in the control dimension between the partially adherent group and the totally adherent group. Participants (n=104) in the group that adhered totally indicated “never” to all

five items on the Medication Adherence Report Scale (MARS). When they were compared to those in the partial adherent group (n=180), participants in this group responded other than "never" on at least one item. Those who belong to the total adherence group perceived greater control over their illness. Using the hierarchical logistic regression, control dimensions, causal attributes of genetics and cholesterol, and perceived risk of high cholesterol made a significant contribution to the prediction of medication adherence above those of demographic and clinical factors. In all, they concluded by indicating that individuals in the total adherence group perceived more control over their illness, and illness representation were important in predicting adherence beyond clinical and demographic factors.

Similarly, Griva, Myers and Newman (2000) undertook a cross sectional examination of illness representation and their relationship to treatment adherence (insulin, diet, exercise and blood glucose monitoring). They recruited 64 adolescents and young adults aged 15 to 25 years with insulin dependent diabetes mellitus. The outcome of the study indicated that the control dimensions of illness representation were consistently related to self-reported adherence to all aspects of treatment. On the contrary, poor adherers to diet, exercise, blood glucose monitoring and insulin believed that their illness was controllable. After controlling for age and diabetes, the control dimension accounted for overall adherence. It accounted for 39% of the variance. The study used a small sample size so generalization of the findings will be limited.

Platt, Green, Jayasinghe and Morrisey (2013) carried out a study to investigate associations between the Common sense Self-Regulation Model (CSM), the Transtheoretical Model (TM), trait affect and patients' self-reported adherence to treatment. A total of 142 Coronary Heart Disease (CHD) patients were sampled and responded to questions on the Illness Perception Questionnaire Revised, Self-Efficacy, and Stage of change, Positive and Negative Affect Scale, and General Adherence Questionnaire. The results of the analysis showed that adherence measures for medication, diet, and exercise was correlated with CSM, TM, and trait affects. A

hierarchical multiple regression showed that CSM, TM, and trait affect all together accounted for 23% of the variance in medication adherence. Lower emotional representations had significant independent relationships with higher medication adherence in Step 1 which accounted for 6% of variance, step 2 was 5% of variance and step 3 was 6 % of variance. The CSM variables accounted for statistically significant variance in exercise adherence at step 1. Significant independent association were found with illness consequences that accounted for 3% of variance in exercise adherence, timeline cyclical was 5% as well as emotional representation. Some limitations of the study is the cross-sectional design nature which makes it difficult to test direct relationship between CSM factors and adherence. Again because the sample were self-selected sample, patients were probably selected based on their interest in the topic. Overall, CSM variables were found to explain adherence.

In a related study to explore illness beliefs of coronary heart disease patients' and whether these beliefs could predict adherence to healthy behaviours, Mosleh and Almalik (2014) conducted a multi-centre cross-sectional study using a convenience sample of 254 patients who visited the cardiac clinic for routine review. Participants completed, a self-reported questionnaire, which included the Brief illness Perception Questionnaire, the Godin Leisure Time Activity questionnaire and the Morisky Medication Adherence Scale. Patients reported high levels of disease understanding (coherence) and they indicated that they were able to control their condition by themselves and/or with appropriate treatment. A significant relationship was obtained between timeline, consequences, personal control, coherence, concern and exercise adherence. A significant relationship was also found between personal control, treatment control, concern and medication adherence. They found out that male patients perceived lower consequences and had better understanding of their illness than female patients. Significant association was found between increasing age and timeline and coherence. When an adjusted regression analysis was done, it showed that exercise adherence was predicted by both a strong

perception in personal control, timeline and illness coherence. In their study, medication adherence was predicted by perception of personal control and treatment control. From their findings, they concluded that patient's illness beliefs are candidate for psycho-educational intervention that should be targeted at improved disease management practices and better adherence to recommended health behaviours.

In a related cross-sectional survey to examine the predictive effects of illness perception on adherence to therapeutic regimens of patients with hypertension, Shiah-Lian, Jen-Chen and Wen-Lieng (2008) sampled a total of 277 patients using the purposive sampling method. They found out that with the exclusion of identity and emotional representation, significant relationship was found between the rest of the illness perception components and adherence. Treatment control and personal control dimensions were positively correlated with adherence. Their analysis also indicated a negative correlation between timeline cyclical, consequences and adherence. Their findings therefore suggested that the self-Regulation Model may provide a useful framework for understanding and explaining adherence to therapeutic regimens of patients with hypertension across culture. Because a cross-sectional study of a convenience sample was employed, it will be difficult to generalise beyond the population that was used.

Byrne, Walsh, and Murphy (2005) conducted a research to examine the extent to which illness representation and beliefs about medications predicts the performance of secondary preventive behaviours related to diet, smoking, exercise, alcohol consumption and medication adherence. The study was conducted among persons with coronary heart disease who were selected using stratified, random selection of general medical practices. In all, 1084 persons with coronary heart disease participated in the study. The findings of their study indicated that a belief that one's timeline for the illness was chronic significantly and independently predicted better medication adherence. When all the illness representation dimensions were examined together, they discovered that they were weak predictors. They accounted for only 1% of the variance in

adherence scores. The reason given for this outcome was the asymptomatic nature of coronary heart disease and the low level of illness identity in the sample used.

In a study conducted by Molloy et al. (2009) to assess levels of adherence to angiotensin-converting-enzyme inhibitors (ACEI) and to examine whether patient beliefs about Heart failure was associated with adherence to ACEI, fifty-eight (58) patients with chronic stable heart failure were recruited to form part of the study. The Illness Perception Questionnaire-Revised was used to measure patient's beliefs about heart failure and adherence to ACEI was assessed by measuring serum levels of angiotensin-converting enzyme (sACE). Their findings indicated that adherence to ACEI was 72%. Logistic regression analysis indicated that Timeline-acute/chronic and Consequences significantly predicted medication adherence separately. When multivariate analysis was done for both variables, Timeline-acute and chronic and Consequences were found to be marginal predictors of medication adherence and accounted for 19% of variation in the level of adherence. Apart from the Identity dimension, all the other illness belief dimensions predicted adherence. The study used a small sample therefore generalisation cannot be made to a wider population.

In another study conducted by Zugelj et al. (2010) to examine the role that illness representations and personality play in the various adherence behaviours of adolescents diagnosed with essential hypertension, ninety-seven (97) hypertensive adolescents were recruited as samples for the study. Information about their adherence, illness representation and personality were solicited using Medical Outcomes Study Adherence Questionnaire, the Brief Illness Perception Questionnaire and the Inventory of Child/ Adolescents Individual Differences respectively. Their findings indicated that Treatment control, concern and emotional burden were significantly related to adherence. Identity was not a significant predictor of medication adherence in their study. In a hierarchical multiple regression, conscientiousness and treatment control were found to be the best predictor of general

adherence. Meaning that participants who were scoring higher on conscientiousness and those having higher expectations about the effectiveness of their treatment generally adhered better to medical instructions than participants who were less conscientious. Agreeableness was also found to be a predictor of general adherence. This means that the adolescents who scored higher on agreeableness were more adherent that participants who scored lower on agreeableness. Again their study is limited by the small sample used so generalisation to a larger population cannot be made.

Searle, Norman, Thompson and Vedhara (2007) undertook a study to examine the relationships between illness representations and the relative importance of coping cognitions and coping behaviours in the context of the management of type 2 diabetes. The relationship between these variables were explored using a prospective design. One-hundred and thirty-four (134) patients with diabetes were assessed using the Illness Perception Questionnaire-Revised as well as coping cognitions and coping behaviours which includes adherence to medication, physical activity and diet. The results of their analysis indicated that, illness representations directly predicted both coping cognitions and coping behaviours in patients with type 2 diabetes. The Illness identity dimension however was not a significant predictor of adherence in their study.

Byers and Myers (2000) explored the relationship among illness representation, beliefs about medicines and medication compliance. The study was conducted using 64 patients with asthma. Results from their study indicated that illness identity was related with self-reported adherence and it accounted for 7% of the variance. Due to the small sample size, it will be difficult to make a generalisation to others in this population.

In a related study, Jessop and Rutter (2003) examined the role of illness representation to medication adherence using a sample size of 330 individuals who had asthma. The outcome of their study indicated that illness label that is what the individual believes to be wrong or what

they call their illness significantly predicted adherence. Stated differently, individuals with asthma who identified their illness as asthma are more likely to comply with their medication.

On the contrary, a study to investigate the relationship between illness representation and three types of adherence was carried out by Chen, Tsai and Lee (2009). In their study, illness identity was operationalized as symptoms and symptom monitoring. They recruited 277 Taiwanese individuals with HTN and they were given a list of 32 symptoms and were asked to indicate if they were symptoms they experienced personally. The higher the score on identity the more symptoms participants had. Two items were used to measure symptom monitoring. They were asked whether they experienced symptoms after the diagnosis of hypertension and if they could predict high blood pressure through their symptoms. Their findings indicated that there was no relationship between identity and adherence and they indicated that it may have been associated with low mean identity.

Brewer, Chapman, Brownlee and Leventhal (2002) also explored the relationships among cholesterol control, medication adherence, and illness representation using a sample size of 169 patients with hypercholesterolemia. In their study, of all the dimensions of illness representation, the only dimension that predicted adherence was consequences. The implication being that individuals who believed that high cholesterol had serious consequences, such as heart attack and stroke, adhered to medications. When the scores on consequences were divided at the median to get low and high beliefs groups and adherence for each of the group was examined, individuals in the low consequence beliefs reported an adherence rate of 62% while those with high consequences beliefs were 76% adherent.

In another research conducted by Ross, Walker and MacLeod (2004) to examine the role of illness representation and treatment beliefs to adherence, a cross sectional study design was used and a sample of 514 people with Hypertension was recruited. The outcome of the study

shows that adherence was high among the sample used for the study and only 22% of the sample was categorized as either medium or low adherers. Unlike other studies were patients who perceived high consequences for their illness adhered to treatment, in this study when a multivariate analysis was done, it showed that participants who perceived the consequences of hypertension as not serious had higher levels of adherence. Another dimension of illness representation that was explored in this study was personal control and treatment control. The researchers found out that participants who had lower personal control beliefs reported higher levels of adherence. Participants with high treatment control beliefs also reported high levels of adherence. The only illness representation dimensions that significantly and solely predicted adherence were emotional response to illness, personal control beliefs and specific-necessity. One fascinating thing that was discovered was that generally the sample considered hypertension as a chronic condition that is controllable however they did not perceive it to have serious consequences.

Chen et al. (2009) studied the association between illness representation and three types of adherence using a sample of 277 Taiwanese individuals who have been diagnosed with hypertension. The result of the data analysed shows that treatment control was significantly associated to total, increased, decreased and unintentional adherence. Personal control was also significantly related to total increased and unintentional but not decreased adherence. Cyclical timeline was significantly related to total, increased, decreased and unintentional adherence. Stated differently, individuals who saw their illness as cyclical in nature were more likely to be non-adherent, with decreasing frequency and types of medication, adding dosages, taking medications intermittently and deviating from the prescribed timing. Participants who also perceived their illness with serious consequences were more likely to adhere. When a hierarchical regression analysis was done, the researchers found out that individuals who

believed that the treatment would control their illness were more likely to adhere than those who did not and treatment control was a significant predictor of adherence.

Dalbeth et al. (2011) conducted a study to examine illness perceptions in patients with gout and how these perceptions are related to adherence. Their belief about medication was also assessed. A total of 142 patients who had gout were recruited as samples for the study. Perceptions about gout was assessed using a gout specific Brief Illness Perception Questionnaire (BIPQ), medication beliefs was assessed using the Belief about Medicines Questionnaire (BMQ). Adherence was measured using a nine-item questionnaire based on the Medication Adherence Report Scales. The results of their findings indicate that the illness dimension consequences was significantly and negatively related to medication adherence. A negative but significant positive relationship was also found between identity and adherence. Emotional response and adherence were also significantly and negatively related. Illness coherence was also positively and significantly related to adherence. The other illness dimensions (timeline, personal control, treatment control and concern) were not significantly related to illness adherence. Patients who were receiving urate-lowering therapy reported high level of need for their medications. On the whole, there was a moderate concern about taking these medications. Adherence scores were high in the group overall and for patients taking urate-lowering therapy, serum urate inversely correlated with adherence scores.

Turrise (2015) undertook a study to investigate the relationships among illness representations, treatment beliefs, medication adherence, and 30-day hospital readmission for heart failure exacerbation in aging adults with chronic heart failure. Adopting a prospective correlational design, 96 older adults with primary and secondary diagnosis of heart failure were recruited using the convenience sampling strategy for the study. The Brief Illness Perception Questionnaire (B-IPQ), Beliefs about Medicines Questionnaire (BMQ) and the Medication Adherence Report Scale were employed to measure participants illness perception, treatment

beliefs and medication adherence respectively. The outcome of her study indicates that none of the dimensions was significantly related to medication adherence. Necessity-concerns differential was not related to medication adherence. In a post hoc analysis where medication adherence was analysed as a dichotomized variable, the illness representation dimension personal control was negatively related to high medication adherence meaning that the belief that one has little or no personal control over his or her illness is significantly related to medication adherence. No other illness representation dimension was related to adherence. The necessity-concerns differential in the post-hoc was also found to be significantly related to adherence as a dichotomous variable indicating that when medication necessity belief were stronger than medication concerns, subjects were highly adherent to their medications. When a logistic regression analysis was conducted to examine the necessity-concerns differential remained a significant predictor of high medication adherence as personal control dropped form the model. The odd ratios indicated that the probability of medication adherence was approximately 70% higher in participants whose necessity beliefs for medication outweighed their medication concern beliefs than in participants whose medication concern beliefs outweighed their medication necessity belief. The study had some limitations. Some of these are limitations in generalizability as a relatively small sample size was used. A cross-sectional design does not allow for assessment of changes in variables over time.

Dennis-Antwi, Culley, Hiles and Dyson (2011) conducted a study to describe the lay meanings of sickle cell disease in the Ashanti region of Ghana. The study was purely qualitative and an in-depth interview with 31 fathers of people with SCD was conducted. A focus group was also conducted among health care professionals who were connected with the new born sickle cell screening programme and a focus group discussion with mothers of children with SCD. Results of their study indicated that the participants had varied perception about sickle cell disease. These varied perceptions were captured in seven main themes. These are SCD seen by fathers

and mothers of children with SCD as a 'bought' disease which one's enemy purchases to afflict you or your family to bring some hardships upon you. Participants also saw SCD as strongly related with early death. Parents saw their children with SCD as passing through life for a brief moment since such children are often ill, and sickly and do not live long. Another theme was the cost of SCD treatment serving as a source of financial pressure. One lay perception parents had about having a child with SCD is the fact that it is cost involving and this leads to the draining of their resources. In their conclusion, they indicated that lay perspectives on SCD are constructed in the contexts of enduring culture (High value placed on children); changing culture (medicine and research as available alternative discourses to supernatural ones).

Yussuff, Obe and Joseph (2008) conducted a study to describe the pattern of anti-diabetic drug prescribing; to ascertain the level of glycemic control, adherence with prescribed anti-diabetic medications, and diabetes self-management practices among patients with type-2 diabetes in a tertiary care setting in Nigeria. The researchers adopted the cross-sectional review of randomly selected case notes of type 2 diabetic patients and a cross-sectional interviews, with a pre-tested adherence and self-management monitoring tool (ASMMT) of 200 consecutive patients that presented their drug prescriptions at the satellite pharmacy unit. The result of their study indicated that only 93% were considered to be adherent with prescribed anti-diabetic drugs. Interviews using the structured ASMMT indicated that 59% of patients were non-adherent with the previous anti-diabetic drugs due to lack of finance, side effects, perceived inefficacy of prescribed anti-diabetic drugs. This study was only assessing the rate of adherence among diabetic patients and not considering the relationship among variables.

Abdulazeez, Omole and Ojulari (2014) investigated the degree of diabetic patient's compliance with their prescribed medications, factors responsible for non-compliance and how compliance can be enhanced. A total of 220 diabetic patients on anti-diabetic medication visiting the out-patient clinic of the University of IIorin Teaching Hospital, Nigeria were sampled for the

research. The results of the analysis showed that a total of 162 patients were non-compliant with medications. No significant relationship was observed between the number of prescribed medications, side effects, patients' level of education, patients' belief of efficacy of medication and compliance. This study was only interested in looking at general factors that predict non-compliance and not specific factors.

