THE RELATIONSHIP BETWEEN PRECOCIOUS PUBERTY AND PSYCHOSOCIAL FUNCTIONING: A CASE OF PREADOLESCENT GIRLS IN SELECTED PRIMARY SCHOOLS IN KIAMBU COUNTY, KENYA

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DECLARATION PAGE

This dissertation is my original work, and has not been presented for a degree or any other award in any other University.

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DEDICATION

This work is dedicated to all the preadolescent girls in Kenya and the world.

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ABSTRACT

Pubertal maturation is a dynamic biopsychosocial-emotional process that presents a myriad of challenges to most girls, even when it occurs at normal timelines. The purpose of this study was to establish the prevalence of precocious puberty, and then determine its relationship with the psychosocial functioning of preadolescent girls in primary schools in Kiambu County. The study applied the descriptive correlational and comparative research designs and was guided by the psychosocial theory of development. A total of 442, 11 and 12 year old girls, and 12 female class teachers from 13 schools participated in the study. Primary data was collected using questionnaires, focus group discussions and structured interviews. The instruments were pilot-tested on 36, 11 and 12 year old girls and 3 class teachers from 3 schools within Kiambu County, who were omitted from the actual study. The Statistical Package for Social Sciences (version 25) was used to generate frequency distributions, regression models and Chi square tests for the quantitative data and the results were presented using tables. The qualitative data was transcribed and analysed using the thematic analysis approach. Key themes were identified, described and analysed using Nvivo version 12. The results were presented using thematic descriptions based on the predefined framework from the study objectives. This study found that 178 (40.4%) girls had precocious puberty, indicating that the prevalence was relatively high. Further, this study found that precocious puberty significantly affected the psychosocial functioning, and that diet influenced both the onset of precocious puberty and the psychosocial functioning of the preadolescent girls in schools in Kiambu County. It is hoped that these findings will enable parents, teachers and policy makers to put in place measures such as diet control, psychoeducation, and provision of menstrual hygiene materials inorder to better care for the early maturing girls.

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ABBREVIATIONS AND ACRONYMS

BMI	Body Mass Index
CPP	Central Precocious Puberty
NACOSTI	National Commission for Science, Technology and Innovation
NMRC	National Mentoring Resource
PACU	Pan Africa Christian University
RCARDS	Revised Children's Anxiety and Depression Scale and Subscales
SES	Self esteem Scale
SPSS	Statistical Package for Social Scientists
UNESCO	United Nations Educational Scientific and Cultural Organization
USA	United States of America

OPERATIONAL DEFINITION OF TERMS

Precocious Puberty: In girls, this refers to the appearance of secondary sexual maturation characteristics (such as rapid changes in weight and height, the development of breasts, changes in the skin, and emergence of pubic hair) before the age of 8 or the onset of menstruation before the age of 12 (Al-Jurayyan et al., 2017). The defining factor for precocious puberty for this study was the onset of menstruation before age 12.

Psychosocial Functioning: Skodol (2018) defined psychosocial functioning as the ability of an individual to carry out roles and perform activities in social, interpersonal, occupational and recreational areas of functioning. This study specifically focused on the psychological, emotional, social and occupational areas of functioning as defined by the variables; self esteem, symptoms of depression, peer relationships and academic performance respectively.

Self esteem: A measure of an individual's sense of self-worth based on perceived success and achievements, as well as a perception of how much one is valued by significant others in the society (Gupta et al., 2016). For this study, self esteem was defined as one's sense of self-worth and was assessed on three levels; high, low or constant.

Depression: This study adopted the definition of Bhanawal et al. (2017) which referred to depression as a mood disorder that varies from normal low mood in daily life, to a clinical syndrome that has the potential to disrupt the emotional, social and occupational functioning of an individual.

Symptoms of Depression: Although depression has many symptoms such as hopelessness, emptiness, tearfulness, withdrawal from people, and suicidal ideations (Bhanawal et al., 2017), this study focused on specific symptoms of depression including: prolonged sadness, loss of interest or pleasure in activities previously enjoyed, changes in sleep and appetite, loss of energy, tiredness, difficulty in concentrating or decision making, worthlessness, fatigue and restlessness.

Peer Relationships: Whereas Sullivan et al. (2016) defined peer relationships as unique contexts where children learn a range of critical social emotional skills such as problem solving, cooperation and empathy, this study defined peer relationships as the social interactions with another individual or individuals who are similar in some characteristics such as social status, age, knowledge or skills.

Academic Performance: Bell (2018) defined academic performance as the manner in which students deal with their studies and how they cope with, or accomplish different tasks given to them by their teachers. For this study, academic performance was defined as the ability for students to meet performance standards prescribed to them by the school course work in written work and exams.

Balanced Diet: According to the World Health Organization (2020), a balanced diet is a meal that promotes all dimensions of individual health and wellbeing, has low environmental pressure, and is affordable, accessible, safe, equitable and culturally accepted. For this study, balanced diet was defined as a meal that has all the necessary nutrients such as proteins, carbohydrates and vitamins, in the right proportions and in adequate amounts that the body needs to function optimally.

Dietary Patterns: This study adopted the definition by Intiful (2020) which described dietary patterns as the habitual decisions that individuals make when choosing the quality and quantity of food they want to eat.

Malnutrition: This is the imbalance between the nutrients the body needs and those that the body receives and can either be under or over nutrition (Intiful, 2020).

Preadolescence: This is the period of human development that precedes adolescence and follows early childhood, and it ranges between the approximate ages of 9 and 12 years (Slavutskaya & Slavutskii, 2020). For this study preadolescents were girls who were 11 and 12 years old.

Menarcheal Age: This study adopted the definition by Kaplowitz and Block (2016) which referred to menarcheal age as the age when girls begin to experience their consistent monthly menstrual flow.

Body Image: Latiff et al. (2018) described body image as the positive or negative ways that individuals perceive, feel and think about their bodies and physical appearance.

CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

Introduction

This chapter covers the introduction and background of the study, the problem statement, the purpose and objectives of the study and the research questions. The chapter also justified why the research needed to be done, showed the significance, assumptions, and scope of the study, and discussed some of the limitations and delimitations of the study.

Background to the Study

Human growth is a progression of various stages. Theorists classify the stages in different ways, but it is generally agreed among developmental psychologists that human beings go through at least seven developmental stages namely, prenatal, early and middle childhood, adolescence, early and middle adulthood and late adulthood, each representing a time when different milestones are achieved (Cherry, 2020). The onset and progression of each stage of development varies from one individual to the other, with some people developing faster, slower or at normal time frames. Puberty is arguably one of the most distinct periods of development, perhaps because of the many changes and challenges that characterize it.

Puberty is the period of growth that marks the dynamic transition from childhood to adulthood with full reproductive capacity. Kota and Ejaz (2022) defined puberty as a developmental interval characterized by three physical and sexual manifestations: 1) growth spurts resulting from increases in weight and height, the secretion of sex hormones and maturation of gonads, 2) the appearance of secondary sexual characteristics (changes in breasts and genitals, growth of pubic, facial and

body hair), and the 3) acquisition of reproductive potential. Puberty results from a complex neuroendocrine system characterized by the increased release of gonadotropin releasing hormone (GnRH) by the hypothalamus, and is influenced by the integrated multiple, central and peripheral signals leading to the physical and sexual manifestations (Kaplowitz, 2022; Stagi et al., 2020).

. Pubertal maturation is an individual process that varies within ages, gender, cultures and ethnicities. On average, pubertal maturation in girls begins with breast development (thelarche) at around age eight and lasts for a period of four to five years, culminating with menstruation (Menarche) at around age 12 (Kaplowitz, 2022). Pubertal timing is defined as the age when an individual becomes sexually mature and it can be earlier, normal or later (Krasniqi & Cakirpaloglu, 2020). This study focused on earlier than normal pubertal maturation also known as precocious puberty.

Precocious puberty has been defined in various ways. Stagi et al. (2020) defined precocious puberty as the occurrence of tanner stage B2 before age 8 in girls or tanner stage G2 before age 9 in boys. Pallavee and Samar (2018) defined the incident of precocious puberty as pubertal maturation that happens more than 2.5 standard deviations earlier than the average age. A simpler definition was offered by Al-Jurayyan et al. (2017) who referred to precocious puberty as; the appearance of any sign of secondary sexual maturation before age eight or the onset of menstruation before age 12 in girls, or the growth of pubic hair and breaking of voice before age

nine in boys. This study focused on pubertal maturation in girls and selected the onset of menstruation before the age of 12 as the defining factor for precocious puberty, regardless of when the other pubertal maturation characteristics began.

Psychosocial functioning examines aspects of people's psychological, emotional, social, behavioural and occupational functioning (Skodol, 2018). This includes how individuals feel about themselves, their emotions, behaviour, and relationship with others in the society, and how they perform at work or at school (Skodol, 2018). Although psychosocial functioning has many dimensions, this study focused on the psychological, emotional, social and occupational areas of functioning as defined by the variables self esteem, symptoms of depression, peer relationships and academic performance respectively.

Research findings demonstrate that early pubertal maturation significantly correlates with many psychosocial challenges and that girls who mature earlier than normal may experience detrimental outcomes such as emotional and conduct problems, alcohol and substance abuse, eating disorders, early sexual debut and pregnancies, strained peer relationships, poor academic performance, lower life satisfaction and reduced global functioning (Choi & Kim, 2016; Kaplowitz, 2022; Kota & Ejaz, 2021; Roberts, 2016; Villamor & Jansen, 2016).

Numerous studies show a significant decline in the age at which pubertal maturation occurs, and an increase in the incidence of earlier than normal pubertal development globally. Findings from a review on the trends of pubertal timing around the world conducted by Al- Jurayyan et al. (2017) showed that there was a clear trend towards earlier puberty. Confirming Al- Jurayyan and colleagues' findings, Eckert-Lind et al. (2020) evaluated data on pubertal timing around the world and found that the overall age of breast development had decreased with almost three months every decade from 1977 to 2013. Another study conducted by Lee (2021) found that the average age at menarche decreased from 17 years in 1840 to approximately 12 years in 2000 in the majority of developed countries. Every other continent has recorded decreases in the pubertal maturation age.

According to a study conducted in India, Jolly and Babu (2018) found that there was a long term decreasing trend of about 0.21 years in the age of menarche between the oldest and the youngest cohorts. In Korea, Lee (2021) found that the mean age at menarche decreased from 16.90 years for women born between 1920 and 1925 to 13.79 years for those born between 1980 and 1985. A study of over 20, 000 girls conducted in urban China between 2003 and 2005, found that the mean age of breast development was 9.2 years with the mean age at menarche falling to 12.27 years (Kaplowitz, 2022).

Research work in America also demonstrated a declining trend towards early puberty. Villamor and Jansen (2016) found that the average age of menarche among

girls in the United States was 14.2 years in 1900, and by the year 1920, the age of menarche had decreased to 13.3 years. An even earlier onset of menarche in America was reported by Krasniqi and Cakirpaloglu (2020) who found that the mean age of menarche was 12.4 years and that white girls reported a later age of menarche when compared with non-white girls.

Historical data from Europe shows a sharp decline in the mean age at menarche from 17 years in the early 19th century to 13 years by the mid twentieth century with a minor decrement in the last 25-30 years (Stagi et al., 2020). According to a Denmark study conducted over a 15 year period (1991-1993 vs 2000-2008), the mean age at which breast tissue appeared in girls decreased from 10.88 years to 9.86 years (Kota & Ejaz, 2021). In Ireland, the age at menarche observed in 1986 was 13.5 years, and by the year 2006, the age had decreased to 12.5 years (Villamor & Jansen, 2016).