Personality traits and Treatment Compliance

Various research points to the fact that some personality characteristics may be linked to health and illness through overt behaviours. This specific overt behaviour includes the recognition of threats to health and the attainment of health-protecting actions such as treatment compliance or adherence. These specific overt behaviours represent a possible behavioural pathway where personality may influence the initiation, course, and final outcome of one's illness (Contrada & Goyal, 2004). The Big Five model of personality basically has five dimensions; these are extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. Some researches done using these dimensions have tried to establish a link between these dimensions and other health related issues. The conscientiousness dimension which has the features of self-discipline, self-control, reliability and perseverance, appears to be consistently linked to various kinds of health-related behaviour (Friedman, 2001; Skinner, Hampson & Fife-Schaw, 2002), and it is significant for attaining health related goals (Friedman, 2001; McCrae & Costa, 1987). Another trait which is also related to adherence is neuroticism. It refers to an individual's tendency to experience negative emotions (fear, worry, anxiety). Individuals with this trait also display moodiness, irritability, distress, caution, and apprehension, lack of self-confidence, low self-esteem, and withdrawn behaviour. This trait is mostly associated with health and health-related behaviour, such as sensitivity to and frequency in reporting illness symptoms, increased medical encounters, poor self-reported health (Costa & McCrae, 1987; Friedman, 2001; McCrae & Costa, 1987; Skinner et al., 2002). According to Friedman (2002),

literature on the other dimensions in relation to adherence is not clear. Researches to examine personality traits and treatment compliance or adherence have been examined in other medical conditions, there are no studies exploring personality and illness beliefs among adolescent sickle cell patients.

Research has indicated that, people with lower levels of agreeableness (Axelsson, Brink, Lundgren & Lötvall, 2011) or conscientiousness (Christensen, et al. 2011) or higher levels of neuroticism (Bruce, Hancock, Arnett & Lynch, 2010; Axelsson et al., 2011) are more likely to show non-adherent behaviour. Individuals with lower levels of agreeableness are more predisposed to being sceptical, reluctant, and less cooperative. People with lower levels of conscientiousness are more disorganized and non-goal oriented in disposition. People with higher levels of neuroticism could be described as anxious, moody and less stress tolerant (Costa & McCrae, 1992). What this implies is that individuals with higher levels of agreeableness and conscientiousness are more likely to comply with treatment. On the other hand, individuals with lower levels of neuroticism are more likely to comply with treatment. Some studies that have looked at the link between personality traits and treatment compliance are reviewed below.

An exploratory study was conducted by Zugelj et al. (2010) to examine the role that illness representations and personality play in the various adherence behaviours of adolescents diagnosed with hypertension. The researchers used a total of 97 hypertensive adolescents who completed self-report questionnaires connected to demographic and medical data, adherence, illness representations and personality. The outcome of their study indicated that, conscientiousness, agreeableness, and perception of treatment effectiveness account for a significant amount of variance in general adherence. When these two personality dimensions were further investigated by performing regression analysis, the model accounted for 17% of variance in the General Adherence scale. They again found out that perception of treatment

effectiveness is a determinant of overall specific adherence and for adherence to most of the individual specific regimen recommendations, illness representations are more predictive compared to personality dimensions. Their overall conclusion was that, personality domains of conscientiousness, extraversion, agreeableness, and illness representation dimensions (treatment control, and emotional burden) were shown to predict adherence behaviours in adolescent hypertensive patients differentially. Their sample size for the study was relatively small so generalization cannot be made to a larger population.

In another related study, Axelson (2013) conducted a study to explore the relationship between personality and adherence behaviour in individuals whom antibiotics have been prescribed for common infections. A total of 445 respondents were sampled and were given the Five-factor Inventory to measure Neuroticism, Extraversion, and openness to experience, the Medication Adherence Report Scale was also given to assess their level of adherence. The results of their analysis indicated that a positive and significant relationship was found between agreeableness, conscientiousness and adherence. There was a positive and significant relationship between extraversion and adherence as well. A negative but significant relationship was found between neuroticism and adherence. A multiple regression showed that Agreeableness significantly predicted adherence more than the others traits accounting for 13% of variance in adherence. This was followed by Conscientiousness which explained 6% of variance in adherence. Neuroticism was a negative predictor of adherence although it was significant. It accounted for 4% of variance in adherence. The study was limited by the low response rate and that can affect the representativeness of the findings.

On the contrary Jerant, Chapman, Duberstein, Robbins and Franks (2011) carried out a research to investigate the relationship between the five-factor model personality factors and medication non-adherence among older adults who have been enrolled in a six-year trial. A total of 771 older adults were sampled and the NEO Five-Factor Inventory was used to measure their

personality traits while medication non-adherence was measured by pill count. They found out that Neuroticism was the only personality trait related to medication non-adherence. No significant association was found between agreeableness, extraversion, openness to experience and non-adherence. The study had some limitation despite using a relatively large sample, the study was community-based and relatively healthy individuals so it may be difficult to generalise the findings.

Wheeler, Wagaman and McCord (2012) conducted a study to investigate the association between primary personality traits and adherence to prescribed diabetes management regimens in adolescents with Type I diabetes. A total of 28 adolescents with insulin-dependent diabetes mellitus were recruited for the study. They completed questionnaires to measure their personality traits and adherence to treatment. Results from their study showed that a significant relationship was found between overall neuroticism and adherence. A significant positive relationship was also found between overall conscientiousness and adherence. A significant relationship was also found between overall extraversion and adherence. Agreeableness however was not significantly related to adherence. The study despite it interesting findings, used a small sample so it will be difficult to make a generalisation to a large population.

In one of the study carried out by Wiebe and Christensen (1997) to examine the main effects of health beliefs and personality on medical regimen adherence using a sample size of 70 in-centre haemodialysis patients, the researchers tested the hypothesis that health beliefs and personality trait predict adherence in an interactive manner. The Health beliefs Model components alongside conscientiousness from the NEO-Five Factor Inventory, and regimen adherence were assessed. In a hierarchical regression analysis, the interaction of health beliefs and conscientiousness failed to explain a significant portion of the variance in interdialysis weight gain, a measure of adherence to fluid restrictions, after demographic factors were controlled. The interaction on the other hand did significantly predict individual differences in

serum phosphorous levels, a measure of diet and medication adherence. This effect was attributable to the interaction of conscientiousness and perceived severity in the HBM. The combination of high conscientiousness and high severity was associated with poorer patient adherence.

Cohen, Ross, Bagby, Farvolden, and Kennedy (2004) carried out a research to explore the relationship between personality characteristics and compliance with antidepressant medication in patients with major depressive disorder (MDD). A total 65 outpatients who were receiving antidepressant treatment were monitored using the Medication Event Monitoring System. Personality characteristics was assessed using the NEO Five-Factor Inventory-Revised. The outcome of their study indicated that, extraversion was a significant predictor of compliance. Extraversion accounted for approximately 10% of the variance in compliance scores. A significant negative relationship was found between extraversion and compliance. No significant relationship was found between neuroticism, openness to experience, conscientiousness, agreeableness and compliance. Their study had some limitations, the sample size was too small so generalization cannot be made. Reliability and validity issues exist with the use of the Medication Event Monitoring System.

Hilliard, Brewer, Cornelius and Raalte (2015) conducted a study to investigate the Big Five personality characteristics as predictors of adherence to clinic-based rehabilitation activities after undergoing anterior cruciate ligament (ACL) reconstruction surgery. Participants for the study included 72 men and 36 women who answered a questionnaire assessing Big Five personality dimensions before they underwent the surgery. Adherence was measured in two ways. Rehabilitation session attendance was recorded and the Sport Injury Rehabilitation Adherence Scale (SIRAS) was also completed by the participants at the end of each rehabilitation session. Personality traits were assessed using the NEO-Five Factor Inventory.

The result of their analysis indicated that agreeableness was a significant positive predictor of attendance, Conscientiousness and openness to experience were significant positive predictors of adherence ratings. When a multiple regression was done, all the 5 personality traits accounted for 11% of the variance in attendance and 17% of the variance in adherence ratings. In the first hierarchical regression analysis, agreeableness was seen as a significant predictor of attendance .It accounted for 27% of variance in adherence indicating that participants who had high agreeableness score attended a higher percentage of their scheduled rehabilitation appointments than those who had low agreeableness score. In the second hierarchical regression analysis, openness to experience and conscientiousness were found to be significant predictors of SIRAS scores as well as positive associations obtained for both traits. Because the study was correlational in nature, no causal inferences can be made.

In a research conducted by O'Cleirigh, Ironson, Weiss and Costa (2007) to find out whether there was a relationship between the Big Five Conscientiousness factor and HIV disease progression (CD4 cell and viral load), a total of 119 seropositive participants were recruited to be part of the study. A one year longitudinal design was employed and participants completed the NEO Five-Factor Inventory Conscientiousness scale. Results from the study shows that conscientiousness predicted significant increase in CD4 number and significant decreases in viral load at 1 year. It was also realised that conscientiousness was related positively to medication adherence and active coping and negatively to depression and perceived stress.

Review of literature on the relationship between various personality traits and treatment compliance have produced interesting results. While some researches showed that some personality traits were significantly related to compliance, others indicated that they are not related to compliance. Zugelj et al., 2010 in their research found out that agreeableness, conscientiousness and extraversion were associated to adherence. Wheeler, Wagaman & McCord (2012) also found a significant relationship between neuroticism, conscientiousness,

extraversion and adherence. A significant relationship was found between neuroticism and adherence but no significant relationship was found between agreeableness, extraversion, openness to experience and adherence in a study conducted by Jerant et al., (2011). Axelson, 2013 found a significant relationship between agreeableness, conscientiousness, extraversion, neuroticism and adherence. Cohen et al. (2004) found out that only the extraversion trait was related to treatment compliance. Wheeler et al., 2012 however found no significant relationship between agreeableness and adherence in their study. O'Cleirigh et al. (2007) also found in their study that only the conscientiousness trait was positively related to medication adherence. On the contrary, Weibe and Christensen (1997) in their studies found out that personality traits did not predict compliance or adherence. This inconsistencies in the study may be as a result of the small sample size.

Adeniran, Akinyinka, Wright, Bakare, Goodman, Kuyinu, Odusanya and Osibogun (2015) carried out a study to assess how patients personality traits, beliefs about medication influences adherence to medication among patients attending the diabetics clinic in a teaching hospital in Southwest Nigeria. They adopted the descriptive cross sectional study design and selected 223 patients attending the diabetic clinic of Lagos State University Teaching Hospital, Lagos. The Big Five-factor Personality inventory, the Medication Belief Questionnaire and the Medication Adherence Report Scale were used to obtain self-report information from patients on their personality, belief about medication and adherence respectively. Results from their analysis indicated that non-adherent respondents had lower mean score of neuroticism personality traits compared to adherent respondents. A negative but significant relationship between neuroticism personality trait and adherence behaviour was found. A weak but significant relationship was also observed between specific concern medication belief and adherence to medication.

In summary, as at the time this research was being carried out, no scientific research exists that sought to establish the relationship between personality traits and treatment compliance among

adolescent sickle cell patients. A research that seeks to establish the relationship between these two variables will help to fill the gap and subsequently help medical providers to identify individuals that are more likely than not to experience treatment non-compliance who will therefore require efficient monitoring or education. Also knowledge in this area may help in the development of interventions that will make health behaviours such as treatment compliance more effective and help reduce high cost associated with non-compliance.

Beliefs about medicine and treatment compliance.

One of the basic things needed for the medical management of chronic conditions is prescribing medicine. Quiet unfortunately, about half of the medication patients are required to take is not taken as recommended. Inability to adhere to medications means a failure to achieve effective treatment outcomes for both the patients and society (National Institute for Health and Clinical Excellence, 2009; World Health Organization, 2003). Non adherence to this treatment regimen comes with negative consequences such as inability to regain health and increased morbidity and mortality for the individual patients and to a lager extent negative consequences for the health care system with regards to wasted resources, increased use of services and admission into the hospital (Horne, Weinman, Barber, Elliot & Morgan, 2006).

Consultation that happens between a doctor and a patient for prescription to be made do not just happen. Both the one doing the prescription and the patient who is to comply with the prescribed regimen come into that relationship with their pre-conceived beliefs about the illness and treatment (Weinman, Petrie, Moss-Morris & Horne, 1996; Horne & Weinman, 1999). Their beliefs about illness and treatment in the long term influences the patient's evaluation of the prescription, their adherence and beneficial (Benedetti, Carlino & Pollo, 2011) or adverse outcomes (Colloca & Benedetti, 2007). Although the perceptual and practical dimensions of adherence or compliance are influenced by social, cultural, economic and healthcare system contexts, it is important that patient's beliefs about prescribed medication be taken into

consideration to support adherence (National Institute for Health and Clinical Excellence, 2009; De Maeseneer et al., 2012). Research conducted with patients with chronic conditions suggests that major beliefs influencing patients' common sense evaluations of prescribed medicines can be classified into two categories: perceptions of personal need for treatment (Necessity beliefs) and Concerns about a range of potential adverse consequences (Horne &Weinman, 1999; Horne, 1997, and Horne, 2003).

In this section, past studies that examine the role of treatment belief as a moderator between illness belief and treatment compliance is presented. The literature review is delimited to studies done using populations with chronic illness requiring medications because not much has been done in the area of sickle cell disease.

Shiyanbola and Nelson (2011) undertook a research with the aim to describe illness perceptions and medications beliefs of minority women with diabetes and to examine if these beliefs have an impact on medication non-adherence. Minority women who were diagnosed with diabetes within the past six months and were taking prescribed medications were recruited to be part of the study. Participants were interviewed about their views on diabetes, beliefs about medicines and medication non-adherence. The characteristics of the patients were examined using descriptive statistics while Mann-Whitney U tests was used to compare patients beliefs to their medication non-adherence and the Spearman's rho correlation examined the relationships between illness perceptions, medication non-adherence and beliefs in medicines. The results of the study indicated that more than half (56.3%) reported being non-adherent. No correlations was also found between medication beliefs and non-adherence. Patient's beliefs that their actions can control the disease were associated with medication non-adherence. The sample size for the study was small so it is difficult to make valid conclusion about the relationships between beliefs and non-adherence.

Horne and Weinmann (1999) conducted a research to assess patients' beliefs about prescribed medicines and their role in adherence to treatment in chronic physical illness. The aim of their study was to quantify patient's beliefs about the necessity of their prescribed medication and their concerns and to assess relations between beliefs and reported adherence. The cross-sectional method was used for the study and 324 patients with asthma, renal, cardiac, and oncology were recruited to be part of the study. Their findings showed a considerable variation in reported adherence and beliefs about medicines within and between illness groups. More than half of the respondents (89%**)** believed that their prescribed medication was necessary for maintaining health. Over one-third had strong concerns about their medication which was a result of their beliefs about the dangers of dependence or long-term side effects. Beliefs about medicines were found to be related to adherence. Higher scores on necessity of treatment correlated with higher reported adherence. Higher concern for treatment also correlated with lower reported adherence. I7% of the total sample concerns for treatment exceeded their necessity for treatment and they reported significantly lower adherence. Stepwise multiple linear regression analysis indicated that higher reported adherence rates were associated with higher necessity-concerns difference scores. They also identified that medication beliefs were more powerful predictors of adherence than clinical and sociodemographic factors as it accounted for 19% of variance in adherence.

Horne and Weinman (2002) conducted a study to explore the extent to which variations in reported adherence to preventer medication for asthma could be explained by two sets of beliefs: perceptions of asthma and perceptions of asthma medication (belief about its necessity and concerns over its use). Adopting a cross-sectional design, One-hundred (100) community-based patients were sampled and they responded to questions about their perceptions of asthma, beliefs about preventer inhalers and reported adherence using the Illness perception questionnaire, Belief about Medicines Questionnaire and Medication Adherence Report Scale

(MARS) respectively. Findings from the study showed reported adherence to preventer medication was significantly related with necessity beliefs and concerns about potential negative effects. Illness consequences was the only illness perception dimension that significantly correlated with adherence. Illness identity, illness timeline, illness cure/control and illness causal beliefs were not significantly related to adherence. A hierarchical multiple linear regression was done to find out if medication beliefs added significantly to the amount of variance in reported adherence explained by demographic factors and clinical factors, illness belief and beliefs about medication (necessity and concerns). They found out that illness perception and treatment beliefs accounted for a significant amount of variance in reported adherence scores (13% and 17%) over demographic factors that accounted for 6% of variance in adherence. They again discovered that the influence of illness perceptions was largely mediated by necessity beliefs about medication as it explained 15% of variance in the level of adherence. The best fit Amos analysis also showed that illness perceptions influenced adherence both directly and indirectly via treatment beliefs. The cross-sectional design nature of the study makes it difficult to determine the direction of causality.