In Africa, cases of precocious puberty have been recorded in South Africa (Nienaber & Walt, 1990), Congo (Okoumou-Mokoet al., 2014), Nigeria (Eyam & Ekpe, 2018) Ivory Coast (Abodo et al., 2017), and Kenya (Mwathe et al., 1991). According to a cross sectional study conducted in Ivory Coast between 2015 and 2017, Abodo et al. (2017) noted that the first case of precocious puberty was a girl whose pubertal maturation symptoms had begun at 5 and half years. The youngest reported case of precocious puberty in Africa so far, was in South Africa, where a six

months girl had developed all the secondary sexual characteristics including the appearance of breast, growth of public hair and the onset of menstruation at the age of six months (Nienaber & Walt, 1990). In Kenya, Mwathe et al. (1991) found clinical features of early puberty including a growth spurt, growth of pubic hair and breast development in a female Kenyan child aged 3 years. Mwathe and colleagues noted that no other such case had been reported in Kenya before this one, although it is possible that there may have been other cases that had not been reported.

After working with groups of girls of variable ages for many years, the researcher noticed that girls begun to show signs of pubertal maturation such as breast development and menstruation earlier than normal. When this happened, the girls were reluctant to attend school, and their academic work was affected negatively. This observation raised the researcher's curiosity on the incidence of precocious puberty. The questions that preoccupied the researcher's mind were among others: how much of a problem was precocious puberty in Kenya, what factors triggered its occurrence and how did maturing earlier than normal affect the daily functioning of girls? This curiosity prompted the need to conduct this study, as the researcher could not find any studies that had been conducted in Kenya that could answer these questions.

Statement of the Problem

Studies show that as a developmental milestone, puberty even when it occurs during the expected time presents many physical, psychological, medical, social,

emotional, and behavioural challenges for most girls (Brito et al., 2016; Qiuyun et al., 2021). When puberty occurs earlier than normal, the challenges may intensify perhaps because the girls and their support systems are unprepared for the radical changes that accompany this stage of development. Earlier than normal pubertal maturation has been associated with psychosocial difficulties such as self esteem issues, conduct problems, symptoms of depression, difficulty in peer relationships, poor academic performance and lower quality of life (Kaplowitz, 2022; Kota & Ejaz, 2021; Pallavee & Samar, 2018) among others challenges.

Global statistics show that the incidence of precocious puberty is on the rise both internationally and locally and that girls are 10 times more at risk than boys (Chen et al., 2018; Eyam & Ekpe, 2018; Kaplowitz, 2022; Leonard et al., 2017). Despite the compelling evidence on the rise of cases of precocious puberty across the globe, and the possible negative outcomes it may pose on developing girls, studies on precocious puberty are scanty and far between. Many studies on precocious puberty have largely focused on the incidence in general and not how it influences the psychosocial functioning (as defined by the self esteem, symptoms of depression, peer relationships and the academic performance) of young girls. The few studies on precocious puberty in Africa and Kenya have focused on abnormal pubertal maturation in children who were less than three years old in clinical settings.

The lack of studies in this emerging area means that there is a general lack of knowledge on precocious puberty and its influence on the functioning of preadolescent girls among stakeholders such as parents, teachers, therapists and peers who can provide a valuable support system for the girls. Dealing with the challenges of early maturity without support can expose the young girls to the detrimental outcomes indicated in precocious puberty, many of which have long term implications for the girls' wellbeing. This study therefore, aimed to fill the existing information gap on the incidence of precocious puberty and its influence of the functioning of preadolescent girls. It is hoped that the knowledge this study provides will not only sensitize stakeholders on the incident of precocious puberty and its influence on the psychosocial functioning of the girls, it will also enable them to seek better ways of caring for the needs of the early maturing girls, hence preventing the possible negative outcomes.

Purpose of the Study

The purpose of this study was to establish the prevalence of precocious puberty, and then determine its relationship with the psychosocial functioning of preadolescent girls in selected public primary schools in Kiambu County, Kenya.

Objectives of the Study

The specific objectives of this study were to:

1. Establish the prevalence of precocious puberty among preadolescent girls in schools in Kiambu County, Kenya.
2. Determine the relationship between precocious puberty and the self esteem of preadolescent girls, in primary schools in Kiambu County, Kenya.
3. Describe the relationship between precocious puberty and symptoms of Depression among preadolescent girls in primary schools in Kiambu County, Kenya.
4. Investigate the relationship between precocious puberty and peer relationships among preadolescent girls in primary schools in Kiambu County, Kenya.
5. Examine the relationship between precocious puberty and the academic performance of preadolescent girls in primary schools in Kiambu County, Kenya.
6. Discuss the relationship between diet, precocious puberty and the psychosocial functioning of preadolescent girls in primary schools in Kiambu County, Kenya.

Research Questions

This study sought to answer the following research questions:

1. What is the prevalence of precocious puberty among preadolescent girls in primary schools in Kiambu County, Kenya?
2. How does precocious puberty affect the self esteem of preadolescent girls in primary schools in Kiambu County, Kenya
3. In which ways does precocious puberty contribute to symptoms of depression among preadolescent girls in primary schools in Kiambu County, Kenya?
4. What is the relationship between precocious puberty and peer relationships among preadolescent girls in primary schools in Kiambu County, Kenya?
5. How does precocious puberty influence the academic performance of preadolescent girls in primary schools in Kiambu County, Kenya?
6. What is the relationship between diet, precocious puberty, and the psychosocial functioning of preadolescent girls in primary schools in Kiambu County, Kenya?

Assumptions of the Study

This study was based on the assumptions that:

1. The incidence of precocious puberty is on the increase globally.

2. Precocious puberty affects the self esteem of preadolescent girls.
3. Precocious puberty contributes to depressive symptoms among preadolescent girls.
4. Precocious puberty has an influence on the peer relationships of preadolescent girls.
5. Precocious puberty affects the academic performance of preadolescent girls.
6. Diet can influence both the onset of precocious puberty and the psychosocial functioning of the preadolescent girls.
7. The 11 year old girls were the best suited respondents to participate in a study to determine the incidence of precocious puberty.
8. The 12 year old girls would provide a perfect comparison group for the study, in order to determine whether puberty in general or precocious puberty in particular accounts for the changes in psychosocial functioning among preadolescent girls.
9. The female class teachers would be the best placed people to provide collaborative information to substantiate the information from the girls.
10. Schools would be the best place to conduct the study because many of the respondents can be found in one place at the same time.
11. Kiambu County has diverse demographic characteristics that are representative of the other Counties in Kenya and therefore, results from this study would be generalizable to the rest of the Country.

12. A pragmatic worldview would be the best approach for a study of this nature as it allows researchers the freedom to choose the best approaches that suits the needs of the study.
13. That a correlational research design was the best suited approach in order to understand the relationship between precocious puberty and psychosocial functioning.
14. A mixed method comprising of both qualitative and quantitative data was the most ideal, considering the nature and objectives of the study.

Justification of the Study

The increasing incidence of precocious puberty poses a critical global challenge to the girl child. Precocious puberty is associated with many negative psychological, emotional, social and occupational challenges such as; self esteem issues, depressive symptoms, difficulty in peer relationships, poor academic performance and lower quality of life among preadolescent girls (Jolly & Babu, 2018; Pallavee & Samar, 2018). Despite the challenges and threats it poses on the girls, studies on precocious puberty and its possible outcomes in Kenya are few. A study on the prevalence of precocious puberty and its relationship with the psychosocial functioning of preadolescent girls is therefore necessary. This information is intended to create awareness and provide knowledge that will enable parents, teachers, therapists, policy makers and other stakeholders, to seek better ways of meeting the

physical, psychological, emotional, social and occupational needs of the developing girls. Without this awareness and knowledge, the needs of the girls will remain unmet, thereby affecting their holistic development and wellbeing negatively.

Significance of the Study

The intention of this study was to create awareness and provide knowledge among stakeholders on the prevalence of precocious puberty and its relationship with the psychosocial functioning of preadolescent girls in primary schools in Kiambu County. It is hoped that findings from this study will enable parents, therapists, teachers, peers, policy makers and other stakeholders to seek better ways of caring for the early maturing girls such as: 1) availing both moral and psychological support to the girls, 2) preparing and empowering them to cope with early maturation, 4) providing menstrual hygiene materials both at home and at school and 5) controlling modifiable factors such as diet, environment and psychological factors that can influence both the onset of pubertal maturation and the psychosocial functioning of the girls. These interventions may help to prevent the possible negative outcomes associated with precocious puberty and help the girls to achieve the best possible outcomes in their psychological, emotional, social, occupational and other areas of functioning.

Scope of the Study

This study sought to establish the prevalence of precocious puberty (as defined by the onset of menstruation before age 12), and then determine its relationship with the psychosocial functioning (as defined by the variables self esteem, symptoms of depression, peer relationships and academic performance) of preadolescent girls. While precocious puberty can also be determined by physical increases in weight and height and the development of secondary sexual characteristics (such as growth of pubic hair, skin changes and the development of breasts before the age of 8), this study specifically selected the onset of menstruation before the age of 12 as the main determinant of precocious puberty. This decision was informed by the fact that menstruation is the last stage of pubertal maturation, therefore if girls are menstruating; it means that all the other signs of pubertal maturation would have occurred. Although psychosocial functioning has other aspects that can be influenced by precocious puberty, this study examined the psychological, emotional, social and occupational areas which were represented by four variables; self esteem, symptoms of depression, peer relationships and academic performance. These areas were selected because they are some of the areas that preadolescent girls struggle with.

The key participants for this study were preadolescent girls aged 11years. The calculated sample population for this study was 380 girls, who were selected from

class 5 in 13 public primary schools within Kiambu County. The sample population was determined using a formula by Yamane (1967) that has been used over the years and across the globe to determine sample sizes. Besides the 11 year old girls, this study also included 12 year old girls who were in class five and who had begun menstruating and female class teachers from each school.

The 11 year old girls were selected for the study because their age was where precocious puberty would best be determined, according to the definition of precocious puberty in the study. That is, if girls were menstruating at age 11 or earlier, they were most definitely experiencing precocious puberty. This made the 11 year old girls the ideal respondents for the study. Girls who were younger than 11 years old were excluded from the study because they were deemed too young to comprehend the nature of the study and participate effectively.

The 12 year old girls were included in the study to provide a comparison group. This group along with the non-precocious 11 year old girls helped to determine whether there was a difference in psychosocial functioning between those who had experienced precocious puberty, those who had not and those who had matured at the normal time (experiencing menstruation at the age of 12). Girls who were 12 years old and who had started menstruating before 11 were excluded from the study because they did not meet the criteria for normal puberty. As well, girls who were older than 12 years were excluded from the study, because it was expected that

majority of them would have gone through pubertal maturation successfully, and therefore, this would not be an issue for them.

The female class teachers were included in the study to provide collaborative information regarding the girls and their experiences with pubertal maturation. The teachers were selected because under normal circumstances, children spend most of their time in school and their teachers have adequate time to observe them and give reliable information regarding their psychological, emotional, social, and occupational functioning. The class teachers also have detailed information about each of their pupils. Female class teachers were specifically selected for the study because they are the first people girls would contact if they experience challenges while at school, and would easily identify those that had pubertal maturation characteristics in their classes. Male class teachers were excluded from the study because girls may shy away from sharing their pubertal development experiences with male teachers.

Kiambu County was selected for the study because it is an expansive rural urban County with different social demographic characteristics including a rural and urban population, cold and warm climates, the rich and the poor and people from different ethnicities. These characteristics were assumed to be representative of the other Counties, making it easier to generalize the results to the rest of the Country. Schools were selected for the study because most of the girls who were in this age bracket were enrolled in primary schools and groups of them would be found in the

same class at the same time. Public primary schools were preferred because whereas private schools are likely to enrol children from affluent backgrounds only, public schools enrol children from both affluent and disadvantaged backgrounds, which helped in capturing the diverse demographic characteristics.

This study was guided by the psychosocial theory of human development (Erickson, 1950). This theory was selected because it clearly stipulates the tasks and challenges that preadolescent girls go through, and the outcomes of successfully or unsuccessfully negotiating the stage. This information is key to the stakeholders as they are able to understand what the preadolescent girls are already experiencing besides the radical changes and possible adverse outcomes of precocious puberty.

Pragmatism was used as the philosophical worldview to guide this study. This worldview was selected from among many because it provided the researcher the freedom to decide the best suited approaches of research design, objectives, questions, data collection methods and analysis according to the needs of the study. The study applied the correlational and comparative research designs. The correlational design was selected because it provided the researcher the opportunity to establish the relationship between the independent variable precocious puberty and the dependent variable psychosocial functioning without conducting an experiment. The comparative design on the other hand, was selected to help in establishing whether it

was pubertal maturation in general or precocious puberty in particular that accounted for the changes in psychosocial functioning.

Limitations and Delimitations of the Study

There was little literature especially in Kenya, on the incident of precocious puberty and its relationship with the psychosocial functioning of preadolescent girls. To overcome this limitation, a diligent search for any literature on the subject was done. Additionally, the study focused on first hand data from the respondents. The study was carried out in only one County and the findings may not have been generalizable to all the 47 Counties in Kenya. To alleviate this challenge, schools were selected from each of the 13 Sub Counties of Kiambu County. It was hoped that the expansive County with its diverse demographic characteristics would represent the other Counties appropriately.

The language used in the standardized tools (the questionnaire which was the main data collection tool) was a bit technical given the age of the respondents. To alleviate this challenge, this study modified the language in the tools (without changing the original meaning) to make it easier for the girls to understand. During the data collection process, the researcher read out the questions for the girls, made clarifications and answered any questions the girls raised. The researcher with the help of the research assistant (who was recruited from the same profession as the researcher and trained ahead of the study) then helped the girls to fill in the self-

administered questionnaires. Pictures showing the different tanner stages were shown to the girls to ease understanding. In addition, focus group discussions were used with the girls and structured interviews with the class teacher's inorder to gather collaborative information for the study.

In an effort to collect data from diverse demographic characteristics, this study included schools in the interior parts of Kiambu County, where some of the parents did not speak English. To enable parents to give informed consent for their daughters to participate in the study, the consent forms were translated to Swahili for easier understanding.

It was hypothesized that the targeted girls (girls who had experienced menstruation at or before age 11) would shy off when called out from among their peers to participate in the study, especially because the classes comprised of mixed gender. To alleviate this challenge, whole populations of 11 year old girls who were in class five were invited for a 'girl's only meeting, during which an open discussion on pubertal development was held.

During this meeting, the nature and purpose of the study was explained and the respondents, whose parents had given consent and were willing to participate in the study, were invited to do so. This took care of the shyness and embarrassment that is associated with pubertal maturation. Along with the 11 year old girls, this study

also invited 12 year old girls who had started menstruating at the normal age to provide a comparison group for the study. This group along with the non-precocious group were compared to the early maturers to determine whether the psychosocial outcomes among preadolescent girls were caused by pubertal maturation in general, or precocious puberty in particular.

Chapter Summary

This chapter introduced the study by discussing the background of the study, the problem statement, the purpose and objectives of the study, the research questions, the justification, significance, assumptions, scope and the limitations of the study. Chapter two reviewed relevant literature on the prevalence of precocious puberty, and its relationship with the psychosocial functioning of the preadolescent girls.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter embarked on the review of relevant literature on the subject of precocious puberty, and its relationship with the psychosocial functioning of preadolescent girls. The aim of the literature review was to examine studies that had been conducted across the globe on the subject of precocious puberty, and identify any gaps in knowledge that the present study could fill. This literature review was organized as follows: introduction, an overview of pubertal maturation, precocious puberty and its prevalence, an overview of psychosocial functioning, the relationship between precocious puberty and psychosocial functioning, the relationship between the four psychosocial functioning variables, some factors that may influence the relationship between precocious puberty and psychosocial functioning (moderating variables), the theoretical and conceptual frameworks of the study and synthesis of the research gap.

Overview of Pubertal Maturation

Sexual development also known as puberty is a complex yet natural developmental process by which a child transitions into an adult. It is characterized by acceleration in physical growth, maturation of the gonadal axis, appearance of

secondary sexual characteristics, and the acquisition of reproductive capacity (Pallavee & Samar, 2018). Normal puberty refers to the time in which most children attain pubertal signs (growth spurts, breast and pubic hair development, skin changes and the onset of menstruation). In the 1960's cross sectional data led to the designation of the normal age range of pubertal onset to be between eight to fourteen years in girls, and between nine to fourteen years in boys (Krasniqi & Cakirpaloglu, 2020; Stephanie et al., 2022).

Pubertal maturation is defined as a biologically driven transition that encompasses rapid and simultaneous transformation across physical, psychological, biological, emotional, cognitive and social domains as the human body prepares for reproduction (Pallavee & Samar, 2018). While it is a significant life transition because it predicts maturity and reproductive ability, pubertal maturation is also a difficult and challenging period for many girls, perhaps because of the diverse and radical changes that are characteristic of this transitional period. So challenging is this period of growth that it has been labelled the age of storm and stress (Liu et al., 2021).

Pubertal maturation is not a single biological event, but a combination of hormonally driven changes, which for girls begin at the end of the first decade of life, and unfolds over a period of about three to five years, as the body prepares to transition from childhood to adulthood (Kaplowitz, 2022). Puberty begins with the growth of bones and muscles also known as a growth spurt, which is responsible for

the physical and anatomical changes that are characteristic of puberty (Pallavee & Samar, 2018). As the physical growth progresses, the brain also develops in both structure and function enabling the children to think in more abstract, advanced, sophisticated, and hypothetical ways (Choi & Kim, 2016; Krasniqi & Cakirpaloglu, 2020).

The development of secondary sexual characteristics in girls is a progressive process that begins with thelarche or the growth of breasts at around age 8, followed by pubarche or the growth of pubic and axially hair soon after (Krasniqi & Cakirpaloglu, 2020). The last stage in the pubertal development process in girls is menarche or the onset of the menstruation, which begins between three to five years after thelarche (Krasniqi & Cakirpaloglu, 2020; Pallavee & Samar, 2018). Other changes include the development and growth of the uterus and other reproductive organs (Krasniqi & Cakirpaloglu, 2020).

Precocious Puberty

Precocious puberty in girls occurs when signs of secondary sexual maturation (such as breast and pubic hair development) appear earlier than the expected average age of eight years, or when the onset of menstruation happens before the age of 12 years (Kaplowitz 2022; Kota & Ejaz, 2021). There are three types of precocious puberty classified according to the underlying physio pathological process including:

central precocious puberty, incomplete precocious puberty and peripheral precocious puberty (Brito et al., 2016; Pallavee and Samar (2018).

Central precocious puberty also known as gonadotropin dependent precocious puberty or true precocious puberty, occurs when the pituitary glands produce hormones called gonadotropins (Stagi et al., 2020). These hormones stimulate the ovaries or testes to make oestrogen or testosterone, which are responsible for the pubertal changes in girls and boys (Brito et al., 2016). There are several manifestations of central precocious puberty, with the most common one being the development of secondary sexual characteristics inconsistent with the age of the child (Pallavee & Samar, 2018).

Incomplete precocious puberty which is characterized by premature thelarche and adrenarche includes variants of normal pubertal development which sometimes may progress to complete precocious puberty (Pallavee & Samar, 2021). Premature thelarche refers to the isolated development of breast which usually regresses over a period of time, premature adrenarche refers to the development of pubic and axillary hair without breast development (normally due to mildly elevated levels of androgens or mildly advanced skeletal maturation) while isolated premature menarche refers to the onset of menstruation without any other signs of sexual development (Krasniqi & Cakirpaloglu, 2020; Pallavee & Samar, 2021). Incomplete precocious puberty does not present with the additional features of puberty such as increased growth spurts,

development of mammary glands or advancement of bone maturation (Pallavee & Samar, 2018) which are characteristic of the general pubertal maturation.

Peripheral precocious puberty also known as gonadotropin independent puberty occurs when the hormones testosterone and oestrogen trigger symptoms of puberty without the involvement of the brain, and the pituitary glands (Pallavee & Samar, 2018). Peripheral precocious puberty is rare in the general population, and the term precocity is used to describe it because it refers only to the secondary sexual characteristics (Kota & Eliaz, 2021). Central precocious puberty hereafter referred to as precocious puberty is more common in the general population and was the focus of this study.

Prevalence of precocious puberty. Studies indicate that the prevalence of precocious puberty is on the increase worldwide, and that the number of girls who experience precocious puberty is many times higher than that of boys (Brauner, 2020; Krasniqi & Cakirpaloglu, 2020; Kota and Ejaz, 2021; Lee et al., 2018). In Asia, a 2020 Indian study found that the overall incidence of precocious puberty was estimated to be 1: 5000 to 1:10000 with a male to female ratio of 10:1.2 (Krasniqi & Cakirpaloglu, 2020). Another study conducted by Huang et al. (2021) in Shanghai China, found that the prevalence of precocious puberty was approximately 100 in every 10000 persons. In a national registry based longitudinal study to investigate the prevalence and incidence of central precocious puberty in Korea from 2008 to 2014,

Kim et al. (2019) found that 37890 girls and 1220 boys were newly registered with a diagnosis of central precocious puberty. This study noted that the overall incidence of central precocious puberty increased from 122.8 per 100000 persons, to 193.2 per 100000 persons during the study period. Kim et al. (2019) concluded that the prevalence of precocious puberty was high and that it had increased steeply during the study period.

Declining age of the onset of menarche and breast development has also been observed in Europe. According to an epidemiologic study from a Danish national registry, 0.2 of all Danish females had some form of precocious puberty, while in boys only 0.05 of them were affected (Kota and Ejaz, 2021). This study concluded that there was a female predominance of about 20 to 23 per 10000 girls compared to boys which was 5 per 10000 boys. Brauner et al. (2017) conducted a population based 20 year cohort study involving 8596 children in Denmark between 1998 and 2017 and found that the annual incidence of central precocious puberty and normal variant puberty had substantially increased during the study period.

In an observational study on the incidence of precocious puberty in Spain, Lee et al. (2018) found that approximately 1 out of every 7500 children had signs of precocious puberty and that girls were 10 times more at risk than boys. Inorder to improve the epidemiologic knowledge on the incidence of precocious puberty, LeMoal et al. (2017) conducted a cross sectional study to analyse the national

incidence and spatial trends of idiopathic central precocious puberty in France between 2011 and 2013. This study found that the national annual incidence of precocious puberty was 2.68 per 10,000 girls under the age of 9 years, and 0.24 per 10000 boys under the age of 10 years (LeMoal et al., 2017).

In America, Calcaterra et al. (2021) found that the incidence of precocious puberty was estimated to be around 1 in every 500-10000. These researchers observed that there had been a consistent increase in the prevalence of earlier than normal pubertal maturation in America. In Africa, Abodo et al. (2017) conducted a study in Abidjan, Ivory Coast and found that 5 out of every 10,000 children experienced precocious puberty and that the incidence was more common in girls than boys. Another study conducted in Nigeria by Eyam and Ekpe (2018) showed that the prevalence of precocious puberty was approximately 1 in every 7500 per children population with a female to male ration of 10: 1. Eyam and Ekpe (2018) were convinced that there would have been greater numbers were it not for the stigma, superstations, religious beliefs, and ignorance that caused many of the cases of precocious puberty in Africa to go unreported.

Considering the above findings, the present study made the following conclusions: 1) there was a general decline in the age at which girls experienced puberty, 2) cases of precocious puberty among girls were on the increase globally and that 3) girls were generally more at risk for precocious puberty than boys.