Bucks et al. (2009) conducted a research to explore the relationship between illness perceptions, emotional representations, treatment beliefs and reported adherence in adolescents with cystic fibrosis (CF). In their study, 38 adolescents who had been diagnosed with CF answered various questionnaires that seeks to gather information on their perceptions of CF, beliefs about prescribed treatments and reported adherence. The result form their study indicated that Time-line perceptions were associated with reported antibiotic adherence with longer time-line perceptions being associated with higher adherence. Treatment control perceptions were significantly associated with antibiotic use, but not with CPT or enzyme use. Necessity beliefs were also found to be associated with all measures of CPT and antibiotic use.

No significant relationship was found between emotional representation and any of the adherence.

Aflakseir (2012) conducted a study to investigate the role of illness and medication perceptions on medication adherence in a group of Iranian patients with type 2 diabetes. In all, a sample size of 102 patients who have type 2 diabetes were selected from an outpatient clinic in Shiraz using a convenience sampling method. The respondents completed the Illness Perception Questionnaire-Revised (IPQ-R), Belief about Medication Questionnaire (BMQ), and Medication Adherence Report Scale (MARS). The outcome of the study indicates that illness perception with timeline (chronic- the belief that diabetes would last a long time) inclusive significantly predicted a higher level of medication adherence. On the other hand medication belief (concern-holding concerns about the potential negative effects of medicines) significantly predicted a lower level of adherence to medicines. Again, it was realised that prediction was above and beyond the relevant and demographic variables such as age and the duration of illness. The study was limited by the following: because the study was cross-sectional in nature, it will be difficult to make an inference regarding the causal nature of patients' beliefs on non-adherence. Again, the number of participants in the study was small so generalization cannot be made.

In a study carried out by Nicklas, Dunbar and Wild (2010) to examine the extent to which illness perceptions and medication beliefs explain the variation in reported adherence to medication prescribed for the treatment of non-malignant chronic pain and to test the applicability of an extended version of the self-regulatory model to the chronic pain population, a cross-sectional design was employed for the study where 217 patients attending clinic for the treatment of their chronic pain participated in the study. They completed the illness perception question, the belief about medication questionnaire and the medication adherent report scale. Findings from their study revealed that participant's perception of illness as chronic,

uncontrollable and unremitting was related with greater adherence. Participants had fewer medication concerns and a belief that treatment was necessary. Structural equation modelling supports an extended SRM for chronic pain. It suggested that patients having perceptions of serious consequences of pain and high emotion level have more concerns about medication are less adherent. Having a perception of serious illness consequence are also associated with stronger beliefs about the necessity of medicines and greater adherence. The study was without some limitations. The cross-sectional design employed did not allow for the exploration of causality. Again the measuring of adherence through self-report is less accurate than using objective measures.

Menckeberg et al. (2008) in their study investigated whether beliefs about inhaled corticosteroids (necessity and concerns) as measured by the BMQ was related to adherence. They adopted the cross-sectional study and recruited patients who were between the ages of 18 to 45. Belief about inhaled corticosteroid (ICS) was measured using the BMQ and self-reported adherence was assessed using the Medication Adherence Report Scale. ICS prescription-refill adherence rates was also obtained from automated pharmacy dispensing records. Their findings indicated that both self-reported adherence and adherence by pharmacy records were correlated with ICS necessity beliefs and concerns.

Rajpura and Nayak (2014) conducted a study to investigate the influence of illness perceptions and medication beliefs on medication compliance of elderly hypertensive cohorts. They employed the cross-sectional survey research design and recruited a total of 117 participants as samples for the study. The results of their analysis indicated that 78 of the participants representing 66% were found to be noncompliant with their medications. Perceptions about illness which was measured using the Brief Illness Perception Questionnaire (BIPQ) and beliefs about medicine which was also measured using the Belief of Medication Questionnaire (BMQ) jointly played a significant role in the prediction of medication adherence. A significant

relationship was found between scores on the adherence scale and scores on the Brief illness Perception Questionnaire. Significant relationship was also obtained between BMQ differential score and adherence as well as between specific necessity, specific concern and adherence. A multiple linear regression was done to find out which of the variables predicted compliance the more. Specific concern was found to negative but significant predictor of medication compliance. It accounted for 19% of variance in medication compliance. The BIPQ composite score and Specific necessity total were not significant predictors. The sample size is relatively small in this study so it will be difficult to make generalisation to a larger population. Convenience sampling was used so it is likely, volunteer bias in the results that was obtained.

Rajpura and Nayak (2014) again conducted a study to examine the joint influence of illness perceptions, medication beliefs, and illness burden on medication adherence using a sample of 117 elderly people suffering from hypertension. They adopted the cross-sectional survey research design using the convenience sampling techniques. The Brief illness Perception Questionnaire, Pictorial Representation of illness and Self-Measure Revised II, Beliefs about Medicines Questionnaire and Morisky Medication Adherence Scale were used to measure illness perceptions, perceived illness burden, medication beliefs, and medication adherence, respectively. The result of their study indicated that, illness perceptions, perceived illness burden and belief about illness collectively played a significant role in the prediction of medication adherence. That is they collectively explained about 32% variance in the adherence score. A correlation analysis was performed to measure the influence of perceptions of illness on medication adherence. A positive and significant relationship was found between medication adherence and illness perception indicating that higher scores on the BIPQ-r scale (meaning more threatening view of illness) would accumulate into higher levels of medication adherence. When the participants' belief about their medication and adherence was explored, a significant and negative correlation was observed between specific concern and medication

adherence. Meaning that as individuals have strong concerns about their medications, their adherence to medication was lower. On the contrary, a positive and significant association was obtained between specific necessity scores and medication adherence giving the impression that the stronger the belief that the medications are necessary, the more adherent they become. A significant and positive relationship was found between BMQ differential scores and medication adherence, indicating that higher scores on the BMQ-d translate to higher medication adherence. So for the participants in this study, beliefs about the benefit of taking medications supersedes the costs or concerns of the medications. Illness perception and specific concern was found to be a significant predictor of adherence than the other variables.

In another study, Aikens and Piette (2005) in a cross sectional study examined demographic, psychiatric and treatment beliefs as a predictor of medication adherence. 81 individuals who were on maintenance antidepressant therapy were recruited for the study. The outcome of their study revealed that the Necessity-Concern Differential was the only variable that significantly related and independently associated with adherence. Their result also shows that in participants whose concerns outweighed need, adherence was lowest.

Ross, Walker and MacLeode (2004) carried out a research to explore hypertensive patients' beliefs about their illness and medication using the self-regulatory model and also to investigate whether these beliefs influence compliance with anti-hypertensive medication. A total of 514 patient were selected to complete the Beliefs about Medicines, Illness Perception Questionnaire and the Morisky self-report questionnaire. Results of the study shows that patients who believe in the necessity of medication are more likely comply with treatment. Age, emotional response and belief in personal ability to control illness were other significant determinants in the population used for the study. Beliefs about illness and about medicines are interconnected. They also realised that factors that are not directly related to compliance influence it but in an indirect way.

Neame and Hammond (2005) undertook a research to investigate the beliefs people with rheumatoid arthritis have about their medications and to what extent these beliefs influence adherence. They adopted a cross-sectional method were a total of 600 out-patients with rheumatoid arthritis were sampled and their beliefs about the necessity and concerns about medication were assessed using the Belief about Medicines Questionnaire. The result of the analysis shows that most respondents (74.3%) agreed or strongly agreed that their arthritis medications are necessary for their health. On the contrary, 47.4% were concerned about potential adverse consequences. The necessity score was higher than the concerns score. Concerns scores for non-adherent participants were higher than for the adherent group.

Sjölander, Eriksson and Glader (2013) undertook a study to examine relationships between patient's beliefs about stroke and drug treatment and how these influence their adherence to drug treatment. The cross sectional questionnaire survey was adopted for the study and 969 people with stroke were sampled to participate in the study but only 578 responded to the questionnaires. Responses about perception about stroke, beliefs about medicine and adherence form participants in the study were assessed using Brief Illness Perception Questionnaire, beliefs about medicine questionnaires and Medication Adherence Report scale (MARS) respectively. Based on the scores from the Medication Adherence Report Scale, 72 of the participants were classified as non-adherent. From this classification, they realised the non-adherent patients scored lower on positive beliefs as measured on BMQ-necessity and BMQ benefit. They however scored higher on negative beliefs as measured on the BMQ-concern. The Brief Illness Perception Questionnaire showed that non-adherent patients believed their current treatment to be less useful.

Maclnnes (2013) undertook a research to determine the relationship between illness representations, treatment beliefs and the performance of self-care in heart failure patients. A cross-sectional survey was carried out in 169 patients with heart failure in South East England.

Participants Illness representations were measured using the Revised Illness Perception Questionnaire (IPQ-R), treatment beliefs were also measured using the Belief about Medicines Questionnaire (BMQ) and self-care was also measured using the Looking After Yourself with Heart Failure Questionnaire (LAYHFQ). Results of their analysis showed that perceived medical knowledge, beliefs about the necessity of medication and illness coherence were moderately associated with self-care. Chronic timeline, cyclical timeline, Treatment control, Consequences were also found to be significantly related to self-care. Non-significant relationship was found between the other IPQ-R dimension and self-care. When multiple regression analysis was done, it revealed that 46% of the variance in self-care could be explained by illness representations and treatment beliefs. She discovered that three factors were significant predictors of self-care. These were medication knowledge, a belief in the illness having serious consequences and the impact of medication use on lifestyle.

Massey et al. (2013) carried out a study to investigate whether changes in goal cognitions, illness perceptions, and treatment belief were related to self-reported medication adherence six months after kidney transplantation. Interviews were conducted with patients in the out-patient clinic six weeks and six months after transplantation. Participant's self-reported adherence was accessed using the Basel Assessment of Adherence to Immunosuppressive Medication Scale. Their illness perception and treatment beliefs were also accessed using the Brief Illness Perception Questionnaire and Belief about Medicines Questionnaire respectively. Results of the analysis indicated that timeline chronic was positively and significantly related to overall adherence. At T2, greater perceived treatment control was related to higher overall adherence. At T2, the consequences scale was significantly rated higher by the nonadherent group than the adherent group. Patients reported high perceived necessity of IM and lower concerns as shown by the necessity-concern differential. It was however discovered that no significant

differences in beliefs about medicines between the adherent and nonadherent group at both time of measurement.

Sweileh et al. (2014) undertook a study with the purpose of assessing medication adherence and its potential association with beliefs and diabetes-related knowledge in patients with type II diabetes mellitus. A total of 405 patients were interviewed and their belief about medicines was accessed using the BMQ, adherence was measured using the Morisky Medication Adherence Scale (MMSA-8) and the Michigan diabetes knowledge test (MDKT) was used to assess diabetes-related knowledge. A total of 42.7% of the study sample were considered non-adherent. They found out that patients with high knowledge score and those with strong necessity of their anti-diabetic medications were less likely to be non-adherent and respectively. Diabetic patients with high adverse consequences of anti-diabetic medications and those with high belief that all medicines are harmful are more likely to be non-adherent

Summary of Literature Review

In this study the various theories or models that served as theoretical foundation were: the Self-Regulatory Model (Leventhal et al., 1984), the Five Factor Model (Costa & McCrae, 1992) and the Necessity Concerns Framework (Horne, 1997). These models or theories helped to throw more light on the various variables in the study. The Self-Regulatory Model, served as a platform to understand the various beliefs or perception adolescents with sickle cell disease have about their illness, the Five Factor Model helped to explain how the various personality dimensions predicts compliance to treatment. Finally the Necessity-Concerns Framework helps to understand how patient's beliefs about treatment affects treatment compliance.

The review of the relevant studies followed the various theories and this was done by investigating how the various dimensions in the illness perception model predicts treatment compliance. On the whole, most of the dimensions significantly predicted compliance to treatment with others not predicting compliance or adherence to treatment.

The role of personality traits determining treatment compliance was also examined. Some studies such as Zugelj et al., 2010; Cohen et al., 2004 and O'Cleirigh et al. (2007) were able to show that the agreeableness, conscientious and extraversion dimensions significantly predicted compliance to treatment. Others such as Weibe & Christensen, 1997 in their studies showed that there was no relationship between personality traits and treatment compliance.

Finally the moderating role of beliefs about treatment between illness beliefs and treatment compliance was also reviewed with quite a number of studies demonstrating that patients' belief about concern that is the potential side effect of treatment will not lead to compliance. On the other hand, a belief in the necessity of treatment significantly predicted compliance to treatment. On the whole, treatment belief was found as a moderator between illness belief and treatment compliance.

Rationale for the study

Illness belief, personality traits and belief about medicine as indicated earlier are factors which have been identified as significant to the field of compliance research. According to the common sense self-regulation model (SRM) of illness, how a person makes sense of his or her illness is a significant determinant of his or health coping behaviour such as compliance to treatment regimen. Personality traits one possess, has also been found to affect one's decision to comply with treatment or not. The necessity-concern framework has also helped to explain the role belief about medicine plays in the relationship between illness belief/perception/representation and treatment compliance or adherence. Adherence or compliance to treatment has been identified as a problem for effective management of individuals with chronic medical conditions. This has however been identified as a more challenging tasks for adolescent patients simply because adolescence is a period of development when long-standing health-care behaviours are established (Greening, Stoppelbein, & Reeves, 2006; Williams, Holmbeck, &Greenlay, 2002). A strong evidence also

exist to make a claim that many patients in various Pediatric chronic conditions have difficulty adhering to their regimen (Kahana, Drotar, & Fraizer, 2008; Quittner, Modi, Lemanek, levers-Landis, & Rapoff, 2008; WHO, 2003).

Past research on patients with a wide range of health conditions examined the role patient's illness belief or perception, treatment beliefs and personality traits play in explaining various coping and health outcomes such as compliance or adherence. For example Horne and Weinman, 2002 found out that perceived consequences of the illness and treatment belief was related to adherence. Perceived identity and consequences of the illness and the perceived specific necessity of medications were also found to be a predictor of adherence among haemophilia patients (Llewellyn, Miners, Lee, Harrington, &Weinman, 2003). For adolescents and young adults diabetes patients, perceived consequences and treatment effectiveness was found to be associated with adherence (Skinner et al., 2002). Again for adolescents with cystic fibrosis, treatment beliefs were found to be related to adherence (Bucks et al., 2009). Psychological explanations of compliance in adolescents with sickle cell disease has not been explored much, as such more research is needed. Attempts to explore factors that predict compliance have focused on demographic factors and most of these factors have been found to be unrelated to compliance. Numerous studies have also explored the relationship between illness perception and treatment compliance as well as the relationship between personality traits and treatment compliance in other medical conditions. As at the time of conducting this research, **no** study was found examining the relationship between illness representation, personality traits and treatment compliance in individuals with sickle cell disease. It is therefore not known what role illness beliefs and personality traits play in influencing compliance to treatment in individuals with sickle cell disease. It is against this background that this research is been conducted to examine the role illness belief, personality traits and belief about medicine play in influencing compliance to treatment.

Statement of Hypotheses

Due to paucity of studies and lack of a well-developed theoretical framework for adolescents treatment compliance in sickle cell, hypothesis are formulated and be tested based on previous study done using individuals with various chronic diseases.

Hypothesis 1a: Illness belief dimensions (consequences, emotional representation, timeline acute and chronic, timeline cyclical, treatment control, illness coherence and identity) will have a significant positive correlation with treatment compliance.

Hypothesis 1b: The will be a significant negative relationship between personal control of illness and treatment compliance.

Hypothesis 2a: Personality trait dimensions (agreeableness, conscientiousness) will have a significant positive relationship with treatment compliance.

Hypothesis 2b: The will be a significant negative correlation between neuroticism and treatment compliance.

Hypothesis 3: The illness belief dimension timeline cyclical will significantly predict treatment compliance than the other illness belief dimension.

Hypothesis 4: The personality trait agreeableness will significantly predict treatment compliance than the other personality trait dimensions.

Hypothesis 5a: There will be a significant positive relationship between necessity for treatment and treatment compliance.

Hypothesis 5b: There will be a significant inverse relationship between concern for treatment and treatment compliance.

Hypothesis 6: Beliefs about medicine (necessity of treatment and concern for treatment) of sickle cell adolescent's patient will significantly moderate the relationship between: Illness belief and treatment compliance.

Conceptual Framework of the Study

Figure 2.1:

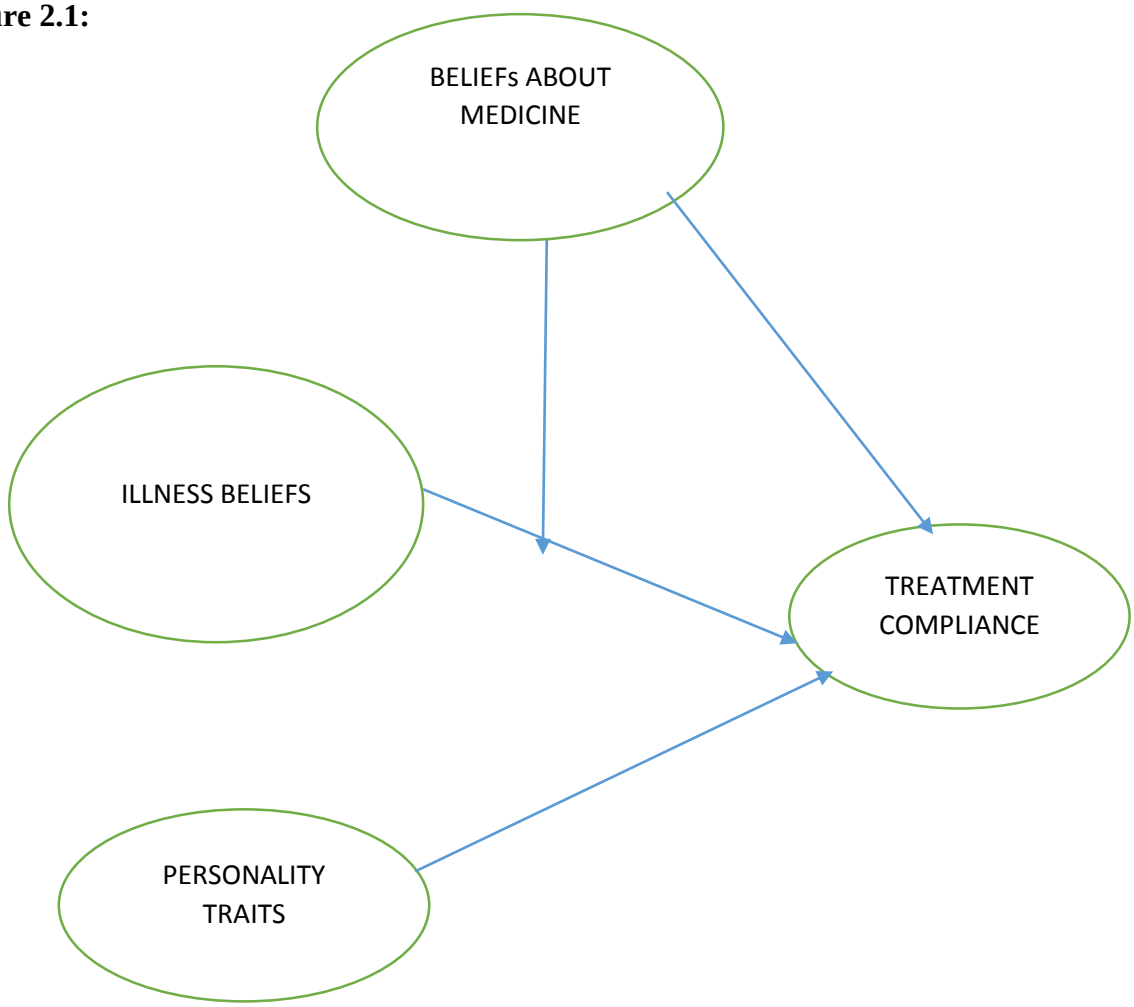


Figure 2.1. Represents the proposed conceptual framework guiding this study. The figure indicates expected significant relationship between the variables used in this study. Illness Belief (illness identity, consequences, treatment control, personal control, timeline acute/chronic, timeline cyclical, illness coherence and emotional representation) is expected to significantly predict medication adherence. Personality traits comprising of agreeableness, conscientiousness and neuroticism are also expected to significantly predict medication adherence. Belief about medication consisting of necessity of treatment and concern for

treatment is expected to significantly predict medication adherence and at the same time, significantly moderated the relationship between illness beliefs and medication adherence.

Operational Definition:

Illness belief: This refers to the interpretation or meaning given to one's illness in this case sickle cell disease.

Illness Belief Components: Patient's belief of illness identity, illness coherence, illness consequence, treatment control, personal control, timeline, emotional representations.

Personality traits: Personality trait refers to long lasting personal characteristics that are shown in a particular pattern of behaviour in a variety of situations.

Personality traits Components: Conscientiousness, Agreeableness, Neuroticism.

Compliance: Compliance is defined as "the extent to which a person's behaviour (taking medicine or executing lifestyle changes) coincides with medical or health advice'' (Kaveh & Kimmel, 2001). Bloom (2001) describes compliance as an act of adhering to the regimen of care recommended by the clinician and persisting with it over time. In this study, by referring to treatment compliance, I am referring to medications given to patients.

.**Adolescence:** It is defined as the period of life between childhood and adulthood (Kaplan, 2004). In terms of age, it ranges from 13 years to 18 years.

Beliefs About Medicine: One's concern about the adverse effect of medicine as well as necessity of treatment.

Research Variables:

Independent Variables: Illness Belief and personality traits

Dependent Variables: Treatment Compliance

Moderating Variables: Belief about Medicine

Demographic Variables: Age, Gender, Educational level, Religion, Duration of illness, Sickle cell Genotype.

CHAPTER THREE

METHODOLOGY

Introduction

This chapter reports all that transpired in the conduct of the main study highlighting the research design, research setting, population, sample and sampling technique employed, inclusion and exclusion criteria, research instruments, pilot study of instruments, and the procedure employed in the data collection. Ethical consideration and approval, data entry and cleaning and finally data analysis strategy are also reported.

Research Design

The study is purely quantitative in nature. Quantitative methods despite their limitations when adopted for researches or studies help to make generalisation from a sample to the population. According to Scandura & Williams, 2000, Objectivity, counting of numbers, reliability, validity, empiricism, statistical testing of hypothesis, replication of study, and generalisation of findings are some of the outstanding features of quantitative techniques. The cross-sectional survey design was deemed suitable for this study. This was deemed suitable because the research objectives and hypothesis examined in the study explored the relationship between independent variables (illness beliefs and personality traits) and dependent variable (treatment compliance). This design again allowed the researcher to gather information from adolescents with sickle cell disease about their illness belief, personality traits, belief about medicine and treatment compliance through the use of appropriate questionnaires or inventories. Data was also collected from the respondents only once.

Research Setting

Two health facilities within the Greater Accra Region of Ghana constituted the sites of the study. These two facilities are Korle-Bu Teaching Hospital in the Accra Metropolis and Tema General Hospital in the Tema Metropolis. For both sites, the questionnaires were administered at the sickle cell unit as well as the Child Health unit in Korle-Bu Teaching Hospital. These settings were chosen because they had special sickle cell units that are accessed by sickle cell patients from all over the region and beyond and it was an opportunity to get enough of the research participants within the time available.

Population

The population of interest in this study was all adolescents within the age range of 13 to 19 years who were receiving treatment at Korle-Bu Teaching Hospital and Tema General Hospital. This population was chosen from the Greater Accra and from the two hospitals because it captures individuals with a wide variety of characteristics relevant for this study and these are two large urban hospitals with large patient populations.

Sample Size

The sample size of One hundred and twenty (120) was considered suitable because according to Field (2009), to analyse dat**a** using multiple regression in order to obtain a medium effect size of .8, a sample size of 200 is enough when there are 20 predictors and where there are only 6 or less predictors, a sample size of 100 is adequate.

Sampling Procedure

The sample size of this study was One hundred and twenty (120) adolescents with sickle cell disease. These 120 sickle cell patients were sampled from Korle-Bu Teaching Hospital and Tema General Hospital using the convenient sampling technique and purposive sampling technique. Convenient sampling was used to select adolescents who were available and were willing to participate in the study and the purposive sampling was used to select adolescents

who qualified that is met the criteria for inclusion to participate in the study to enable the researcher answer the research objectives and test the hypothesis. The characteristics of the respondents in the study are summarized in the table 1 below:

Table 1:

Demographic Characteristics of the Sickle Cell Patients in the Study

Characteristics	N (%)
Gender	
Male	60 (50.00%)
Female	60 (50.00%)
Age	
13-16 years	46 (38.30%)
17-19 years	74 (61.60%)
Education Background	
Primary	42 (35.00%)
Secondary	51 (42.5%)
Tertiary	27 (22.5%)
Religion	
Christianity	101 (84.20%)
Islam	16 (13.30%)
Others	3 (2.50%)
Type of Sickle Cell	
SS	49 (40.80%)
SC	68 (56.70%)
OTHERS	3 (2.50%)
Duration of Illness (Mean)	2.75

Inclusion Criteria

1. Any adolescent diagnosed of sickle cell disease by a qualified medical officer and receiving treatment at any of the setting selected for the study and is between the ages of 13 years to 19 years.
2. Also the adolescent must be willingly to participate.
3. The adolescent with sickle cell disease must have been on treatment for sickle cell disease for at least one month since the study seeks to measure compliance to treatment.

4. Participants were also required to show a sound comprehension of the English language since the questionnaires expected participants to have a certain degree of literacy.

Exclusion Criteria

1. Individuals below age 13 and above 19 years.
2. Adolescents with sickle cell disease who cannot respond because they are too sick to be interviewed.
3. **Participants who have a history of cognitive contra-indications like traumatic brain injury, seizure disorders, diabetes and other unstable medical illness.**
4. Participants who are yet to begin treatment for sickle cell disease.
5. Participants who do not understand and are not able to communicate in the English Language.

Research Instruments/ Measures

The variables in the study were measured by using questionnaires or inventories presented below:

Demographic Data

This aspect of the questionnaire uses the researcher's self-designed questions to collect demographic information such as Age, Gender, Educational level, Religion, Type of Sickle Cell, and Duration of Illness.

The Revised Illness Perception Questionnaire-IPQ-R (Moss-Morris et al., 2002)

The Revised Illness Perception Questionnaire (Moss-Morris et al., 2002)) was used to assess participant's perception or belief about their illness along dimensions of identity(14 items), timeline acute or chronic (6 items (e.g. My sickle cell illness will last a short time), illness coherence (5 items (e.g. I don't understand my sickle cell illness), timeline cyclical (4 items (e.g. My sickle cell symptoms come and go in cycles), treatment control (5 items (e.g. My

treatment will be effective in curing my sickle cell illness), personal control (6 items (e.g. There is a lot which I can do to control my sickle cell illness), emotional representation (6 items (e.g. When I think about my sickle cell illness I get upset), and consequences (6 items (e.g. My sickle cell illness is a serious condition). The scale was modified so that illness as stated on the original scale was replaced with "sickle cell illness". These items are scored on a Likert scale ranging from strongly disagree =1, disagree= 2, neither agree nor disagree=3, agree= 4 to strongly agree=5. Research shows that the Revised Illness Perception Questionnaire (IPQ-R) is a valid measure of illness perception than the original measure (Knibb & Horton, 2008). The components of the scale showed a good test-retest reliability, with correlations ranging from .46 to .88 and internal reliability or Cronbach's alphas for the original English version of IPQ-R ranging from .79 to .89 for the subscales (Moss-Morris, et al., 2002). The authors suggested that a high score on the identity, timeline, consequences, and cyclical dimensions show patients belief about the number of symptoms attributed to their illness, the chronicity of the condition, the negative consequences of the illness and the cyclical nature of the condition respectively. High scores on the personal control, treatment control and coherence dimensions gives an impression that participants have positive beliefs about the controllability of the illness and a personal understanding of the condition. Items 1,4,8,15,17,18,19,23,24,25,26,27,36 are to be reversed and scored accordingly.

The Big Five Inventory (BFI) John and Srivastava, 1999

The Big Five Inventory is made up of 44 items measuring five trait dimensions of personality-extraversion (8 items), agreeableness (9 items), conscientiousness (9 items), neuroticism (8 items) and openness to experience (9 items). Items are measured on a five point Likert scale ranging from 1=disagree strongly, 2=disagree a little, 3=neither agree nor disagree, 4=Agree a little to 5= agree strongly. The reported reliability for this scale ranges from 0.79 to 0.88. Some examples of items on the questionnaire are: I see myself as someone who: tends to find fault

with others, does a thorough job, is reserved, can be cold. Item 2, 6, 8, 9, 12, 18, 21, 23, 24, 27, 31, 34, 35, 37, 41, and 43 are revered before scoring is done.

Beliefs about Medicines Questionnaire (BMQ) Horne, Weinman and Hankins, (1999)

The questionnaire has 18 items in all and has two main focus, specific and general beliefs. The specific beliefs are individual's belief about particular medications that has been prescribed. General beliefs on the other hand are those beliefs about medications in general. The two beliefs together makes four BMQ subscales related to necessity and concern beliefs. These are: Specific-Necessity, which measures beliefs about the necessity of medications prescribed for the patient (e.g., "my health, at present, depends on my medicine") b. Specific-Concerns that is characterized by the concerns about medications prescribed (e.g., "I sometimes worry about the long-term effect of my medicine") c. General-Harm also indicates a patient's view about the nature of medications and d. General-Overuse measures what the patient believes about how medications are used by doctors. For the purpose of this research, only the data from the specific-necessity and specific-concerns will be utilized. Items on the BMQ are rated on a five-point Likert scale ranging from 1=strongly disagree to 5=strongly agree. Internal consistency reliability for Specific-Necessity and Specific-Concerns subscales has been reported in various research using individuals with various chronic conditions. For example an internal reliability consistency of 0.68 to 0.81 was reported for diabetes patients by Aikens & Piette, 2009) and 0.67 to 0.81 for heart failure patients by George & Shalansky, 2006. Score ranges from 5 to 25. A higher score on the specific-necessity indicates stronger beliefs about the necessity of treatment and a higher score on the specific-concern shows stronger concerns.

Medication Adherence Report Scale 5 (MARS-5) Horne and Hankins, 2004

The inventory Medication Adherence Report Scale (MARS) is a 5-item self-report scale for assessment of adherent and non-adherent behaviour. The items are rated on a 5-point Likert scale, ranging from 1= 'very often to' 5 = 'never'. Examples of items include "I take less than

instructed" and I sometimes forget to take my medicines." Lower scores indicate lower levels of adherent behaviour and vice versa. It was used to measure participant's self-report measure of adherence to their sickle cell illness medication Scores range from 5 to 25. Cronbach's alpha for MARS was 0.77 and internal consistency reliability has been reported in a sample of individuals taking inhaled corticosteroids (0.81; Menckeburg et al., 2008).

Pilot Study

Burns and Grove (2001) indicated that it is very expedient to conduct a pilot study to ensure that research questionnaires are reliable and produce valid responses before the actual collection of data. Before the commencement of the main data collection for this study, a pilot study was carried out to ascertain the appropriateness of the research questionnaires and to do a preliminary test of some of the hypothesis stated. The questionnaires were tested to ensure that participants understood every item on them and also to identify any weaknesses that should be addressed before the main data collection. A total of 10 respondents were conveniently sampled while they were receiving an outpatient care at the Korle-Bu Teaching Hospital. The questionnaires were administered to them after purpose of the study was explained to them and their consent sought. Consent was however sought from parents whose children were below the age of 18 but were qualified to participate in the study. After the administration of the questionnaire, participants were interviewed to find out if they experienced any difficulty with regards to comprehension of any of the items on the questionnaire. Their opinion was also solicited on how some of the items can be modified to suit their level of understanding.

On the whole, the outcome of the pilot study indicated that most of the participants understood the items though few items were difficult for some of the participants. The participants found the questionnaire suitable, not stressful and easy to comprehend. After the responses were reviewed, some modifications on items the adolescent saw as confusing or difficult to comprehend were made. The items were replaced with those ones that was easy to understand.