Overview of Psychosocial Functioning

Psychosocial functioning examines how people generally function in their social, emotional, relational, occupational, behavioural, and others aspects of their lives (Skodol, 2018). This may include but is not limited to how they feel about themselves, their emotions, behaviour, and relationship with others in the society, and how they perform at work or at school. Although psychosocial functioning can be defined by many aspects, this study considered the psychological, emotional, social and occupational areas of functioning as defined by self esteem, symptoms of depression, peer relationships and academic performance respectively. Each of the variables is discussed below.

Self esteem

Self esteem, also known as self love, self respect, self completeness or self importance is a component of the self-concept that Rosenberg (1965) defined as the totality of the individual's thoughts and feelings about him or herself. Several other people have defined self esteem. According to Abdel-Khalek (2016), self esteem is the barometer of self-evaluation, an individual's sense of worth or value, or the extent to which a person values, appreciates, approves, prizes or likes him or herself. Gupta et al. (2016) defined self esteem as a measure of an individual's sense of self worth based on perceived success and achievements, as well as a perception of how much one is valued by peers, family members, teachers and society in general. Self esteem

can also be defined as the assessment that people make of themselves, expressing an attitude of either approval or disapproval, which shows the competence that individuals possess to believe in themselves, their capabilities, strengths, weaknesses, abilities, attitudes and values (Levine, 2020).

Minev (2018) described four categories of the self esteem: 1) real self esteem is the actual state of the qualities one possesses at a given point in time and is the basis for behaviour and choices that an individual makes in life, 2) perceived self esteem is a person's subjective notion about how others perceive his or her qualities, and the opinion of significant others about him or her, 3) regulatory self esteem relates to the expectations of others towards an individual's behaviour and it reflects the person's self appraisal when his or her behaviour is compared to the social norms, and moral values of the society they live in, and 4) ideal self esteem which reflects a person's views and aspirations for achieving a level of development that meets his or her ideals and values.

Levels of self esteem. Self esteem is typically viewed as a continuous dimension ranging from high to low although it can also be moderate. Abdel-Khalek (2016) wrote that people with high self esteem are happy, motivated, optimistic, resilient, self-regulated and goal directed. High self esteemed people feel good about themselves, have a positive outlook about life and are able to; accept happy moments, engage in close relationships, work on self-improvement and resolve conflicts

rationally. High self esteem has been considered an important shield against anxiety and is associated with better: mental health outcomes, adjustment to social environment, emotional stability, adaptability and occupational performance. High esteemed people are: less anxious, rarely depressed and more persistent in the face of difficulties (Li et al., 2019).

While high self esteem is a good trait that predicts good outcomes, excessive high self esteem can become narcissistic. Narcissism is characterized by a conceited, arrogant, grandiose, inflated, self-image and a desire for power, coupled with a sense of entitlement and lack of regard for others (Hepper, 2016). Narcissists expect to receive positive evaluations from others and when they receive negative evaluations, their egos are easily threatened. High self esteem is differentiated from narcissism in that while self esteem involves feeling comfortable with one self and equal to others, narcissism involves feeling grandiose and superior to others (Li et al., 2019).

Low self esteem on the other hand is characterized by: feelings of worthlessness, inferiority, emotional instability and a general dissatisfaction with life. People with low self esteem have a negative attitude towards others, situations and life in general (Abdel-Khalek, 2016). Low self esteem has been linked to: poor school performance, serious behavioural (such as aggression, early sex initiation, alcoholism, delinquency substance abuse, suicidal tendencies and general maladjustment), psychological (such as loneliness and alienation, social anxiety, depression, poorer

mental health and suicidal ideations) and general (such as somatic complaints, fatigue, less competency to perform tasks and overcome difficulties and decreased level of wellbeing) problems (Abdel-Khalek, 2016; Gupta, 2016; Li et al., 2019). The pubertal period is a critical time for the development of self esteem and self-identity and low self esteem may endanger the young people's emotional regulation (Abdel-Khalek, 2016).

Domains of self esteem. People possess not only views of their global worth, but also views of their specific abilities in different domains such as social, scholastic, athletic appearance and general conduct (Gupta et al., 2016). Self esteem can either refer to the overall self or to specific aspects of the self-such as; how an individual feels about his or her social standing, racial or ethnic group, physical features, co curriculum skills, and occupational performance (Abdel-Khalek, 2016). Physical appearance has been identified as one of the biggest predictors of self esteem during puberty (Gupta et al., 2016).

Formation and development of self esteem. Self esteem is a relatively stable personality trait which forms early in life in response to personal experiences, response from significant others and temperamental factors. Self esteem can be weakened or strengthened depending on how individuals are treated by significant others and how they respond to life situations (Noronha et al., 2018). For example, if an individual's feelings are respected, their thoughts valued and their abilities

recognized during childhood, their self esteem is strengthened, but if their feelings are trampled on, their thoughts belittled and their abilities criticized, their self esteem is weakened (Noronha et al., 2018). Self esteem rises when a person succeeds, is praised or experiences love, thus self esteem is not only dependent on ones perception of himself, but also others perception of the individual (Noronha et al., 2018).

Children develop a conscious sense of self esteem between 8 and 11years, although younger children's behaviour indicates that they already possess some representation of their worth (Hepper, 2016). Self esteem starts off high in childhood, drops drastically at the start of adolescence and then gradually increases during adulthood until approximately 60 years of age at which point it begins to decline as people enter old age (Gupta, 2016; Hepper, 2016). This trajectory varies by gender in that during puberty girls generally suffer a larger drop in self esteem than boys, while in old age men suffer a larger drop in self esteem than women (Hepper, 2016).

The drop in self esteem during the transitional periods is attributed to the psychosomatic changes during adolescence or changes in status and responsibilities during old age. Self esteem is a crucial variable for understanding identity development and individual's functioning, and underpins the development of mental and psychological health adjustment. It is a major key to success in life and the development of a healthy self esteem is extremely important for good personal and social adjustment (Abdel-Khalek, 2016). The pubertal period is important for the

process of self esteem formation and parental involvement and willingness to give autonomy are positively correlated to high self esteem during puberty (Li et al., 2019).

Depression

Most people experience sinking feelings of sadness, nervousness, discouragement and loneliness, especially after going through difficult experiences such as; divorce, bereavement or loss of a livelihood. However, when sinking feelings persist for more than two weeks and interfere with the daily functioning of the individual, it becomes a serious mental health problem (Bhanawal et al., 2017). Depression is used to describe a range of experiences ranging from a slightly noticeable and temporary decrease in mood, simple sadness and mild tiredness to the most profound state of apathy and severe symptoms of anhedonia, depressed mood and a set of correlated emotional, cognitive, motivational, neuro vegetative and somatic symptoms (Bhanawal et al., 2017). Although there are many classifications of depressive disorders, this study specifically focused on clinical depression also known as Major Depressive Disorder.

Clinical depression is a mental disorder characterized by prolonged sadness, discouragement, despair or hopelessness that lasts for weeks, months or longer (Bhanawal et al., 2017). The general symptoms of clinical depression include: loss of interest or pleasure in previously enjoyed activities, prolonged sadness or emptiness, hopelessness, helplessness, worthlessness, guilt, restlessness, anger, irritability,

changes in appetite and sleep, fatigue, difficulty in concentrating or decision making, chronic or psychosomatic pain, withdrawal from friends and family, and suicidal ideations (Bhanawal et al., 2017). While depression among children and adolescents has many similarities with adult depression, there are many differences that create a distinction between the two diagnoses. One major difference is that children and adolescents have high rates of internalizing problems, making their symptoms more difficult to recognize. Another difference is that rather than the sad, hopeless, worthless or empty feelings experienced by adults, children and adolescents exhibit increased behaviour problems, irritability and tearfulness (Bhanawal et al., 2017).

According to Minev (2018), children and adolescents who suffer from depression experience low mood, inability to experience joy, decreased or drop in energy, and problem solving deficits. Depressed children possess fewer social skills when compared to their non-depressed peers, have difficulty expressing themselves, do not engage in social relationships, and during latency, social isolation is a stronger indicator of depression in girls than boys (Minev, 2018). In adolescents, depression is characterized by; low self esteem, a negative view about oneself and the surrounding world, thoughts of self harm, school avoidance, academic decline, risk taking behaviour, psychosomatic illnesses, excessive guilt and worry, unexplained tears and fatigue among other symptoms (Minev, 2018).

Diagnosing depression. In order to meet the criteria for Major Depressive Disorder, the Diagnostic Manual for Mental Disorders (DSM-V) requires that children and adolescents exhibit either a depressed mood (expressed through irritability, reckless behaviour, acting out, anger and hostility in adolescents and nonverbal actions such as frowning, poor eye contact and crying in children), or loss of interest or pleasure in normal activities (such as peer interactions, school work or play). Besides depressed mood and loss of interest, children and adolescents must also exhibit four other symptoms that can either be: unexplained weight gain or loss, lack of sleep or oversleeping, changes in appetite, unexplained pains and aches, difficulty in concertation or decision making and suicidal ideations. These symptoms must be present for a period of two weeks or longer for a child or adolescent to be diagnosed as suffering from clinical depression (DSMV, 2013).

Prevalence and comorbidities in depression. Depression has been ranked as the second most common cause of death among children and adolescents (Khalid et al., 2017). According to a study conducted by Waller et al. (2018) the prevalence of Major Depressive Disorder among children in primary schools in western cultures ranged from 1.9 to 3.4 percent, while among adolescents the prevalence was 8 percent. This study noted that among children and adolescent diagnosed with a major depressive episode, there was a 70 % rate of recurrence within 5 years, and that 50 % of children and adolescents who suffered from depression, had a recurrence at least once in their life time (Waller et al., 2018). Depression in childhood and adolescence

is often accompanied by other mood or mental disorders. Waller and colleagues study found significant comorbidity rates between depression in children and adolescents and; impaired psychosocial functioning, conduct, and anxiety disorders, lower academic outcomes and suicidal ideations.

Gender differences in depression. Females seem to be more vulnerable to depression than males in the general population. Studies show that there is a twofold greater prevalence of depression in females than males, although the differences do not begin at birth. According to Jiang et al. (2021), women are twice as likely as men to be diagnosed with depressive disorders and much more likely to exhibit depressive symptoms than men. Before puberty, depression rates remain similar between males and females, but at menarche women's bodies undergo psychological, environmental and psychosocial changes along with a sudden change in the level of oestrogen and other sex steroids that are known to be associated with depression (Jiang et al., 2021). Supporting this finding, Shen et al. (2019) noted that pre pubertal boys have a higher proportion of depressive symptoms than girls, but the depression level of girls gradually increases in puberty. They attributed this difference to among other things the hormonal changes in puberty, the body image dissatisfaction, the decline in parent child relationships, peer pressure and academic demands (Shen et al., 2019).

Causes and risk factors of depression. Depression can be caused by a combination of psychological, biological, social, environmental and genetic factors as discussed below. Genetic predisposition: people with a family history of depression (for example a child whose parents or grandparents have had an episode of depression) have three to four times increased rates of depression compared to their peers who have no history of depression in their families of origin (Bhanawal et al., 2017).

Psychological risk: Proulx (2022) noted that stressful life events such as rejection and social exclusion, bereavement, chronic illness, sleep deprivation, rumination, financial challenges and life transitions can trigger depressive symptoms. In addition, people who have low self esteem and those who have a pessimistic attitude towards life are more vulnerable to depression than those who are well adjusted, have normal or high self esteem and have an optimistic view of life (Bhanawal et al., 2017; Proulx, 2022). In children and adolescents, Minev (2018) noted that those who have learning difficulties, anxiety, and behavioural disorders and those who experience life challenges such as bereavement or stress, are at a higher risk for depression. It is worthwhile to note that individuals who have a genetic predisposition for depression show increased sensitivity to psychosocial risk factors than those who do not (Bhanawal et al., 2017).