Finally, the study was carried out in English instead of translating the questionnaire into any local dialect because most of the participants understood the items on the questionnaire. The Cronbach alpha (Internal Consistency) was run for each subscale.

Table 2:

Internal Consistencies of the Scales from a Pilot study of 10 Sickle Cell Patients

SCALE	Cronbach Alpha
BFI Sub-Scales	
Conscientiousness	0.96
Agreeableness	0.95
Neuroticism	0.95
IPQ-R Sub-Scales	
Identity	0.59
Consequences	0.97
Emotional Representation	0.78
Timeline Cyclical	0.82
Personal Control	0.95
Treatment Control	0.95
Illness Coherence	0.97
Timeline	0.98
MARS 5	0.66
BMQ Sub-Scales	
Necessity	0.91
Concerns	0.86

Data collection Procedure

An ethical clearance was obtained from the University of Ghana Ethics Committee for the Humanities (ECH). A letter of introduction from the department of Psychology with the Ethical clearance certificates were sent to the Greater Accra Regional Health Directorate for permission to use the Tema General Hospitals whiles for that of Korle-Bu teaching Hospital, a copy of the introduction letter as well as the ethical clearance certificate was sent to the Head of the Sickle Cell Unit. The approval letter from the regional health directorate was sent to the Tema General Hospital. The permission to gather data was granted at the Tema General Hospital and Korle-Bu Teaching Hospital and a date was fixed for data collection.

One research assistant who read psychology at the undergraduate level was recruited to assist the principal researcher for the data collection. She was trained on the administration of the questionnaires. The training for the research assistant was done in two days and she was

basically trained on what the purpose of the research was. She was also trained on the contents of the questionnaires so as to have understanding of the items as well as how to administer these questionnaires. She was also trained on how to seek for consent from the adolescents and parents where necessary. Whiles patients were waiting to see the doctors or nurses for their vital signs to be taken, the researcher and his assistant approached the adolescents and asked some questions to ensure they met the inclusion criteria. Where the adolescents met the inclusion criteria their consent were sought as well as consent sought from parents for those who were below 18 years. The voluntary nature of the study as well as possible benefits and harms were explained and they were assured of confidentiality of any information collected. The participants who agreed to participate were made to write their names and sign or make a mark on the consent form to show their willingness to participate voluntarily. After consent was obtained, the questionnaires were administered to them by either the researcher or his assistant. Each adolescent participation in the study consisted of one-on-one completion of the questionnaires that assessed the variables of interest in the study. The various items were read out to the participants and their responses were ticked and written where applicable by the researcher. Although this approach may be a little intrusive and may deny participants of their privacy, it was still adopted to boost response rate and proper completion of questionnaires. Clarifications or instructions that were deemed necessary during the data collection were provided when requested by respondents. Where there was the need for some clarifications to be done in the local dialect, it was done although the study was done in English. In all, it took 30 to 45 minutes to complete the all the questionnaires. Participants were given the opportunity to ask questions or seek clarifications after the administration of the questionnaires. Finally, participants were thanked and the contact or address of the principal investigator was given to them should they want to contact him for any issue concerning the research.

Ethical Considerations and Approval

The study was granted ethical approval by the Ethics Committee for Humanities of the University of Ghana. Strict guidelines of the Committee on the use of Human subjects in research was adhered to. Copy of the approval letter for the conduct of the study from the ethic committee is presented in appendix C.

Because the study was gathering private information from the participants, strict ethical standards and respect for privacy was maintained. Before the commencement of the administration of the questionnaire, informed consent was sought from participants by telling them the purpose and details of the study. Participants were also told that there was no monetary reward for participating in the study. The information collected in this research was confidential and the anonymity of the participant's identity was ensured. The participants were assured that their responses would not be seen by another person apart from the one administering the questionnaire. They were also assured that their names would not be mentioned anywhere in the study. Contact details on the consent form was protected. Participants were also told about the voluntary nature of the study and their right to withdraw anytime from the study without any punishment.

For participants who met the inclusion criteria and were willing to participate voluntary, the informed consent form was given to them and they were given 15 minutes to read the information on them. Participants who were still interested were then given the consent form in appendix B to sign or make a sign to indicate their voluntary agreement to participate.

Data Entry and Cleaning

Data collected from participants was initially entered into SPSS. The entries were checked to ensure the right entries were made. Where there was an error, it was cross checked from the questionnaire and subsequently corrected. Descriptive analysis was also done to check for the distribution and skewness of data.

Data Analysis Strategy

Analysis of data was done using SPSS version 20.0 for windows and the results are presented in chapter 4 of this thesis. All inferential statistical analyses were two-tailed and the level of significance was set at 95% ($\rho<0.05$). Descriptive statistics made up of frequencies, percentages, means and standard deviations were carried to examine on the whole the descriptive features of the sample with regards to variables such as gender, religion, sickle cell genotype, educational level, age and duration of illness. Pearson bivariate correlations was used to ascertain the relationship between the illness belief dimensions, personality traits and treatment compliance. The multiple linear regression was employed to ascertain which of the illness belief dimensions and personality traits dimension was accounting for variance in treatment compliance the most. Hierarchal multiple regression was also done to test for the moderating role of belief about medicine between illness belief and treatment compliance.

CHAPTER FOUR

RESULTS

Introduction

This chapter reports a summary of the key findings using appropriate tables from the analyses of the data gathered from respondents. The version 20.00 of SPSS was employed for analyzing the data as well as a number of statistical tests including descriptive statistics to summarize the data. The key statistical tests that were employed to analyze the hypotheses stated were Pearson moment correlation coefficient, multiple regression analysis and hierarchical regression analysis. The discussion of the hypothesis in relation to whether they were supported or rejected are subsequently followed with detailed presentations of tables with their interpretations. Key findings are summarized and also presented with the observed model.

Descriptive Statistics

Table 3 presents a summary of the means and standard deviations of scores on illness belief dimensions (identity, timeline-acute and chronic, consequences, personal control, treatment control, illness coherence, timeline cyclical, emotional representations), personality traits dimension (agreeableness, conscientiousness, neuroticism) and treatment belief dimensions (necessity for treatment and concern for treatment). The internal consistency of scale as well as the degree of skewness and kurtosis are also presented in Table 3 below.

Table 3:

Means, Standard Deviation and Cronbach Alpha of Variables

Variables	*M*	*SD*	α	Skewness	Kurtosis
Illness Belief					
Identity	5.95	2.47	.59	-.21	0.70
Timeline-acute and chronic	19.42	7.29	.98	-.58	.20
Consequences	22.93	6.82	.97	.14	-.14
Personal Control	24.58	4.79	.95	.05	-.94
Treatment Control	20.54	3.81	.95	.37	-.59
Illness Coherence	18.8	5.03	.97	-.37	.73
Timeline Cyclical	16.57	1.71	.82	.10	.09
Emotional Representation	25.11	2.61	.78	-.22	-1.23
Personality traits					
Agreeableness	36.45	8.51	.96	-.22	-.55
Conscientiousness	34.53	9.06	.96	-.69	-.66
Neuroticism	20.48	8.71	.95	.14	-1.4
Belief about Medicine					
Necessity of Treatment	16.31	5.81	.91	-.92	0.50
Concern for Treatment	15.25	5.14	.86	.04	.09
MARS-5	18.50	3.13	.66	-.37	-.70

Data Analyses

Hypotheses 1a, 1b, 2a, 2b, 5a and 5b were tested using the Pearson correlation because the variables (Illness belief, personality traits and treatment compliance) were measured at least on an interval scale and assumed to be related linearly and the aim is to find out if there is any relationship between the two variables. Hypothesis 3 and 4 was analyzed using the multiple regression analysis because illness belief dimensions and Personality dimensions (Treatment Control, Timeline Acute and Chronic, Personal Control, Illness Coherence, Identity, Emotional

Representation, Timeline Cyclical, Consequences, Agreeableness, Extraversion and Conscientiousness) were regressed on treatment compliance and the researcher was also interested in finding out which of the dimensions significantly predicted and accounted for variance in treatment compliance the most. Hypothesis 6 was tested using hierarchical regression, this was to help test for the moderating role of belief about medicine on the relationship between illness belief and treatment compliance.

HYPOTHESIS TESTING

The Pearson correlation was done to test the hypothesis 1a, 1b, 2a, 2b, 5a and 5b as stated in the chapter two of this work. The results are summarized in Table 4 and 5 below:

Table 4

Correlation Matrix of Illness belief, belief about medicine and Treatment Compliance of Adolescents with sickle cell disease.

VAR	1	2	3	4	5	6	7	8	9	10	11
1.COMP	-										
2.TLC	.87**	-									
3.TL	.82**	.72**	-								
4.TC	.77**	.68**	.71**	-							
5.IDE	.06^{ns}	.08^{ns}	.03^{ns}	.01^{ns}	-						
6.ER	.90**	.82**	.84**	.74**	.03^{ns}	-					
7.CON	.45**	.33**	.42**	*42**	-.08^{ns}	.48**	-				
8.IC	.76**	.64**	.68**	.64**	-.07^{ns}	.79**	.46**				
9.PC	-.62**	-.64**	-.62**	-.59**	.01^{ns}	-.65**	-.28**	-.49**			
10.NEC	.66**	.87**	.53**	.50**	.04^{ns}	.64**	.45**	.50**	-.39**	-	
11.CONC	-.21**	-.17*	-.19*	-.14	.10^{ns}	-.19*	.04	-.27**	.18*	-.27**	-

***Significant at .01 alpha level, *Significant at .05 alpha level, ns=not significant. TL=Timeline (acute/chronic), TLC= Timeline Cyclical, TC= Treatment Control, IDEN=Identity, ER=Emotional Representation, CON= Consequences, IC=Illness Coherence, PC= Personal Control, NEC=Necessity of Treatment, CONC=Concern for treatment.*

Table 5

Correlation Matrix of Personality Traits, belief about medicine and Treatment Compliance of Adolescents with sickle cell disease.

VAR	1	2	3	4	5	6
1.COMP	-					
2.AGR	.88**	-				
3.CONS	.85**	.74**	-			
4.NEU	-.71**	-.61**	-.69**	-		
5.NEC	.66**	.56**	.64**	-.57**	-	
6.CONC	-.21**	-.20*	.30**	.33**	-.27**	-

***Significant at .01 alpha level, *Significant at .05 alpha level .CONS=Conscientiousness, AGR=Agreeableness, NEU=Neuroticism NEC=Necessity of Treatment, CONC=Concern for treatment, COMP=Compliance.*

Hypothesis 1a: *Illness belief dimensions (consequences, emotional representation, timeline acute and chronic, timeline cyclical, treatment control, illness coherence and identity) will significantly and positively be related to treatment compliance.* Pearson Product-Moment correlation coefficient was computed to find out if there was any significant positive relationship between seven independent variables (consequences, emotional representation, timeline acute and chronic, timeline cyclical, treatment control, illness coherence and identity) and a dependent variable (treatment compliance) which were all continuous variables and measured on at least interval scale. From the correlation matrix in table 4 presented above, it was observed that illness consequences was positively and significantly related with treatment compliance ($r_{(120)} = .45, \rho < .01$). A significant positive relationship was also obtained between emotional representation and treatment compliance ($r_{(120)} = .90, \rho < .01$). A significant positive relationship was again observed between timeline acute and chronic and treatment compliance (($r_{(120)} = .82, \rho < .01$). It was again observed that a significant positive association existed

between timeline cyclical and treatment compliance ($r_{(120)} = .87$, $\rho < .01$). Treatment control ($r_{(120)} = .77$, $\rho < .01$) and illness coherence ($r_{(120)} = .76$, $\rho < .01$) dimensions were also significantly related to treatment compliance. The only illness dimension that was not significantly related to treatment compliance was illness identity ($r_{(120)} = .06$, $\rho > .05$). Therefore the hypothesis that stated that "*Illness belief dimensions (consequences, emotional representation, timeline acute and chronic, timeline cyclical, treatment control, illness coherence and identity) will have a significant positive correlation with treatment compliance"* was partially supported.

Hypothesis 1b: *There will be a significant negative relationship between personal control of illness and treatment compliance.* This hypothesis was also tested using the Pearson Product-Moment Correlation as the researcher sought to find out whether a relationship existed between the independent variable (personal control) and one dependent variable (treatment compliance) among adolescents with sickle cell disease. Both variables were continuous and measured on at least an interval scale. From the correlation matrix in table 4 above, it was observed that the perception of personal control was significantly and negatively correlated with treatment compliance ($r_{(120)} = -.62$, $\rho < .01$). Therefore the hypothesis that was stated as *"The will be a significant negative relationship between personal control of illness and treatment compliance''* was supported.

Hypothesis 2a: *Personality trait dimensions (agreeableness, conscientiousness) will have a significant positive relationship with treatment compliance.* This hypothesis was tested using the Pearson Product-Moment Correlation. The independent variables (agreeableness and conscientiousness) and the dependent variable (treatment compliance) are both assumed to be continuous variables and measured on at least an interval scale thus the selection and use of the Pearson Product-Moment Correlation test. The findings as represented in the correlation matrix in table 5 above shows that there was a significant positive relationship between agreeableness

and treatment compliance ($r_{(120)}$ =.88, ρ<.01). A significant positive relationship was also obtained between conscientiousness and treatment compliance ($r_{(120)}$ =.85, ρ<.01). Thus the hypothesis that was stated as "*Personality trait dimensions (agreeableness, conscientiousness) will have a significant positive relationship with treatment compliance"* was supported.

Hypothesis 2b: *There will be a significant negative correlation between neuroticism and treatment compliance.* This hypothesis was also tested using the Pearson Product-Moment Correlation. Both the independent variables (neuroticism) and the dependent variable (treatment compliance) continuous variable and measured on at least an interval scale thus the selection and use of the Pearson Product-Moment Correlation test. The findings as captured in the correlation table 5 above shows that there was a significant negative relationship between neuroticism and treatment compliance ($r_{(120)}$ =-.71, ρ<.01). Therefore the hypothesis that was stated as "*There will be a significant negative correlation between neuroticism and treatment compliance"* was supported.

Hypothesis 3: *The illness belief dimension timeline cyclical will significantly predict treatment compliance than the other illness belief dimension*.

A hierarchical multiple regression analysis adopting the enter model was done to find out how the various dimensions of the illness belief predict or explain the amount of variation in treatment compliance among adolescents with sickle cell disease after age, education, gender, duration of illness, type of sickle cell were controlled for. The results as presented in table 6 below indicated that, in step 1 when the control variables alone where entered, there was a significant *R* square [R^2=.12, $F_{(6,113)}$ =2.517, ρ<.05]. In step 2 when the various illness belief dimensions were entered, the results showed that there was a significant *R* squared change [R^2=. 78 $F_{(8,105)}$ =95.66, ρ<.001]. The contributions of each of the illness belief dimensions in explaining the variance in treatment compliance are summarised and presented in the table 6 below:

Table 6

Multiple Regressions of the contributions of the illness belief dimensions to treatment compliance.

Predictors	B	SEB	β	t	*P*
Step 1					
Constant	20.87	3.5		6.01	.000
Age	.13	.24	.07	.53	.599
Duration	-.22	.21	-.14	-1.06	.292
Education	-.71	.40	-.17	-1.79	.076
Sex	.65	.60	.10	1.08	.283
Religion	-.42	.68	-.56	-6.2	.535
Genotype	1.3	.55	.21	2.37	.020
Step 2					
Personal Control	.03	.03	.04	.857	.393
Treatment Control	.19	.07	.13	2.47	.015
Illness Coherence	.13	.06	.11	2.00	.048
Emotional Representation	.24	.06	.33	3.90	.000
Timeline Cyclical	.37	.07	.34	5.60	.000
Consequences	.01	.05	.004	0.93	.926
Timeline (Acute and Chronic)	.13	.06	.14	2.27	.025

Predictors: Personal Control, Treatment Control, Illness Coherence, Emotional Representation, Timeline Cyclical, Consequences, Timeline (Acute and Chronic), Identity
Dependent Variable: Treatment Compliance

A careful observation of Table 6 above showed that the most significant illness belief dimension that predicted treatment compliance is the belief of illness as cyclical in nature which contributed positively to 34% of variance in treatment compliance at the .001 alpha level, [β=.34,t=5.60,ρ<.001]. The second most significant predictor of treatment compliance was emotional representation which also contributed positively to 33% of variance in treatment compliance at the .001 alpha level, [β=.33, t=3.90, ρ<.001]. The third most significant predictor of treatment compliance was the belief about illness as timeline acute or chronic which contributed positively to 14% of variance in treatment compliance at the .05 alpha level,

[β=.14,t=2.70, ρ<.05]. The fourth most significant predictor of treatment compliance was the perception of treatment control about the sickle cell illness which contributed positively to 13% of variance in treatment compliance at the .01 alpha level, [β=.13, t=2.47, ρ<.01]. The fifth most significant predictor of treatment compliance was illness coherence which contributed positively to 11% of variance in treatment compliance at the .05 alpha level, [β=.11, t=2.00, ρ<.05]. The other illness belief dimension did not predict the level of treatment compliance significantly as showed in the multiple regressions Table 6 above. Therefore, the third hypothesis which was stated as "*The illness belief dimension timeline cyclical, will significantly predict treatment compliance than the other illness belief dimension*" was supported.

Hypothesis 4: *The personality trait agreeableness will significantly predict treatment compliance than the other personality trait dimensions.*

Multiple regression analysis was performed to test the hypothesis stated above. A significant model emerged at the .001 alpha level, [R^2=.87, $F_{(3,119)}$ =264.48, ρ<.001]. That is, the entire model explained about 87% of variance in the level of treatment compliance among adolescents with sickle cell disease. The contributions of each of the personality dimensions in explaining the variance of treatment compliance are summarised in the table 7 below:

Table 7

Multiple Regression of the contributions of Personality traits dimensions to treatment compliance.

Predictors	B	SEB	B	T	*ρ*
Agreeableness	.31	.03	.52	10.46	.000
Neuroticism	-.51	.02	-.13	-2.75	.007
Conscientiousness	.24	.03	.38	6.82	.000

Predictors: Agreeableness, Neuroticism, Conscientiousness
Dependent Variable: Treatment Compliance

From the Table 7 above, it was observed that the most significant personality trait that predicted treatment compliance was the agreeableness, [β=.52, t=10.46, ρ<.001]. The next most significant predictor of treatment compliance was conscientiousness, [β=.38, t=6.82, ρ<.001]. This was followed by the dimension of neuroticism, [β=-.13, t=-2.75, ρ<.01]. Therefore, the hypothesis that "*The personality trait agreeableness will significantly predict treatment compliance than the other personality trait dimensions"* was supported.

Hypothesis 5a: *There will be a significant positive relationship between necessity for treatment and treatment compliance*. This hypothesis was tested using the Pearson Product-Moment Correlation coefficient. From the correlation matrix in table 5 above, it was observed that a significant positive relationship existed between necessity for treatment and treatment compliance, $r_{(120)}$ =.66, ρ<.01. Therefore the hypothesis that "*There will be a significant positive relationship between necessity for treatment and treatment compliance"* was supported.

Hypothesis 5b stated that "*There will be a significant inverse relationship between concern for treatment and treatment compliance"*. This hypothesis was also tested using the Pearson Product-Moment Correlation. From the correlation matrix in table 5 above, it was observed that a significant but inverse relationship existed between concern for treatment and treatment compliance, $r_{(120)}$ =-.21, ρ<.01. The hypothesis that "*There will be a significant inverse relationship between concern for treatment and treatment compliance"* was supported.

Hypothesis 6: *Treatment beliefs (necessity of treatment and concern for treatment) of sickle cell adolescent's patient will significantly moderate the relationship between illness belief and treatment compliance.*

To determine whether Adolescents with sickle cell disease belief about medicine (concern for treatment and necessity of treatment) significantly moderate the relationship between illness belief and treatment compliance, a hierarchical regression was done. The Dependent Variable

(DV) in this analysis was the treatment compliance, the independent variables (IV) were treatment control, timeline (Acute/Chronic), personal control, illness coherence, identity, emotional representation, cyclical, consequences and the moderating variable was belief about medicine (concern for treatment and necessity of treatment) The results are summarized in Table 8 below.

Table 8

Hierarchical regression of the moderation effects of the belief about medicine between illness belief and treatment compliance.

Model	B	SEB	β	t	*ρ*
Step 1					
Constant	20.00	.11		191.42	.000
Consequences	.03	.05	.02	.55	.586
Timeline Cyclical	.40	.06	.37	6.32	.000
Emotional Representation	.24	.06	.32	3.9	.000
Illness Coherence	.12	.06	.11	1.99	.049
Personal Control	.04	.03	.05	1.09	.277
Timeline-Acute/Chronic	.13	.06	.14	2.26	.026
Treatment Control	.20	.07	.13	2.65	.009
Step 2					
Constant	20.00	.10	-	192.75	.000
Consequences	.04	.05	.03	.81	.42
Timeline Cyclical	.38	.07	.35	5.83	.000
Emotional Representation	.21	.06	.29	3.37	.001
Illness Coherence	.11	.06	.10	1.84	.068
Personal Control	.03	.03	.04	.94	.348
Timeline-Acute/Chronic	.13	.06	.14	2.29	.024
Treatment Control	.19	.07	.13	2.60	.011
Necessity	.24	.14	.07	1.66	.100
Concerns	-.06	.11	-.02	-.54	.594
Step 3					
Constant	20.16	.14		141.71	.000
Consequences	.10	.06	.08	1.75	.084
Timeline Cyclical	.38	.08	.35	4.71	.000
Emotional Representation	.11	.07	.15	1.65	.102
Illness Coherence	.16	.07	.14	2.41	.018
Personal Control	.03	.03	.45	.98	.329
Timeline-Acute/Chronic	.15	.06	.16	2.37	.020
Treatment Control	.27	.08	.18	3.44	.001
Necessity	.27	.14	.08	1.87	.064
Concerns	-.03	.12	-.01	-.21	.836
Consequences*Necessity	.09	.06	.07	1.68	.096
Timeline Cyclical*Necessity	.08	.07	.09	1.13	.263
Emotional Representation*Necessity	-.09	.08	-.11	-1.16	.251
Illness Coherence*Necessity	.10	.06	.09	1.56	.121
Personal Control*Necessity	-.06	.04	-.07	-1.27	.208
Timeline-Acute/Chronic*Necessity	.01	.07	.01	.16	.872
Treatment Control*Necessity	-.34	.10	-.23	-3.54	.001
Consequences*Concerns	.005	.06	.00	.09	.929
Timeline Cyclical*Concerns	-.01	.07	-.01	.-19	.850
Emotional Representation*Concerns	.014	.07	.02	.20	.841
Illness Coherence*Concerns	-.011	.08	-.010	-.136	.892
Personal Control*Concerns	-.02	.03	-.03	-.56	.575
Timeline-Acute/Chronic*Concerns	.05	.06	.06	.81	.420
Treatment Control *Concerns	-.12	.10	-.08	-1.15	.255

Dependent Variable: Treatment Compliance. R^2=.89, .89, .92 and ΔR^2=.887, .004, .027 for steps 1, 2 &3 respectively.

A hierarchical regression was performed to test the hypothesis that belief about medicine will significantly moderate the relationship between illness belief and treatment compliance. Before the analyses was done, the independent and moderator variables were centred and an interaction term was computed from the centred variables (Baron and Kenny, 1986). A moderation analysis was done to examine the extent to which the relationship between the independent and dependent variable changes as a result of the role of a third variable called the moderator variable. Both the independent and moderator variables were centred. By doing cantering, deviation scores were obtained by subtracting each variable's mean from the individual observations. After the variables were centred, a product term or interaction term of the centred independent and dependent variables were created.

From Table 8 above in the step 1 of the hierarchical regression, the illness beliefs dimensions were entered. The results showed that there was a significant *R* squared, $F_{(8,111)}$ =109.98: R^2=.887, ρ<.001. This means that the illness belief dimensions on their own was significantly related to treatment compliance. In step 2, the moderators were then entered. The results showed that there was no significant change, $F_{(2,109)}$ = 1.77: ΔR^2=.004, ρ>.05. This means that the moderating variables on their own was not significantly related to treatment compliance. In step 3, the independent variables, the moderating variables as well as the interacting effects were entered in the third step. The results showed that there was a significant change, $F_{(16, 93)}$ =1.93: ΔR^2=.027, ρ<.05. This means that the moderating variable significantly moderated the relationship between illness belief and treatment compliance. On the whole, the model showed that belief about treatment moderated the relationship between illness belief and treatment compliance.

A further evaluation showed significant interaction effect between treatment control and necessity of treatment (β=-.23, *t*=-3.54, ρ=.001). No interaction effect was obtained between

the other illness belief dimensions and belief about treatment dimensions (necessity of treatment and concern for treatment).

Therefore, the hypothesis that treatment beliefs (necessity of treatment and concern for treatment) of sickle cell adolescent will significantly moderate the relationship between illness belief and treatment compliance was supported.

Summary of Findings:

This study tested six hypothesis to assess the illness belief, Personality traits and Treatment compliance among adolescents with sickle Cell Disease in Ghana. The summary of findings is presented below:

I. Illness belief dimensions of adolescents with sickle cell disease are significantly and positively related to treatment compliance. Identity was not significantly related to treatment compliance but there was a positive correlation. Personal control on the other hand was negatively correlated but was significantly related to treatment compliance.

II. The illness belief dimension timeline cyclical was the most significant predictor of treatment compliance.

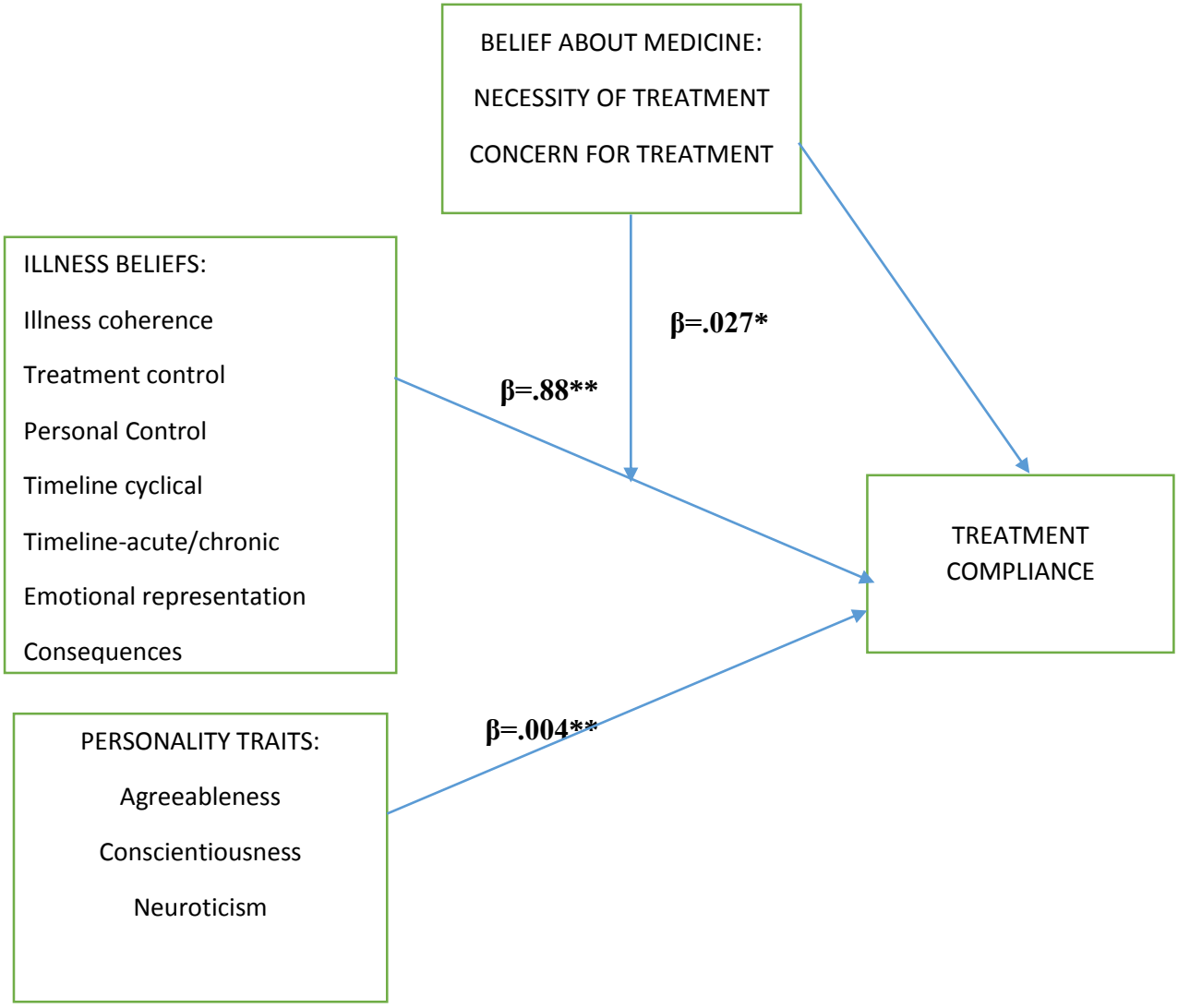
III. Personality traits agreeableness and conscientiousness of adolescents with sickle cell disease was significantly and positively related to treatment compliance. Neuroticism was significantly related to treatment compliance but there was a negative correlation between them.

IV. Agreeableness was found to be a major significant predictor of treatment compliance compared to the other personality traits.

V. Belief about medicine moderated the relationship between illness belief and treatment compliance.

Observed Model

Figure 4.1



From the model above, it can be observed that illness belief and personality traits significantly relates to treatment compliance. Seven of the illness belief dimensions significantly predicted treatment compliance and three of the personality dimensions significantly predicted treatment compliance. Belief about treatment dimension significantly moderated the relationship between illness belief and treatment compliance in this study. These findings are diagrammatically illustrated in the figure above.

CHAPTER FIVE

DISCUSSION

Introduction

The objective of this study was to investigate how illness belief and personality traits predict treatment compliance. The moderating role of belief about medicine between illness belief and treatment compliance was also examined. This chapter presents the findings that were obtained from the study in relation to whether the hypothesis that were tested were supported or rejected. Discussion of findings from the study was made making reference to past studies and theories (Self-Regulatory Model (SRM) by Leventhal, Meyer and Nerenz, 1984; Five Factor Model, Costa & McCrae, 1992; Necessity-Concerns Framework, Horne, 1997) reviewed in the study. Findings were explained to put the outcomes into proper perspective taking into consideration culture, personality differences and other relevant factors that may be contributing to the different results that may have come up. The implications of the findings and recommendations for subsequent related studies, practitioners, clients and the health sector were stated. The limitations and conclusions of the study were also presented taking in consideration the findings and implications for the study.

Sickle cell disease is a chronic condition and like all illnesses, individuals form certain beliefs or perceptions about the illness which tend to influence health behaviours such as their compliance to treatment. Not only do the beliefs or perceptions they have about their illness influence their compliance to treatment but the personality traits also influence the extent to which they will comply with treatment or not. The belief one holds about medicines for their treatment is also known to play a moderating role between illness belief and treatment compliance.

Adolescents with sickle cell disease receiving treatment at the sickle cell units in the Greater Accra Region of Ghana were the population of interest for the study. Some patients who reported at the Korle-Bu Teaching Hospital and the Tema General Hospital for treatment of their condition were selected as sample for this study. These hospitals were selected because they serve as the largest referral points for the surrounding health facilities. The sample consisted of adolescents, (males and females) with any of the sickle cell disease genotype and were between the ages of 13 to 19 years.

Illness belief and Treatment compliance among adolescents with sickle cell disease.