Advanced pubertal status or physical development. In girls, advanced pubertal status or physical development has been associated with depressive symptoms, and is thought to be the reason for the gender differences in rates of depression during adolescence (Jiang et al., 2021). The fact that increased prevalence of depression correlates with hormonal changes in girls implies that the female hormones may be a trigger for depression (McGuire et al., 2019).

Social support: family and friends provide a stable support system that may help to deal with stress and reduce the risk of depression among individuals. Unfortunately, the 21st century is characterized by urbanization and busy work schedules that have led to the breakdown of the traditional social and family structures. This leaves the family systems scattered with no one to turn to in their time of adversity, making them more vulnerable to depression.

Peer Relationships

Peer relationships refer to the social interactions that occur between people of the same age, and who have similar skills and knowledge. According to Saedibona (2017), members of peer groups tend to be similar to one another in behavior and attitudes, which has been explained as being a function of homophily (a situation where individuals who are similar in behavior and attitudes choose to spend time together, and individuals who spend time together shape each other's behavior and

attitudes). Simply stated, people's character influences their choice of friends, and friends influence each other's character.

Peer relationships during childhood usually focus on shared activities such as play with peers of the same age and gender. However, during puberty same gender peer groups that were common during childhood expand into mixed gender groups comprising of both same gender and opposite gender peers in the same age bracket (Barboza and Schiamberg, 2021). Peer relationships during puberty are characterized by intimate exchange of thoughts and feelings that include; personal disclosure, vulnerability and loyalty or betrayal, which significantly influences the young people's outlook of the world.

Statuses in peer relationships. There are three major classifications of peer statuses: 1) popular children who are generally liked by their peers 2) neglected or rejected children who are generally disliked by their peers, and 3) controversial children who are neither liked nor disliked by their peers. Expounding of the statuses, Selvam (2017) wrote that the popular status comprises of individuals who are sociable, happy, friendly, and cooperative. These individuals are: skilled at social interactions, good at maintaining positive relationships, and are open to giving support to their friends. People with a popular status are self confident without being conceited, maintain open lines of communication with peers and are sensitive to the

needs of others. They are capable of being assertive without being aggressive and are able to control negative emotions (Selvam, 2017).

The neglected or rejected group is made up of individuals who are generally disliked by others. People in this category are aggressive, impulsive, and emotionally reactive, easily angered and have fewer social skills (Selvam, 2017). Due to these deficits rejected individuals find it difficult to initiate and maintain positive peer relationships and as a result they tend to be isolated and lonely. The rejected status comprises of two categories; i) the aggressive rejected who display hostile, threatening and disruptive behavior, bully others, withhold friendship, and lack in social competence and, ii) the withdrawn rejected who are socially withdrawn, timid in social situations, lack confidence and are at risk for being bullied (Selvam, 2017). Both categories of the rejected status are at a greater risk for behavioral problems such as delinquency, emotional problems such as anxiety and depression, and are more likely to get in trouble with the law.

The controversial status comprises of individuals who possess the characteristics of both the popular and rejected status. Controversial individuals tend to be cooperative and social, but they can also be aggressive, disruptive, and prone to anger (Selvam, 2017). They can initiate interpersonal relationships, but due to their uncontrolled emotions they find it difficult to maintain the relationships. Individuals in this category are neither liked nor disliked by others (Selvam, 2017).

Dynamics in peer relationships. Peer relationships are multifaceted, meaning that they are not only experienced through one on one association with friends; they are also experienced through group participation. Developmental psychologists have identified three main levels at which peer interactions occur: 1) dyadic relationships which are predominantly pairs of friends, 2) cliques which are smaller peer groups whose members regularly meet and interact with each other and 3) crowds which start to emerge during puberty and are often so large that peers do not necessarily know each other personally (Selvam, 2017). The latter two are discussed below.

Crowds are large groups of individuals who share a set of values, behaviour and norms (Moran et al., 2017). One major characteristic of crowds is that they can be relatively abstract without the peers necessarily interacting with each other. Moran et al. (2017) noted that peer crowds are more symbolic than concrete, more cognitive than behavioural and that identification with a particular peer crowd is a cognitive rather than a purely interactional process.

People can identify with a crowd and adopt its norms even though they do not have in person contact with the crowd members. In the same way, a person may follow a certain behavioural pattern associated with a crowd, but not cognitively identify with that particular crowd (Moran et al., 2017). Because crowd membership is initially outwardly imposed, individuals can be classified by peers as belonging to a crowd that they do not consider themselves as part of. For example, girls who have

experienced signs of pubertal maturation early automatically belong to the ‘early bloomers’ crowd whether willingly or unwillingly.

Individuals develop a sense of identity from the social crowds and categories they belong to. Identification with a social crowd or category provides people with a sense of esteem and belonging and helps them structure and make sense of their environment (Moran et al., 2017). This is particularly relevant for young people who use peer crowds to help them navigate the complex social world. Social identification with a peer crowd also helps people to structure their behaviour. As young people identify more strongly with a particular peer crowd, they begin to map the crowd’s prototype into their own identity and subsequently use the prototype to guide their own behaviour (Moran et al., 2017). Thus, young people who identify with peer crowds for which risky behaviour is normative will be more likely to engage in that risky behaviour because they are acting in accordance with their social identity.

Moran et al. (2017) observed that crowds serve an essential purpose in young people’s identity development especially during puberty, shaping individual values, behavior and both personal and peer expectations. Both preadolescent and adolescent children define themselves by the crowd to which they belong, such that the group one belongs to, becomes their own provisional identity.

Cliques are groups made up of individuals who interact frequently with one another and who share similar interests (Labrum, 2016). Like crowds, cliques are often bound together by shared social characteristics such as ethnicity and socioeconomic status. One person may be a part of multiple cliques each functioning independently from the others. Cliques differ from crowds in that cliques are generally smaller in size and have very specific boundaries. Labrum (2016) noted that the structural cohesion of the clique is the constant face to face interaction between members that can either create or dissolve the group, depending on the level of interaction. Labrum argued that if face to face interaction is regularly established, then cohesion between individuals will form. However if the face to face interaction depreciates, then the cohesive social bond between the said individuals will eventually dissolve (Labrum, 2016).

Cliques may exhibit external social influence by impacting on the emotions, opinions or behaviors of group members (Labrum, 2016). Individuals can experience social isolation within their cliques, if their values or behavior begin to differ from the rest of the group. For example if a member of a clique begins to dress differently from the cliques dressing culture, they may face excommunication by the rest of the group members.

One of the key contexts in which peer relationships including crowds and cliques develop is the school. This is especially true for the preadolescent girls who spend most of their time in school. According to Nangle et al. (2020) schools are social environments where feelings of belonging, acceptance and respect for differences enhance both personal growth and academic success. Both positive and negative peer relationships can coexist within the same school, and students may experience both kinds of peer dynamics either as victims or perpetrators.

Peer verses parental relationships. Although puberty is a time when young people distance themselves from their parents, Fatima et al. (2018) argued that the parent child relationships are essential to an individual's psychological health, and that those who have strong relationships with their families also maintain good relationships with their peers. Sackman and Terway (2016) concurred with Fatma and colleagues, when they wrote that strong relationships with the family and positive adult role models were associated with better emotional development, better performance in school, and less engagement in high risk activities like drug abuse and irresponsible sexual behaviour in adolescents. Supporting the above sentiments, Sharon et al. (2018) noted that secure parental attachments not only influence attachments with peers and significant others later in life, they also promote healthy adolescent adjustment, predicting higher self esteem, greater life satisfaction, better college adjustment and less psychological distress. While children identify with

parents and role models, pubertal children identify with peers who offer a conducive environment for growth and self knowledge that families cannot provide.

Significance of peer relationships. Peer relationships during puberty play a significant role in the lives of individuals. Sharon et al. (2018) argued that peers play such an influential role in preadolescent children's lives that the credibility, authority, power and influence of peers are greater during this period than any other time in life. The magnitude of influence depends on the nature of the group the individuals engage in and their personalities. There are two primary dimensions characterizing preadolescent peer relationships: 1) support, which reflects positive quality relationships and 2) conflict, which reflects negative quality relationships. Some of the areas where peer relationships have significant influence on pubertal children are discussed below.

Individuation. Puberty is a period of turbulence characterized by anxiety, doubts, indecision and many questions, as the young people crave to form their own identity and attachments, inorder to achieve autonomy and become self-reliant. Sharon et al. (2018) noted that positive peer relationships and friendships are crucial in helping adolescents deal with developmental tasks such as identity formation, acquisition of social skills, the development of self esteem and the establishment of autonomy and independence from parents. Selvam (2017) supported Sharon and colleagues when he wrote that peer groups provide a secure way of moving away

from the protection and control of the family towards greater independence by providing the much needed emotional support and encouragement. Similarly, Nangle et al. (2020) supported the above sentiments when they wrote that peer relationships provide companionships, psychological closeness, shared activities, emotional support, and social comparison especially during puberty, when the young people are establishing autonomy and independence.

Identity formation. The formation of identity is shaped by the society one lives in and the people one interacts with. Peer groups influence the; attitudes, values, aspirations and lifestyle of individuals which is critical for identity formation and a sense of belonging. According to Sharon et al (2020), peers support the identity formation and individuation process by providing information about the world outside the family, giving useful feedback about one's abilities and providing a source of comparison.

Socialization. Socialization is the process by which individuals learn the way of life of the society in which they live. Through socialization people learn what is acceptable and unacceptable and how to meet the expectations of the society. Selvam (2017) posited that peer relationships help in establishing an identity, and also functions as a major agent of socialization. As they live and interact with their peers, children learn how to behave with people outside their family, learn about teamwork, loyalty, social roles, leadership and cooperation (Selvam, 2017). They learn to

understand and judge the feelings and thoughts of others and to respect them. Peer groups also provide individuals with an opportunity to learn how to behave in a group, mingle with others, control social behaviour, develop relevant skills and interests, share problems and feelings and receive general moral guidance (Selvam, 2017). Peer relationships also provide children with opportunities to explore their interests and learn about social behavior such as; self-expression, turn taking, empathy, and self-control (Gray et al., 2018). Friendships and interactions with peers allow children to learn about cooperative play and sharing and to gain important social skills that they will use for the rest of their lives.

Growth. Peer groups provide a basis for moral, cognitive and social growth. Selvam (2017) asserted that involvement in social activities in which there is a good deal of give and take, can promote moral growth and a ground for change from the self-centeredness and selfishness that is characteristic of children to a morality of cooperation. Peer groups provide an environment where individuals learn: 1) to be keen observers of peers interests and perspectives inorder to smoothly integrate themselves into ongoing peer activities, 2) self-regulatory skills that can be used to regulate their emotional expressions in contexts that evoke emotions, and 3) the principles of fairness and justice by working through disagreement with peers (Selvam, 2017).

General well being. Engaging in positive peer relationships has been linked to higher levels of emotional wellbeing, increased adoption of values for prosocial behaviours and more positive belief in oneself. Sharon et al (2018) posited that peer relationships can be an important source of affection, intimacy, sympathy, alliance, feeling of inclusion and enhancement of self-worth, and has been linked to both current and future wellbeing of children. These researchers observed that: 1) having positive peer relationships in early and elementary school years had been associated with an increase in social competence and acceptance through ought the later school years, 2) individuals who participated in social networks had better: perceived self-worth, sense of wellbeing and engaged in more healthy behaviour, 3) positive psychological traits such as optimism and happiness were significantly and positively associated with supportive peer relationships in early adolescence, 4) high quality relationships served as a protective factor with positive effects on adolescent health including decreased risk of emotional and behavioural problems, and that 5) inclusion in peer groups in early adolescence had been associated with high levels of wellbeing, lower levels of emotional distress and better school adjustment. Sharon et al. (2018) concluded that peers were valuable social contacts who contributed to young people's health and subjective wellbeing.