To examine whether the Illness belief dimensions (consequences, emotional representation, timeline acute and chronic, timeline cyclical, treatment control, illness coherence and identity) were significantly related to treatment compliance, correlation was done and the results of the analysis indicated that with the exception of the identity dimension, all the other dimensions were significantly related to treatment compliance. What this means is that as participants in this study perceive their sickle cell illness to have negative consequences on them, their compliance to treatment was high. The findings from this study is consistent with findings in other researches. For instance Dennis- Antwi, Culley, Hies & Dyson, 2011; Brewer et al., 2002 in their study, found a significant relationship between illness consequences and treatment compliance. Chen et al., 2009;Horne & Weinman, 2001; Molloy et al. (2009);Shiah-Lian et al. (2008); Maclnnes, 2013;Massey et al. (2013); Dalbeth et al, 2011 all found a significant relationship between illness consequences and treatment compliance. On the contrary, Byrne et al., 2005 found no relationship between illness consequences and treatment compliance. Horne & Weinman, 2002; Molloy et al., 2009 also found out in their study that serious consequences are related to non-adherence. A possible reason for the significant positive relationship between illness consequence and treatment compliance in this study may be attributed to the concept of consequences. Illness consequences was operationally defined in

this study as the patient perception of the effects of the illness on their life. Consequences may be physical, emotional, or several other interacting factors (Ogden, 2004). The consequences are perceived as something that is likely to happen now or in the future. Considering the fact that the samples in this study are adolescents and they possibly have many years to live before they die, they perceive serious consequences for their illness in the future, thus, their compliance to treatment to reduce the negative consequences associated with their illness. It is also possible that despite the adolescents being young, they may have already experienced serious consequences of living with sickle cell disease and this might have shaped their illness management behaviour hence their compliance to treatment in the present. A significant positive relationship was also observed between emotional representation and treatment compliance. This means that as participants perceived their illness to have negative impact on their emotion's the more likely they are to comply with treatment. Higher emotional representation of sickle cell disease gives the indication that the disease induces high negative feelings such as fear, anger, sadness which are all negative. The finding was consistent with some past research and inconsistent with others who found no significant relationship between the two variables. Ross et al. 2004; Kretchy, 2011 found a significant relationship between emotional response and treatment compliance. Zugelj et al. (2010) in their research also found a significant relationship between emotional burden and adherence. Molloy et al. (2009); Dalbeth et al. (2011) all found a significant relationship between emotional representation and adherence. Abubakari et al. (2011) found out that emotional representations contributed to variations in self-management in their study. Shiah-Lian et al. (2008); Maclnnes, 2013 on the contrary found no significant relationship between emotional representation and adherence in their study.

A significant positive relationship was also observed between timeline acute and chronic and treatment compliance. This means that as participants perceive their condition to be chronic,

the more compliant they become to treatment and if they perceive it to be acute, they less compliant they will be. These findings were consistent with some studies done by other researchers. For example Byrne et al., 2005, Chen et al., 2009; Meyer et al., 1985 ;Nicklas et al. (2010); Aflakseir, 2012; Molloy et al. (2009); Shiah-Lian et al. (2008); Maclnnes, 2013; Massey et al. (2013) all found a significant positive relationship between timeline acute/chronic and treatment compliance. Other researchers such as Brewer et al., 2002; Ross et al., 2004; Dalbeth et al. (2011) reported no significant correlation between chronic illness timeline and treatment compliance. A possible reason for the contradictory findings could be the use of objective and subjective measures of medication adherence in the various studies.

Again, a significant and positive relationship was observed between timeline cyclical and treatment compliance. The belief of sickle cell as cyclical in nature by participants in this study means that they see their condition and symptoms associated with it to be unpredictable and fluctuating. Seeing their condition as unpredictable and fluctuating will make them comply with treatment as they don't know when the symptoms of their condition will appear to make things difficult for them. Perceiving their condition to be cyclical in nature is evident in the pain patients frequently experience. The experience of pain which is a major symptom experienced by sickle cell patients is not predictable thus their perception of their condition cyclical. This finding was consistent to that which was found by Chen et al., 2009; Shiah-Lian et al. (2008) and Nicklas et al. (2010); Maclnnes, 2013.

A significant and positive relationship was also seen between treatment control and treatment compliance. This means that as individuals had strong beliefs that their treatment will be effective the more they will comply with their treatment. This finding was consistent with findings in other studies such as that carried out by Chen et al., 2009 as well as Ross et al. (2004); Senior et al. (2004) and Griva et al. (2000) also found significant relationship between the control dimensions and self-reported adherence. Similar findings were also reported by

Zugelj et al. (2010) and Shiah-Lian et al. (2008); Maclnnes, 2013; Massey et al. (2013). Therefore adolescents patient's belief of the benefits of medication in controlling their disease can be said to be a motivational force for their continual medication adherence.

A significant positive relationship was also obtained between illness coherence and treatment compliance. This is consistent with other findings by other researchers who used different sample. For example Mosleh & Almalik (2014) in their study reported that patients indicated they had better understanding of their condition and it influenced their adherence to treatment. In their research, they found out that illness coherence was one of the significant predictors of adherence. Shiah-Lian et al. (2008); Maclnnes, 2013; Dalbeth, Petrie, House, Chong, Leung, Chegudi, Horne, Gamble, Mcqueen &Taylor, 2011 also found a significant relationship between illness coherence and treatment coherence in their study. Molloy et al. (2009) also found a significant relationship between illness coherence and adherence in their study. What this means is that adolescent patients with sickle cell disease demonstrate an appreciable level of understanding of their condition and this understanding of their condition as chronic or as having high negative consequences is manifested in their compliance to treatment.

On the contrary illness identity was not significantly related to treatment compliance in this study. The finding from this study is consistent with some past researches and inconsistent with others. For Example Byrne et al., 2005; Chen et al., 2009; Jessop & Ruttter, 2003; Searle et al. (2007); Zugelj et al. (2010); Molloy et al. (2009) found no significant relationship between identity and treatment compliance. These findings were seen because participants identified little to no illness-related symptoms. Participants in this studies, may also have experienced comorbidities and they are likely not to have identified the symptoms listed as a result of their sickle cell condition but rather as a result of their comorbid condition. Leventhal and colleagues indicated that individuals with more than one physical illness may attribute or

assign symptoms inappropriately. Byers & Myers (2000) however in their study found that a significant relationship existed between illness identity and self-reported adherence.

To further examine whether a significant but negative relationship exists between personal control and treatment compliance, correlation was done and the results showed that there is a significant and negative relationship between personal control and treatment control. This means that as the adolescents with sickle cell disease had the belief that they can control their illness, their compliance to treatment decreases and if they believe they have no personal control over their illness, their compliance to treatment increases. This hypothesis was supported in this sample. This finding is consistent with the works of other researchers. Nicklas et al. (2010) in their study using patients with non-malignant chronic pain, found out that patient's perception of their illness as uncontrollable was significantly related to treatment compliance. Olayinka et al. (2011) also found out that patient's belief that their actions can control their disease was associated with medication non-adherence in their sample. Ross et al. (2004); Turrise, 2015 in their study also found out that participants who had lower personal control beliefs reported higher levels of adherence. A possible explanation is that although participants felt they had control personally over their illness, they still believed that treatment would be effective in the management of their disease so they still complied with treatment. Some other research findings were inconsistent with this result as they found no significant relationship between personal control and self-reported adherence. Horne & Weinman, 2001; Maclnnes 2013 for example found no significant relationship.

Timeline cyclical was however found to have predicted treatment compliance than the other illness belief dimension when a regression analysis was done to see which of the illness beliefs dimensions was significantly predicting treatment compliance. This hypothesis was supported. It is consistent with previous studies where timeline cyclical was found to be one of the

significant predictors of adherence. For instance Platt et al. (2013); Maclnnes, 2013 in their study found timeline cyclical to be a significant predictor of treatment compliance.

Personality Traits and Treatment compliance among adolescents with sickle cell disease.

The personality traits conscientiousness, agreeableness were found to be significantly and positively related to treatment compliance. That is the more conscientious and agreeable the individual is, the more they are likely to comply with treatment. This is consistent with other studies done by other researchers. Zugelj, Zupancic, Komidar, Kenda, Varda&Gregoric (2011). In their study, they observed that the personality trait conscientiousness was significantly related to adherence and accounted for significant amount of variance in general adherence. O'Cleirigh et al. (2007) also found a significant relationship between conscientiousness and treatment compliance. Axelson 2013; Wheeler et al. (2012); Hilliard et al. (2015) also found a significant relationship between conscientiousness and treatment compliance in his study. This finding is not surprising as individuals who are highly conscientious have traits such as self-discipline, self-control, reliability and perseverance and having these traits predisposes one to be compliant to treatment .In other studies, conscientiousness was not found to be significant with adherence. Wiebe& Christensen, 1997; Cohen et al. (2004) found no relationship between conscientiousness and adherence. Agreeableness was also found to be significantly associated with treatment compliance. This finding is consistent with previous researches that found a significant relationship between agreeableness and treatment compliance or adherence. For instance Axelson (2013) found a significant relationship between agreeableness and treatment compliance. Zugelj et al. (2010); Hilliard et al. (2015) also found a significant relationship between agreeableness and adherence. Other previous researches produced results that were inconsistent with what was found in this study. Jerant et al. (2011); Wheeler et al. (2012); Cohen et al. (2004) all reported an insignificant relationship between agreeableness and

adherence. Individuals who have the personality trait agreeableness are seen as kind, sympathetic, warm, cooperative and considerate hence their compliance to treatment.

While a significant and positive relationship was found to exist between conscientiousness, agreeableness and treatment compliance, neuroticism was found to be significantly but negative related to treatment compliance. For instance, Wheeler et al. (2012); Axelson, 2013 found significant relationship between neuroticism and treatment compliance. Jerant et al. (2011); Adeniran, A., Akinyinka, M., Wright, K. O., Bakare, O. Q., Goodman, O. O., Kuyinu, Y. A.,. .. & Osibogun, A. (2015) in their study found neuroticism as the only personality trait related to medication non-adherence. Individuals who score low on neuroticism are often calm, even-tempered, self-satisfied and unemotional. Having these characteristics predisposes one to comply with treatment. Other studies like that of Cohen et al. (2004) found no significant relationship between neuroticism and treatment compliance.

To determine whether agreeableness significantly predicted treatment compliance than the other personality traits, it was observed that treatment compliance was significantly predicted by having an agreeableness personality. This hypothesis is consistent with the work done by Axelson, 2013; Hilliard et al. (2015) where agreeableness was found to be a significant predictor of adherence. In the study conducted by Axelson, 2015 conscientiousness was the next significant predictor of treatment compliance followed by neuroticism which was also a significant but negative predictor of adherence. Hilliard et al., 2015 also found agreeableness to be a significant predictor of attendance in their first hierarchical regression analysis. Conscientiousness was also found to be a significant predictor adherence.

Belief about Medicine and Treatment compliance.

To investigate whether a significant relationship exists between necessity for treatment and treatment compliance, correlation was done and the results of the analysis indicated that there

is a significant relationship between necessity for treatment and treatment compliance. This hypothesis concurs with some past researches that found a significant relationship between necessity for treatment and treatment compliance. For example; Ross et al. (2004); Horne & Weinman, 2001; Horne & Weinman, 1999; Rajpura& Nayak, 2014; Maclnnes, 2013. What this means is that as participants in the study perceive treatment for their condition to be necessary, the more they comply with treatment.

Concern for treatment was also found to be significantly related to treatment compliance although the direction of the relationship was inverse. This is consistent with past researchers. Neame &Hammond, 2005; Rajpura & Nayak, 2014;Menckeberg et al. (2008); Aflakseir 2012;Bucks et al. (2009) ;Horne & Weinman,2001;Horne & Weinmann (1999). This means that the more negative concern participants have about their treatment, the less compliant they become or the less concern they have about their treatment, the more compliant they become.

Moderating role of belief about medicine (necessity for treatment and concern for treatment) on relationship between illness belief and treatment compliance

To determine whether necessity for treatment and concern for treatment moderated the relationship between illness belief and treatment compliance, it was observed that these variables significantly moderated the relationship between illness belief and treatment compliance. This finding is consistent with other studies. For instance (Maclnnes, 2013; Turrise, 2015; Rajpura & Nayak, 2014; Horne & Weinman, 2001; Horne & Weinmann, 1999) found belief about medicine moderating the relationship between illness perception and adherence. Belief about medicine moderating the relationship between illness belief and treatment compliance means it strengthens the relationship between illness belief and treatment compliance and it plays a significant role in influencing or predicting compliance to treatment

among adolescents with sickle cell disease which is consistent with the SRM (Leventhal et al., 1985).

Recommendations

Recommendations are summarized under the following headings (i) Future Studies, (ii) Adolescents with Sickle cell illness (iii) Health Professionals (iv) Health Sector

Future Studies

As a recommendation for further studies, a larger sample size as well as multiple settings or sites should be considered to increase generalizability of findings. Future studies can also consider using the probability sampling technique to ensure samples used for the study are representative to population of adolescents with sickle cell disease. The cause dimension of the illness beliefs dimensions was not considered in this study. Further studies should consider assessing this dimension as it will give a picture about what adolescents believe to be the causes of sickle cell disease and how that account for compliance to treatment. In subsequent studies, more objective measures of treatment compliance be used to ensure the consistency of self-report measures which will help to reduce if not eliminate issues that come up as a result of memory and recall. The study also examined whether the following personality traits: conscientiousness, agreeableness and neuroticism was related to treatment compliance. Future studies can explore the other personality traits to observe if they will also predict compliance. The interaction role of personality and illness belief should be explored in future research to see which one predicts compliance to treatment the most. Qualitative Studies can also be carried out to have an in-depth exploration of how the various illness belief and personality trait dimensions affect treatment compliance. Gender differences were not done in this study so future studies may consider finding out if there are gender differences in the various

variables tested. Future studies should also consider doing a comparative study to compare findings.

Adolescents with Sickle cell disease

The identity dimension was found not to be significantly related to treatment compliance. This was probably because the participants indicated little or no symptoms for their illness. Adolescents should feel comfortable to find out from their health care providers what the likely symptoms of sickle cell disease are so they can act quickly once those symptoms begin to manifest to avoid any complications. Most participants reported high scores on the emotional representation dimension. It is recommended that adolescents with sickle cell disease who have emotional problems as a result of their condition should seek for help for counsellor, psychologists and other mental health professionals.

Health Professionals

The outcome obtained from this study also have implications for health professionals who have direct contact with adolescents who have sickle cell disease. This study has offered support for SRM by providing evidence that illness beliefs are determinant of treatment compliance among adolescents with sickle cell disease. For mental health professionals, special attention should be paid to the illness beliefs of adolescent's with sickle cell disease as the research indicated that illness belief significantly accounted for the level of compliance to treatment. Special interest should also be given to the assessment of their belief about treatment as this research has indicated that the belief one holds about treatment does play a significant role between their belief about illness and treatment compliance. Not only their beliefs about treatment and illness but other emotional concerns that are manifested because of the sickle cell illness should be explored and dealt with. The study also found out that various personality traits or characteristics significantly predict compliance to treatment. Health professionals are therefore

encouraged to assess for differences in personality and how that affect treatment compliance and have individualized based treatment plans due to the differences individuals that is targeted to patient's personality.

Health Sector

The health sector cannot be ruled out as the findings in this study has implications for them. Based on the finding of this study, it is recommended that a comprehensive approach or a biopsychosocial(s) approach be employed in the management of sickle cell disease. This involves getting health professionals like clinical psychologist or psychiatrist. This is because sickle cell disease affects the emotional well-being of patients and these problem needs to be addressed by someone who has an expertise like a clinical psychologist.

Limitations of the Study

The success of this research was without challenges. Attempts were made to put measures in place to ensure that weaknesses in previous researches were controlled but some limitations were still encountered. The first amongst them were the delay in getting approval from the sickle cell unit of Korle-Bu Teaching Hospital for data collection. By the time the approval was granted, most of the adolescents with sickle cell disease who were the target of the study were gone back to school as most of them were in the Senior High School (SHS) and this accounted for the small sample size used for the study. For Tema General Hospital, approval for data collection was granted early but not much of the sample was gotten there.

Some participants were also not willing to participate in the study apparently because they were tired of always volunteering in research without any motivation. This leads to the second limitation were there was inadequate funds to help motivate the participants and carry out other necessary things pertaining to the research.

Frequent power outage as a result of the energy crisis the country was experiencing was also a major challenge. When light was needed seriously to work on the research, it was taken off and hindered the smooth progress of the work. This study relied on retrospective self-reports to collect information on participants demographic, illness belief, personality traits, belief about medicine and treatment compliance. Such self-report data are criticized because of them not being too reliable and valid as a result of the possibility selective reporting, recall problem, social desirability problems. Future studies should consider getting information from doctors or other health care providers and parents if possible to prevent the problem of overestimation of compliance to treatment.