Better social adjustment. Thornberg et al. (2018) noted that preadolescents with healthy peer relationships were happier and better adjusted, than those who had conflictual peer relationships or those who were socially isolated. Tellen and

Rodriguez (2016) supported the critical role peer relationships play during puberty, when they argued that being socially accepted and having friends in middle school was positively related to more prosocial behaviour, psychological adjustment, less antisocial behaviour, better academic achievements, and negatively associated with aggression and maladjustment. Tellen and Rodriguez (2016) also noted that affiliation with a peer group may reduce the tendency to develop internalizing problems such as anxiety and depression, and concluded that peer groups may have norms against the expression of delinquent, aggressive or risky behaviour, which could reduce the expression of externalizing problems in individuals.

Better functioning. Fatima et al. (2018) argued that relationships and associations with others lead people to a sense of being valuable parts of the society, motivate them towards building communities, and encourages them to work for the warfare of others. Fatma and colleagues noted that people who have high levels of support in their social relationships function better both physically and psychologically, when compared to people with low support.

While positive and supportive peer relationships have rewarding outcomes as discussed above, negative and conflictual relationships or the inability to establish peer relationships could have adverse outcomes on the functioning of young people as discussed below.

Poor adjustment. Thornberg and colleagues observed that children who experience serious and continuous difficulty in establishing and maintaining healthy peer relationships during their primary school years, were at a greater risk for a lifetime of maladjustment in areas of emotional, social and behavioural health. Such children, Thornberg et al. (2018) observed, exhibit deficits in social skills and problematic social behaviours that alienate their peers, making it difficult for them to make friends and avoid peer rejection. This leads to an unending cycle in which the more they are rejected by others, the worse their behaviour gets, and the worse their behaviour gets the more they are rejected by peers.

Mental health challenges. Rejection or being overlooked by peers as is common among individuals in the rejected status, can lead to loneliness or hostility, which in turn can lead to mental health challenges. Selvam (2017) wrote that while positive peer relationships in adolescence were linked with positive mental health at midlife, poor peer relationships in childhood or the inability to engage in social networks were associated with different challenges such as delinquency, alcoholism, school drop outs and mental disorders during adolescence. Thornberg et al. (2018) noted that while positive peer attachments could enhance preadolescent's wellbeing, negative peer relationships or the inability to find a peer group to belong to, can have significant physical, psychological, social, emotional and occupational consequences for them. Brito et al (2016) supported the above sentiments when they posited that

friendships can have low levels of support and increased levels of conflict and pressure, which are associated with negative outcomes such as higher levels of depressive symptomatology, less social participation and more interpersonal issues.

Negative behaviour. Peer groups are some of the strongest influence of behaviour during puberty. While involvement with good peer groups promotes good behaviour outcomes, engagement with bad peer groups could cultivate negative behaviour in pubertal children. Considering that this is an age when the young people want to belong with others they may choose to get into deviant groups than be isolated by their peers. Selvam (2017) observed that majority of juvenile crimes were committed by groups and even when it was an individual effort, there was support from an undercover group.

Academic Performance

Academic achievement is a multifaceted construct that comprises of different domains of learning. It involves meeting goals, achievements and objectives set in programs or courses that a student attends (Aurora & Singh, 2017). Academic performance is differentiated from academic achievement and refers to how well learners meet standards that are set out for them by the schools and the government (Bell, 2018; Maganga, 2016). For example the scores acquired by a learner in examinations or tests set for them by their learning institutions or in standardized exams that are set by the government for all learners nationally.

In typical school settings, learners demonstrate their academic efforts by participating in class activities and discussions, making class presentations, turning in homework, and taking written examinations (Maganga, 2016). Academic performance is assessed through teacher's ratings, tests and both internal and external examinations. Teachers evaluate learners in the form of letter or number grades, and offer comments to describe how well a student has done, or to back up the specific grades that were given (Maganga, 2016). Achievements in academic work are marked by the successful completion of educational benchmarks such as primary and secondary school certificates or college degrees (Maganga, 2016). Although there are many ways of assessing academic performance, results from written exams were used to evaluate academic performance in this study.

*Importance of academic performance.*Academic performance as measured by standardized assessments that are designed for selection purposes (such the Kenya Certificate of Primary Education exams set by the Kenya National Examination Council) is a key factor in determining the future career goals of learners. According to Kapur (2018), academic performance plays a significant role in the economic and social development of a country, by producing professionals who form the human resource and leaders for such a nation Reinstating Kapur's sentiments, Maganga (2016) argued that education polishes the mind, reinforces the cognitive processes, strengthens people's character and behavior towards others and equips people with

information in various fields in general, and specific areas of specialization in particular.

Steinmayr et al. (2017) supported the above sentiments when they wrote that education is one of the most important aspects of human resource development as it not only inculcates the essential skills, abilities and knowledge among individuals, it also influences the economic and social development of a nation. Steinmayr and colleagues observed that educated people were able to accomplish their desired goals and objectives, and also render efficient contributions towards the wellbeing of communities through their leadership and skills. According to these authors, the strong association between a societies' level of academic achievement and positive socioeconomic development, is one of the reasons why parents' teachers, governments and other stakeholders overemphasize the need for hard work and good grades among students (Steinmayr et al., 2017).

As career competitions grow stronger in the workplace, the importance of students doing well in school has drawn the attention of many stakeholders including; the learners themselves, parents, schools, legislators, governments and employers. On their part, learners have to put the greatest effort in their studies to obtain good grades, and to prepare themselves for future opportunities in their career and job market (Steinmayr et al., 2017). Schools are concerned about mean grades and the benefits that come with the overall academic performance of a school. The ministry of

education is charged with the responsibility of improving schools, and so they device methods of measuring success in order to create plans for improvement, while employers pay keen attention to school performance as they look to hire new employees (Steinmayr et al., 2017).

Academic performance and extracurricular activities are considered to be fairly reliable predictors of future wellbeing and success. Kapur (2018) argued that better grades and involvement in extracurricular activities help in the prevention of negative behaviour development, and aids in optimal functioning of children. Kapur suggested that tracking of student's academic performance is important because results provide a framework for parents and other stakeholders to identify areas of weaknesses' in students, so that they can find ways of improving them, thereby maximizing the learning process (Kapur, 2018).

Factors that affect academic performance. The academic performance of learners is affected by many factors including; caregivers academic socialization, physical activity, personality, intelligence, motivation, skills, interests, study habits, and the teacher student relationships among others. Some of these factors are expounded below. Caregiver's academic socialization refers to the way parents and guardians influence their children's academic performance by shaping their skills, attitudes and behaviors towards school (Maganga, 2016). The caregiver's socioeconomic status can also influence the academic performance of learners. For

example, highly educated and wealthy caregivers tend to have more stimulating learning environments than the less educated and poor caregivers (Maganga, 2016). It is worthwhile to note that while these sentiments could be true to some extent, they cannot be generalized to all the caregivers. There are some uneducated caregivers who are very keen on giving quality education to their children, while some wealthy caregivers are carefree about their children's education.

Kapur (2018) wrote that physical activity increases neural activity in the brain, thus increasing the executive brain functions such as, thinking, reasoning, memory, and attention all of which are key elements in improving academic performance. Kapur further noted that participation in extra curriculum activities in school is linked to variables such as; positive peer relationship and behaviors, identity development and mental health which can improve academic performance. Supporting Kapur, Maganga (2016) observed that social support and development which can be acquired through organized after school activities is beneficial for achieving academic success.

Personality and Intelligence has also been linked to academic performance. Expounding on these factors, Aurora and Singh (2017) wrote that learners with high mental abilities, those who put a lot of effort in their school work and those who are self-motivated tend to achieve highly in their academic work, when compared to those who have low mental ability and are unmotivated. Interestingly, Aurora and Singh (2017 observed that high achieving learners were more likely to be characterized by

negative self confidence, selfishness, a high level of anxiety, hostility towards authority and difficulty in interpersonal relationships. It is the opinion of this study that these sentiments are not generalizable to everyone, as there are low achievers who also possess the above characteristics, while some high achievers are selfless, reliable and balanced individuals. This study suggests that teachers and caregivers help all learners to develop social, emotional and interpersonal skills so that they can grow to be balanced individuals.

Apart from the factors highlighted above, Maina (2019) identified several other factors that may affect academic performance including; levels of self esteem (people with normal or higher self esteem perform better than those with low self esteem) behaviour (truant children usually perform poorly in school due to issues such as abseentism, disrespect for authority and constant conflict with peers), health and general wellbeing (learners who are stressed, depressed or sickly are likely to perform poorly in school).

The Relationship between Precocious Puberty and the Psychosocial Functioning of Preadolescent Girls.

Pubertal maturation is a dynamic physical, psychological, biological, social and emotional process that is accompanied by visible physical changes in the body and the onset of secondary sexual characteristics (Pallavee & Samar, 2018; Villamor & Jansen, 2016). Although some girls may go through the pubertal stage without any

challenges, majority of the girls are likely to report high levels of psychosocial challenges even when pubertal maturation occurs at the normal time. Research suggests that an earlier onset of pubertal maturation in girls correlates with a number of detrimental health, social and psychological outcomes when compared with on time or later maturation as discussed below.

Brito et al. (2016) observed that puberty as a developmental milestone even when it occurs during the normal time presents many physical, psychological, medical, social, emotional, and behavioural challenges for most girls. When puberty occurs earlier than normal, the challenges may intensify considering the unpreparedness of both the girls and their support system. According to Kota and Ejaz (2021), earlier than normal pubertal maturation has adverse effects on the social, behavioural and psychological development, can reduce the adult height potential and may shift some lifelong health risks to the girls. These researchers noted that precocious puberty is associated with advancement in bone age, which leads to early fusion of epiphyses, resulting in reduced final height and short stature. Kota and Ejaz (2021) concluded that early sexual maturation was a very challenging diagnosis as the differential varies from benign variants to serious conditions such as malignancy.

These sentiments were echoed by Costello et al. (2016) who in a study named the smoky mountains; found that girls who experienced earlier than normal pubertal maturation were more likely to report higher levels of psychological distress,

psychiatric problems, criminality, alcoholism, non-marital sex, social isolation and substance abuse compared to their peers who developed later. Similarly, Choi and Kim (2016) found that early pubertal maturation significantly correlated with many psychosocial challenges including; emotional and conduct problems, substance abuse issues, eating disorders, strained peer relationships, risky sexual behaviour, poor academic performance, lower life satisfaction and reduced global functioning.

Kaplowitz (2022) also supported the negative outcomes of precocious puberty when he wrote that earlier than normal pubertal maturation had been linked with psychosocial difficulties, was a risk factor for younger age at first sexual intercourse and carried negative implications for long term health including: depression, increased risk for type 2 diabetes, weight gain, cardiovascular disease, obesity and even premature death. Adding to the possible negative outcomes of precocious puberty, Chen et al. (2018) observed that an early onset of puberty could lead to a number of adverse health consequences in later life including; hormone related cancers, metabolic syndrome and higher risks of all-cause mortality. Similarly, Shen et al. (2019) noted that early menarche has been associated with many health problems such as diabetes, breast cancer, obesity, cardiovascular disease and psychological disorders.

In summary, the above studies confirm that girls who mature earlier than normal are at a greater risk for a range of 1) psychological problems such as distress

and low self esteem, 2) emotional problems such as depression and anxiety, 3) behavioural problems such as substance abuse, precocious sexuality, and delinquency, 4) social problems such as social isolation and strained peer relationships, 5) occupational problems such as poor academic performance, 6) health problems such as breast and endometrial cancers, obesity, type 2 diabetes, cardiovascular disease and all-cause mortality and 7) physical problems such as short adult stature and obesity among other challenges. Although precocious puberty can cause many psychosocial challenges, studying all of them was beyond the scope of this study. This study therefore, focused on the psychological, emotional, social and occupational aspects of psychosocial functioning as defined by the self esteem, symptoms of depression, peer relationships and academic performance respectively. The relationship between precocious puberty and these four variables are discussed below.

The Relationship between Precocious Puberty and Self esteem

Puberty is the period of time when the self concept and the self esteem develop. Wehrle and Fasbender (2018) defined the self concept as the totality of a complex, dynamic and organized system of beliefs, attitudes, and evaluative judgements that people hold about themselves, while self esteem involves evaluating how one feels about his her own self-concept. Self esteem starts out early but drops drastically as children enter puberty (Hepper, 2016). The dramatic changes in self

esteem during puberty maybe attributable to many factors including; weight increases, body image concerns, changes in peer relationships, changed role perception and societal expectations during puberty.

Precocious puberty, physical changes and self esteem. A person's body continuously changes over the lifetime due to factors such as growth and development, environmental changes and physical health. Ayselozdemir et al. (2016) observed that during puberty, nearly every part of the body goes through physical changes, altering a child's morphology significantly. Ayselozdemir and colleagues noted that, due to the activation of the hormones controlling pubertal development, and the acceleration of the secretal system, adolescents go through a rapid period of growth known as a growth spurt, which accounts for the many changes that are experienced during the pubertal stage. It is estimated that; 15-25% of the final adult height is gained during the growth spurt of puberty, one third of adult bone mass occur during and immediately after puberty, and that during the peak of the linear growth spurt, females gain roughly 8-9 cm of height per year, and experience about 120 % of body fat (Ayselozdemir et al., 2016).

As these physical changes progress, the internal organs change in size, and the reproductive organs begin to mature (Ayselozdemir et al., 2016). According to Chen and Eugster (2016), it takes less time for early maturing girls to progress from tanner stage 2, which is characterized by breast budding and pubic hair development

to menarche. An earlier timing or faster progression of pubertal development has been linked to higher body mass index and greater risk of overweight and obesity in adolescence and early adulthood (Chen & Eugster, 2016).

While increases in height, weight and body fat is normal during puberty, many girls tend to view them negatively, especially when they occur earlier than normal. Commenting on this Gupta et al. (2016) wrote that body image is critical for the adolescents' self-definition because they have been socialized to believe that appearance is an important basis for self evaluation and for the evaluation of others. For pubertal girls, the social pressures exerted by constant media messages about the perceived ideal body type can cause significant levels of dissatisfaction about their body. Gupta et al. (2016) posited that thoughts about body image and self esteem are so inextricably linked that perceived appearance is the strongest single predictor of self esteem among both male and female pubertal children. These researchers concluded that although many factors affect the self esteem of adolescents, there are good reasons to believe that changes in body image may be crucial for understanding this trend (Gupta, 2016).

Fraser (2017) supported the relationship between early puberty, weight gain and self esteem. According to this study, early maturing girls are more likely to report body dissatisfaction and poor self esteem and to engage in disordered eating than their later maturing counterparts. Fraser posited that 19 % of all preadolescent females are

estimated to engage in some form of disordered eating behaviour, and to display distorted body perception, but early maturation may magnify normative concerns with body shape and weight. This researcher concluded that because puberty incited weight gain physically distances early maturing girls from both the current idealized thin body type, and the bodies of their less developed peers, a comparatively earlier age of sexual maturation confers increased risk for eating pathology by triggering body dissatisfaction and low self esteem (Fraser, 2017).

Further support for discomfort with weight gain during puberty is found in the work of Jolly and Babu (2018). This study found that gaining weight at the beginning of puberty, may lead girls to engage in behaviours similar to those seen in eating disorders such as dieting, weight concerns and a need to exercise. Jolly and Babu (2018) concluded that increases in weight can lead to obesity and body weight dissatisfaction in girls with precocious puberty, which has an implication on their self esteem.

Studies conducted in the United States and Australia showed that body dissatisfaction was a wide spread issue among preadolescent girls, and that there was a well established connection between girls' body dissatisfaction and their self esteem (Choi & Kim, 2016). These researchers noted that individuals progressing through puberty showed lower levels of self esteem than their prior or post pubertal peers (Choi & Kim, 2016).

Due to the advancement in bone age which leads to early fusion of the epiphyses, girls with precocious puberty grow taller than their peers during childhood, but they end up with a reduced final height and short stature (Kota and Ejaz, 2021). The short duration of time that early maturing girls have to assimilate physical changes might exacerbate feelings of anxiety, confusion and fear, while the physical changes themselves are a risk factor for a variety of psychosocial challenges such as low self esteem, decline in academic work and strains in interpersonal relationships (Kaplowitz, 2022; Pallavee & Samar, 2018). The 'abnormal' physical development is regarded as bizarre by peers, and it can lead to bullying and teasing in young girls, which in turn can lead to low self esteem. One of the most serious long term consequences of early puberty is the reduced final height and short adult stature because it not only differentiates the girls from peers during adolescence, but also in adulthood which may affect their levels of self esteem for a lifetime (Kota and Ejaz, 2021).

Another physical change that may influence levels of self–esteem during puberty is changes in the skin. Eyuboglu et al. (2018) noted that acne affects more than 80 % of pubertal children. Skin changes even when they appear at the normal time can be a source of discomfort for the developing girls. However, when they appear earlier than normal they distant the early maturing girls from both the current cultural and media ideologies of beauty (portrayed as a thin tall body and a smooth

flawless skin), and their same age peers. This may impact on how they perceive their bodies and result to lower levels of self esteem.

Precocious puberty, biological changes and self esteem. Puberty is initiated when a hormonal signal from the pituitary glands stimulates the sex glands (ovary and testes) to secret the sex hormones, oestrogen and testosterone (Stagi et al., 2020). These sex hormones are responsible for; the growth spurts (such as changes in weight and height), the development of primary and secondary sexual characteristics (such as budding of breast, the appearance of pubic hair, and the onset of menstruation in girls), fertility, and increases in sexual drive (Stagi et al., 2020). Although all the changes during puberty have the potential to cause disturbance among girls, the onset of menstruation is arguably one of the most radical signs of pubertal development. Menarche is known not only for its dramatic and sudden transition, but also for the impact it has on the developing girls. Kiesner et al. (2019) argued that even when it occurs at the expected time, the menstrual flow in and of itself is a challenge for many girls. Many girls report discomfort, embarrassment and shame during their menstrual flow which has a negative impact on their self esteem (Shah & Madiha, 2017).

The hormonal shifts associated with puberty may result in arousal, excitability or excessive emotionality, which may be complicated by neurological changes that spark increased desire for risk taking and sensation seeking early in puberty (Kiesner et al. 2019). Mehrabi et al. (2016) noted that girls who experience early menarche are

more likely to abuse alcohol, experiment with sex, bear children at an early age, obtain low paying jobs, experience a startling array of psychological difficulties, and rear children in environments characterized by chronic stress, all of which may have a negative impact on their self esteem. Supporting Mehrabi, Jolly & Babu (2016) wrote that early sexual activity at a time that the girls are not cognitively mature to make informed decisions, may lead to many negative consequences including; teenage pregnancy, abortions, early parenthood, school dropout, an increased risk of having more children while still a teenager, a lower quality of life, and lower levels of self esteem.

Precocious puberty, cognitive changes and self esteem. Puberty is a period of time when the self awareness and the self concept undergo a profound development (Kakonge et al., 2022). The physical changes such as increases in body weight and acne that accompany pubertal maturation, have a strong influence on the way girls perceive and evaluate themselves, and on their global self esteem (Kakonge et al., 2022). This is particularly true in early puberty when the physical appearance tops the list of factors that determine global self esteem for girls.

Girls with early pubertal development not only have to cope with the difficulties experienced in puberty, they also have the disadvantage of being too young and lacking in skills to understand and cope with the challenges of puberty (Krasniqi & Cakirpaloglu, 2020). Given their precocious physical appearance, the

society may ascribe unwarranted perceptions of maturity unto the girls, and expect too much from them. For example, parents may expect the girls to take up more responsibilities, while teachers may expect them to understand concepts quickly, at a time that the girls do not have the cognitive ability to handle these expectations. The challenges of having to cope with early pubertal changes and societal demands with fewer or no cognitive skills can lead to confusion and stress which in turn may lower the girls' self esteem.

Precocious puberty, changing trends and self esteem. There is an increased pressure by the media to maintain a thin body with a flawless skin as those are regarded as the definition of beauty (Latiff et al., 2018). Unfortunately the increases in body weight that are synonymous with puberty, move the early maturing girls further away from the trendy thin female body ideal and from their peers. Girls, who find themselves plump at an early age in a culture that glorifies thinness, may become overly preoccupied with their physical appearance and develop a negative body image leading to low self esteem.

Relationship between Precocious Puberty and Symptoms of Depression

Pubertal maturation in general and precocious puberty in particular has been associated with symptoms of depression. According to Costello et al. (2016), the female pubertal maturation in and of itself is a stressful life event that places all individuals at an increased risk for depression. Several empirical studies support this

argument. In a study that sought to explore self consciousness and depression in precocious pubertal children and analyse its effect, Huang et al. (2021) found that the children with precocious puberty had higher rates of depression compared to those without, and that girls were more prone to anxiety and unhappiness than boys (Huang et al., 2021). These researchers concluded that children who experienced early puberty were at a greater risk of developing psychosocial problems than children with normal puberty because their emotional and cognitive development did not match the physical changes that occurred in early maturation (Huang et al., 2021).

Another study conducted by Jiang et al. (2021) to examine the influence of pubertal development stage on depression, and its psychosocial mechanisms in a non clinical population in china found that: 1) pubertal development was positively correlated with depression, low self esteem and interpersonal stress, 2) adolescent depression was closely associated with adult depression and suicidal ideations, 3) depression in puberty could affect normal growth, impair social relationships with friends and family and cause serious educational barriers, and that 4) body dissatisfaction was a major predictor of low self esteem, depression and eating disorders in adolescents. Explaining the causal relationship between early maturation and depression, Jiang et al. (2021) noted that the media along with significant others have painted a picture of beauty as thinness for girls which causes body dissatisfaction, low self esteem and the risk of depression. This study identified low

self esteem as the key mediator underpinning the predictive role of puberty in adolescent depression (Jiang et al., 2021).

Supporting the above studies, Mendle et al. (2018) wrote that early pubertal maturation in girls was associated with higher rates of depressive symptomatology, substance use, suicidality, panic attacks, and academic difficulties. Mendle and colleagues posited that females who matured earlier than normal continued to report elevated psychopathology even later in life (Mendle et al., 2018).

Findings from a study conducted to compare the association between breast versus pubic hair development and depression among female adolescents showed that: 1) girls who were at more advanced stages of breast development at age 14, had more depressive symptoms than girls at lower stages of breast development, irrespective of age at pubertal onset and that, 2) girls who were at more advanced stages of breast development at age 14, continued to report depressive symptomatology and were more likely to meet the criteria for major depressive disorder at age 17 (Lewis et al., 2018). Lewis and colleagues concluded that girls at more advanced stages of development were at an increased risk for depressive symptoms.

In a study to establish the role of relational aggression in the relationship between pubertal timing and youth internalizing psychopathology, Pomerants found that early pubertal timing in girls and late pubertal timing in boys were related to elevated levels of relational aggression, which was in turn associated with elevated

levels of internalizing problems. Pomerant's study also examined both depressive and anxiety symptoms as key indicators of broadband internalizing problems and found that early pubertal timing was indirectly associated with both anxiety and depressive symptoms (Pomerants, 2016).