Conclusion

Sickle cell is a chronic condition and individuals with this condition have beliefs about their illness, their treatment they receive as a result of their condition. These beliefs determine whether individuals will comply with treatment or not. Personality traits explain why we behave in different ways. Not only do personality traits explain differences among individuals but research has demonstrated that personality differences affect various health-related behaviours such as compliance to treatment. This research investigated the influence of illness beliefs and personality traits on treatment compliance among adolescents with sickle cell disease. The outcome of this study indicated that apart from identity dimension, all the illness belief dimensions (timeline cyclical, timeline-chronic and acute, illness coherence, treatment and personal control, emotional representation) were significantly related to treatment compliance. Timeline cyclical was found to be a more significant predictor of treatment compliance followed by emotional representation and treatment control. The three personality traits that were examined were also found to be significantly related to treatment compliance. Agreeableness was found to be the most significant predictor of treatment compliance followed by conscientiousness. Neuroticism was found to be significant but negative predictor of

treatment compliance. Belief about medicine is which is made up of necessity for treatment and concern for treatment was a significant moderator between illness belief and treatment compliance.

In summary, the findings of the study provide a foundation for future studies. There are no studies to the best of my knowledge that has been conducted in our Ghanaian setting exploring the influences of illness beliefs, personality traits on treatment compliance as well as the moderating effect of belief about treatment between illness belief and treatment compliance.

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APPENDICES

Appendix A: Questionnaires

Section A: Demographic Characteristics

Please by making a tick (×) the one which best applies to you and provide responses where appropriate.

Sex: Male ( ) Female ( )

Age: ……

Education: No Education ( ) Primary ( ) Secondary ( ) Tertiary ( )

Religious Faith: Christianity ( ) Islam ( ) Others ( )

Type of Sickle Cell: ……

Duration of illness (Years): ……

Section B: Big Five Inventory-BFI

Here are a number of characteristics that may or may not apply to you. Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement.

Items	***Disagree Strongly***	***Disagree a little***	***Neither Agree nor Disagree***	***Agree a little***	***Agree Strongly***
1.Is talkative	**1**	**2**	**3**	**4**	**5**
2. I tend to find fault with others	**1**	**2**	**3**	**4**	**5**
3. I carry out my job thoroughly	**1**	**2**	**3**	**4**	**5**
4. I am depressed	**1**	**2**	**3**	**4**	**5**
5. I am original and comes up with new ideas	**1**	**2**	**3**	**4**	**5**
6. I am reserved	**1**	**2**	**3**	**4**	**5**
7. I am helpful and unselfish with others	**1**	**2**	**3**	**4**	**5**
8. I can be somewhat careless	**1**	**2**	**3**	**4**	**5**
9. I am relaxed and can handle stress well	**1**	**2**	**3**	**4**	**5**
10.I am curious about many different things	**1**	**2**	**3**	**4**	**5**
11. I am full of energy	**1**	**2**	**3**	**4**	**5**
12. I start quarrel with others	**1**	**2**	**3**	**4**	**5**
13.I am a reliable worker	**1**	**2**	**3**	**4**	**5**
14. I can be tense	**1**	**2**	**3**	**4**	**5**
15. I am creative and a deep thinker	**1**	**2**	**3**	**4**	**5**
16. I generate a lot of enthusiasm	**1**	**2**	**3**	**4**	**5**
17. I have a forgiving nature	**1**	**2**	**3**	**4**	**5**
18. I tend to be disorganized	**1**	**2**	**3**	**4**	**5**
19. I worry a lot	**1**	**2**	**3**	**4**	**5**
20.I have an active imagination	**1**	**2**	**3**	**4**	**5**
21. I tend to be quiet	**1**	**2**	**3**	**4**	**5**
22. I am generally trusting	**1**	**2**	**3**	**4**	**5**
23. I tend to be lazy	**1**	**2**	**3**	**4**	**5**
24. I am emotionally stable and not easily upset	**1**	**2**	**3**	**4**	**5**
25. I am inventive	**1**	**2**	**3**	**4**	**5**
26. I have an assertive personality	**1**	**2**	**3**	**4**	**5**
27. I can be cold and isolated	**1**	**2**	**3**	**4**	**5**
28. I preserve until the task is finished	**1**	**2**	**3**	**4**	**5**

Items	***Disagree strongly***	***Disagree a little***	***Neither Agree nor Disagree***	***Agree***	***Agree Strongly***
29. I can be moody	**1**	**2**	**3**	**4**	**5**
30. I value artistic experience	**1**	**2**	**3**	**4**	**5**
Items	**1**	**2**	**3**	**4**	**5**
31. I am sometimes shy and inhibited	**1**	**2**	**3**	**4**	**5**
32. I remain calm in tense situations	**1**	**2**	**3**	**4**	**5**
33. I do things efficiently	**1**	**2**	**3**	**4**	**5**
34. I remain calm in tense situations	**1**	**2**	**3**	**4**	**5**
35. I prefer work that is routine	**1**	**2**	**3**	**4**	**5**
36. I am outgoing and sociable	**1**	**2**	**3**	**4**	**5**
37. I am sometimes rude to others	**1**	**2**	**3**	**4**	**5**
38. I make plans and follow through with them	**1**	**2**	**3**	**4**	**5**
39. I get nervous easily.	**1**	**2**	**3**	**4**	**5**
40. I Like to reflect and play with ideas	**1**	**2**	**3**	**4**	**5**
41. I have few artistic interests.	**1**	**2**	**3**	**4**	**5**
42. I like to cooperate with others	**1**	**2**	**3**	**4**	**5**
43. I am easily distracted	**1**	**2**	**3**	**4**	**5**
44. I am advanced in art, music or literature.	**1**	**2**	**3**	**4**	**5**

SECTION C

Illness Perception Question-IPQ-R

Listed below are a number of symptoms that you may or may not have experienced since your illness. Please indicate by circling Yes or No, whether you have experienced any of these symptoms since your illness, and whether you believe that these symptoms are related to your illness (Sickle Cell).

	I have experienced this Symptom since my illness		This symptom is related to my illness	
Pain	Yes	No	Yes	No
Sore Throat	Yes	No	Yes	No
Nausea	Yes	No	Yes	No
Breathlessness	Yes	No	Yes	No
Weight Loss	Yes	No	Yes	No
Fatigue	Yes	No	Yes	No
Stiff Joints	Yes	No	Yes	No
Sore Eyes	Yes	No	Yes	No
Wheeziness	Yes	No	Yes	No
Headaches	Yes	No	Yes	No
Upset Stomach	Yes	No	Yes	No
Sleep difficulties	Yes	No	Yes	No
Dizziness	Yes	No	Yes	No
Loss of Strength	Yes	No	Yes	No

I am interested in your own personal views of how you now see your current illness (sickle Cell).

Please indicate how much you agree or disagree with the following statements about your illness by circling the one that applies to you in the box.

Views about your illness	***Strongly Disagree***	***Disagree***	***Neither Agree nor Disagree***	***Agree***	***Strongly Agree***
1.My Sickle cell illness will last a short time	**1**	**2**	**3**	**4**	**5**
2.My Sickle cell illness is likely to be permanent rather than temporary	**1**	**2**	**3**	**4**	**5**
3.My Sickle cell illness will last for a long time	**1**	**2**	**3**	**4**	**5**
4.This Sickle cell illness will pass quickly	**1**	**2**	**3**	**4**	**5**
5.I expect to have this Sickle cell illness for the rest of my life	**1**	**2**	**3**	**4**	**5**
6.My Sickle cell illness is a serious condition	**1**	**2**	**3**	**4**	**5**
7.My Sickle cell illness has a major consequences on my life	**1**	**2**	**3**	**4**	**5**
8.My Sickle cell illness does not have much effect on my life	**1**	**2**	**3**	**4**	**5**
9.My Sickle cell illness strongly affects the way others see me	**1**	**2**	**3**	**4**	**5**
10.My Sickle cell illness has serious financial consequences	**1**	**2**	**3**	**4**	**5**
11.My Sickle cell illness causes difficulties for those close to me	**1**	**2**	**3**	**4**	**5**
12.There is a lot which I can do to control my symptoms	**1**	**2**	**3**	**4**	**5**
13.What I do can determine whether my Sickle cell illness gets better or worse	**1**	**2**	**3**	**4**	**5**
14.The course of my Sickle cell illness depends on me	**1**	**2**	**3**	**4**	**5**
15.Nothing I do will affect my Sickle cell illness	**1**	**2**	**3**	**4**	**5**
16.I have the power to influence my Sickle cell illness	**1**	**2**	**3**	**4**	**5**
17.My actions will have no effect on the outcome of my Sickle cell illness	**1**	**2**	**3**	**4**	**5**

Views about your illness	***Strongly Disagree***	***Disagree***	***Neither Agree nor Disagree***	***Agree***	***Strongly Agree***
19.There is very little that can be done to improve my Sickle cell illness	**1**	**2**	**3**	**4**	**5**
20.My treatment will be effective in curing my Sickle cell illness	**1**	**2**	**3**	**4**	**5**
21.The negative effects of my Sickle cell illness can be prevented by my treatment	**1**	**2**	**3**	**4**	**5**
22.My treatment can control my Sickle cell illness	**1**	**2**	**3**	**4**	**5**
23.There is nothing which can help my condition	**1**	**2**	**3**	**4**	**5**
24.The symptoms of my condition are puzzling to me	**1**	**2**	**3**	**4**	**5**
25.My Sickle cell illness is a mystery to me	**1**	**2**	**3**	**4**	**5**
26.I don't understand my illness	**1**	**2**	**3**	**4**	**5**
27.My Sickle cell illness doesn't make any sense to me	**1**	**2**	**3**	**4**	**5**
28.I have a clear picture or understanding of my condition	**1**	**2**	**3**	**4**	**5**
29.The symptoms of my Sickle cell illness change a great deal from day to day	**1**	**2**	**3**	**4**	**5**
30.My symptoms come and go in cycles	**1**	**2**	**3**	**4**	**5**
31.My Sickle cell illness is very unpredictable	**1**	**2**	**3**	**4**	**5**
32.I go through cycles in which my Sickle cell illness gets better and worse.	**1**	**2**	**3**	**4**	**5**
33.I get depressed when I think about my Sickle cell illness	**1**	**2**	**3**	**4**	**5**
34.When I think about my Sickle cell illness I get upset	**1**	**2**	**3**	**4**	**5**
35.My Sickle cell illness makes me feel angry	**1**	**2**	**3**	**4**	**5**
36.My illness does not worry me	**1**	**2**	**3**	**4**	**5**
37.Having this Sickle cell illness makes me feel anxious	**1**	**2**	**3**	**4**	**5**
38.My Sickle cell illness makes me feel afraid	**1**	**2**	**3**	**4**	**5**

SECTION D

Please tick accordingly the one which applies to you

Medication Adherence Rating Scale (MARS 5)

Items	***Always***	***Often***	***Sometimes***	***Rarely***	***Never***
1.I forget to take my medication	**1**	**2**	**3**	**4**	**5**
2.I change my medication	**1**	**2**	**3**	**4**	**5**
3.I stop taking my medication after a while	**1**	**2**	**3**	**4**	**5**
4.I decided to skip one of my medication dosages	**1**	**2**	**3**	**4**	**5**
5.I use my medication less than is prescribed	**1**	**2**	**3**	**4**	**5**

SECTION E- Belief About Medicine Questionnaire (BMQ)

Please indicate how much you agree or disagree with the following statements about your beliefs about your treatment for sickle cell illness by ticking the appropriate box

Statements	***Strongly Disagree***	***Disagree***	***Uncertain***	***Agree***	***Strongly Agree***
Specific-Necessity					
1.My life would be impossible without my medicines	**1**	**2**	**3**	**4**	**5**
2.Without my medicines, I would be very sick	**1**	**2**	**3**	**4**	**5**
3.My health at present, depends on my medicines	**1**	**2**	**3**	**4**	**5**
4.My medicines protect me from becoming worse	**1**	**2**	**3**	**4**	**5**
5.My health in the future will depend on my medicines	**1**	**2**	**3**	**4**	**5**
Specific Concerns					
1.I sometimes worry about the long-term effects of my medicines	**1**	**2**	**3**	**4**	**5**
2.Having to take my medicines worries me	**1**	**2**	**3**	**4**	**5**
3.I sometimes worry about becoming too dependent on my medicines	**1**	**2**	**3**	**4**	**5**
4.My medicines disrupt my life	**1**	**2**	**3**	**4**	**5**
5.My medicines are a mystery to me	**1**	**2**	**3**	**4**	**5**

Appendix B: Consent Form

UNIVERSITY OF GHANA

Official Use only
Protocol number

OFFICE OF RESEARCH, INNOVATION AND DEVELOPMENT
Ethics Committee for Humanities (ECH)

PROTOCOL CONSENT FORM

Section A- BACKGROUND INFORMATION

Title of Study:	**Illness belief, Personality traits and Treatment compliance among Adolescents with Sickle Cell Disease in Ghana**
Principal Investigator:	**Prince Atorkey**
Certified Protocol Number	

Section B– CONSENT TO PARTICIPATE IN RESEARCH

General Information about the Research:

The aim of this research is to investigate if the beliefs adolescents with sickle cell disease have about their illness in terms of cause, timeline, consequences etc. and personality traits have any significant influence on their treatment compliance. You will be expected to respond to each item on the questionnaire as truthfully as possible as there are no correct or wrong answers. The completion of the questionnaires will last for 40 minutes.

Possible Benefits/Risks:

The possible benefits may be indirect. It is however hoped that the outcome of this research will inform policy makers in their decision making process with regards to sickle cell disease management most specifically their beliefs about the illness, personality traits and treatment compliance which the respondents may be beneficiaries.

There are no foreseeable physical, psychological or social risks a participant is likely to face for participating in this research. That notwithstanding, any risk or discomfort experienced by the participants as a result of their involvement in the study will be managed by means of psychotherapy or psychoeducation or any other appropriate means of treatment after assessment of the participants.

Confidentiality:

Please have the assurance that no information provided here will be divulged to a third party without your consent. Your name or any details that will reveal your identity to any other person is not required. All information provided will be handled with care and used for academic purpose only.

Compensation:

There will be no material or direct compensation for participation in the study.

Voluntary Participation and Right to Withdraw:

Your participation in this research is voluntary and you have the right to withdraw or decline to participate in this study at any time without Penalty. You are also assured that you or your legal representative will be informed well before time if information becomes available that may be relevant to your willingness to continue in participation of this study.

Contact for Additional Information:

Should you decide to clarify anything about the research or seek for any additional information concerning the study, you may contact the principal investigator, Prince Atorkey, University of Ghana, Legon. Telephone: 0246598482 or email: princeatorkey@gmail.com.

VOLUNTEER AGREEMENT

"I have read or have had someone read all the above, asked questions, received answers regarding participation in this study, and am willing to give consent for myself, my child/ward to participate in this study. I will not have waived any of my rights by signing this consent form. Upon signing this consent form, I will receive a copy for my personal records."

……

Name of Volunteer

……. ……

Signature or mark of volunteer **Date**

If volunteers cannot read the form themselves, a witness must sign here:

I was present while the benefits, risks and procedures were read to the volunteer. All questions were answered and the volunteer has agreed to take part in the research.

……...

Name of Witness

…… ……..

Signature of Witness **Date**

I certify that the nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual.

……

Name of Person who Obtained Consent

…… …….

Signature of Person Who Obtained Consent **Date**

Appendix C: Ethical Clearance from ECH

UNIVERSITY OF GHANA
ETHICS COMMITTEE FOR THE HUMANITIES (ECH)
P. O. Box LG 74, Legon, Accra, Ghana

My Ref. No.....

17th March, 2015

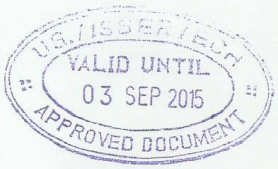
Mr. Prince Atorkey
Department of Psychology
University of Ghana
Legon

Dear Mr. Atorkey

ECH 045/14-15: ILLNESS BELIEF, PERSONALITY TRAITS AND TREATMENT COMPLIANCE AMONG ADOLESCENTS WITH SICKLE CELL

This is to advise you that the above reference study has been presented to the Ethics Committee for the Humanities for a full board review and the following actions taken subject to the conditions and explanation provided below:

Expiry Date:	3/09/15
On Agenda for:	Initial Submission
Date of Submission::	18/02/15
ECH Action:	Approved
Reporting:	Quarterly



Please accept my congratulations.

Yours Sincerely,

Rev. Prof. J. O. Y. Mante
ECH Chair

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