How pubertal timing influences depression. The causal relationship between the timing of puberty and depression has been investigated. McGuire et al. (2019) investigated how the biopsychosocial changes during puberty contributed to, and predicted exacerbations of depressive symptoms in girls during early adolescence. This study found that; the physical, hormonal and psychological changes during puberty, coupled with the academic and social demands, and the search for identity and meaning were significant stressors that could cause depression among young girls. McGuire and colleagues also noted that the hormone oestrogen (which increases dramatically in girls during puberty) was associated with depressive symptoms. This study concluded that the predisposed hormonal vulnerabilities interact with environmental stressors to contribute to the onset of depression in young girls (McGuire et al., 2019).

The role of hormones in the development of depressive symptoms during puberty was supported by the study of Mendle et al. (2018). This study found that the neural and hormonal changes during puberty increases sensitivity to social influences which creates a bewildering array of new social norms and expectations

such as; changes in friendships, increased contact with peers, heightened parental conflict, and the emergence of psychological distress in the adolescent's social network (Mendle et al., 2018). These social changes, together with the integrated nature of the pubertal transition such as; increases in gonadal hormones, body changes, reactions in circadian rhythms and sleep wake cycles, along with other life stressors at a younger chronological age, can trigger the development of psychopathology (Mendle et al., 2018).

The brain plays a role in the development of depressive symptoms during puberty. Lewis et al. (2018) observed that during puberty, there is an inconsistent maturation across the brain systems that are involved in cognitive control (the prefrontal lobes) and those that are involved in emotional arousal and reactivity (subcortical limbic regions). Earlier pubertal maturation showed heightened responsivity in subcortical regions in response to social cues, while the prefrontal regions develops independent of puberty. The imbalance across neural systems without consistent and solid cognitive control is believed to contribute to emotional dysregulation and risk for psychopathology, in the face of life challenges (Lewis et al., 2018).

The Relationship between Precocious Puberty and Peer Relationships

During puberty girls have a great desire to identify and be accepted by their peers. Marceder-yus et al. (2018) noted that puberty is a period of time when girls do

not want to be differentiated from their peers in any way or form. Unfortunately, the body changes during puberty cause the early maturing girls to be physically out of step with age mates at a developmental stage when social comparison increases in significance. This makes it difficult for them to initiate and maintain friendships with same sex peers who have not developed at a similar rate. Kota and Ejaz (2019) noted that when girls mature early, they are forced to make difficult choices as to whether to keep same age peers who are less developed than themselves, or join older peer groups that are not only more developed physically, but they are also mentally and cognitively developed than they are.

Developing faster than peers may result to rejection by age mates or too many expectations from adults. Stephanie et al. (2019) posited that because of their mature physical appearance, precocious children may experience higher social pressure and unrealistic expectations from significant others. In an attempt to belong with others, precocious girls who do not fit in or who are rejected by their peers may choose to join older groups who may seem to understand them, but who may introduce them to negative behaviours such as; substance abuse, precocious sexuality, and delinquency (Sackman & Terway, 2016). The confusion over where to belong with others, the struggle to fit in and the rejection by peers may initiate feelings of anxiety, negative self-appraisal, psychological distress, loss of confidence, low self esteem and depressive symptoms among early maturing girls (Choi & Kim, 2016; Kota & Ejaz, 2019).

The Relationship between Precocious Puberty and Academic Performance

Studies show that there is a relationship between the onset of puberty and academic performance, and that early maturing girls are more likely to exhibit poor academic performance than on time or later maturing girls. In a study to determine the effects of physical changes during puberty on the self esteem and academic performance of primary school pupils in Sagana, Kirinyaga West County, Maina (2019) found that there was a decline in both self esteem and academic performance among pubertal girls. This was attributed to the physical changes that accompany puberty (such as breast and hip development), which were thought to influence the girls' social adjustment and limit their interactions at school and at home. Supporting Maina's findings, Mendle et al. (2018) noted that one of the challenges of early pubertal maturation is that it shortens the time available for children to acquire, internalize and strengthen their adaptive and coping skills, putting them at a risk for adjustment difficulties. As this is school going age, adjusting to academic demands amid the dynamic changes that happen during puberty can have a toll on the academic performance of the girls.

Torvik et al. (2021) conducted a study to investigate the relationship between puberty and academic performance, and found that earlier pubertal maturation was associated with higher academic achievement in both girls and boys. Torvic and colleagues argued that two factors may have contributed to these results: 1) that

maturation could have brought an awakening to the pupils to the fact that their future educational and professional opportunities depended heavily on the grades they receive in school, and therefore they needed to work harder, or 2) The maturity reflected the crossing of a cognitive threshold, that made the young individuals well suited to excel in school.

Interestingly, Torvik et al. (2021) also found that early age at menarche in girls was associated with lower academic performance. Although this seems like a contradiction, it can be explained in many ways: 1) it is possible for some girls to negotiate the pubertal stage without any challenges and therefore their academic work remains unaffected, 2) since the onset of menarche has been known to be the most destabilizing of the developmental changes, it is possible for some girls to continue to perform well in school even after showing signs of pubertal maturation such as breast and hip development, but when menarche sets in, it destabilizes the girls causing a decline in their academic performance.

Pubertal changes and academic performance. The radical changes that accompany pubertal development have been implicated in preadolescent's academic decline. According to Martin and Steinbeck (2017), puberty is a period of self-discovery and self-assertion characterized by diverse physical, biological, hormonal and social changes, turbulence in mood, and lack of stability, all of which may affect the way children learn. Martin and Steinbeck (2017) further noted that pubertal

maturation is accompanied by changes in the self concept and hormone concentration which may have an impact on the behaviour and academic work of preadolescent girls (Martin & Steinbeck, 2017). For example, the changes in the self-concept and hormone concentration may increase arousal or emotional lability causing the girls to see themselves as equal to adults like teachers and to respond to them in inappropriate ways leading to disciplinary actions (such as suspensions) that may affect their academic work in negative ways.

The onset of puberty is also associated with changes in drive, motivation and preferences which can have significant implications for school work. Martin and Steinbeck (2017) claimed that the rising gonadal hormones may sensitize the brain's reward system, making preadolescents more receptive and reactive to rewards that may impact motivation and behaviour, which in turn affects their school work in positive or negative ways. Changes and preferences in sleep patterns during puberty may also affect academic performance. Kedro (2017) observed that most pubertal individuals prefer to stay up late at night and wake up much later in the day. As a result they are typically more tired in the morning and most alert in the afternoons. This presents challenges in concentration and retention during school hours, which has negative implications for their academic performance.

Precocious puberty, the brain and academic performance. The functioning of the brain plays a significant role in learning. Sackman and Terway (2016) expounded

on how the brain works during the preadolescent stage. The limbic system where the sensory processing of emotions and instincts happens develops earlier, while the prefrontal lobe where the executive function for skills such as planning, prioritizing, strategizing, paying attention, managing time, organizing, impulse control and weighing consequences develops later. As a result, pubertal children experience quicker responses to areas like the amygdala, which are connected to emotions and instincts, and almost sluggish responses to their prefrontal cortex.

Because the prefrontal cortex which is the mood modulator of the brain takes longer to mature, pubertal children are likely to: respond to situations emotionally rather than rationally, often experience mood swings and emotional turmoil, and become more prone to engage in risky behaviours, all of which have the potential to negatively affect their school work. Supporting this argument, Kedro (2017) argued that since the preadolescent's brain relies more readily on the amygdala, the area of the brain responsible for impulsive behaviour, they may act more irrationally and make irresponsible decisions, which may affect their overall academic performance.

Precocious puberty, problem behaviour and academic performance. According to Kilinc (2019), girls who go through puberty early, are more likely than their peers who mature later, to be involved in bullying in school either as perpetrators or victims. Kilinc examined data on pubertal timing experiences with bullying among 222,443 teenage girls in 35 countries between 2001 and 2010. This study found that

31 % of the girls who started menstruation early were either victims or perpetrators of occasional bullying compared with about 26 % of girls who started menstruating at age 12 or later. Being bullied in school has a negative effect on the self esteem of girls, which may lead to poor academic outcomes. On the other hand, being a bully puts one at loggerheads with school administration, which also affects their academic work negatively.

Precocious puberty, menarche and academic performance. One of the greatest challenges that young girls have to deal with is the onset of menarche (Kiesner et al., 2019). This transition in and of itself can cause a negative impact on the academic performance of the early maturers. Maina (2019) claimed that when menstruation begun, pubertal girls worried about: 1) how to manage their menses, 2) lack of sanitary materials, 3) menstrual accidents such as soiling their clothes, 4) how to dispose the used pads and 5) how to behave in school in order to keep their experiences a secret, especially where boys and male teachers were involved. Such worries may distract the girls from their studies leading to low academic performance.

Relationship between Variables

It is worthwhile to note that while precocious puberty affects the four psychosocial functioning variables self esteem, depressive symptoms, peer relationships and academic performance, the four variables have an influence on each other. For example, low self esteem can lead to depressive symptoms and affect the

way girls relate and learn. Some of the symptoms of depression such as withdrawal and lack of interest can affect both peer relationships and academic performance. Similarly, strains in peer relationships characterized by bullying, rejection and isolation may lead to low self esteem and depressive symptoms which in turn can affect academic performance. Children who perform poorly in their school work may experience lower levels of self esteem, feel depressed and avoid others for fear of being laughed at. These relationships are explored below.

Self esteem and Symptoms of Depression

While it is clear that a relationship exists between self esteem and symptoms of depression, the causal relationship between the two variables is unclear. Some studies posit that levels of self esteem influence depressive symptoms, while some other studies maintain that depression influences levels of self esteem. Two models; the vulnerability and the scar models explain the relationship between self esteem and depression (Manna et al., 2016). Proponents of the vulnerability model conceptualize that low self esteem is a stable personality factor that predisposes individuals to depression, while proponents of the scar model propose that low self esteem is a consequence rather than a cause of depression (Manna et al., 2016). Supporters of the scar model argue that experiences of depression may leave scars on the individual's self concept that progressively wears off their self esteem over time (Manna et al., 2016).

In order to establish the relationship between self esteem, anxiety and depression and test the vulnerability and scar models, Manna et al. (2016) conducted a study among Italian students. After exploring the differences by gender and age in the two models, Manna and colleagues found that, the effects of self esteem on depression and anxiety symptoms were significantly higher, compared to the effects of anxiety and depression on self esteem. This study concluded that ; 1) high self esteem was negatively related with depression, 2) high self esteem was a protective factor against depression especially during puberty, 3) adolescents with low self esteem developed more depressive and anxiety disorders during adulthood than adolescents with high self esteem, 4) girls tended to report higher levels of depression and anxiety than boys in both models and 5) pubertal children with high self esteem had better coping resources and were protected against the consequences of stressful life events, while those with low self esteem were more vulnerable to stress (Manna et al., 2016).

A study carried out by Bhanawal et al. (2017) to investigate the correlation between depression and self esteem among dental students of Udaipur, found that low self esteem and depression had strong negative correlations, and that improving self esteem reduced the risk of depression regardless of whether the individual was enduring stressful or non stressful experiences. These findings were supported by Bajaj et al. (2016) who found that low self esteem predicted increases in anxiety and depression overtime.

Henriksen et al. (2017) examined the role of self esteem in the development of anxiety, depression and attention problems in a clinical psychiatric sample of adolescents. This study found that high self esteem was positively related to symptoms of depression, anxiety, and attention problems in the clinical sample of adolescents. The study also demonstrated that self esteem protected against the development of attention deficit, anxiety and depression problems among adolescents under treatment for mental health problems. Henriksen et al. (2017) concluded that adolescents with high self esteem suffered fewer symptoms of anxiety, depression and attention problems over time, indicating that self esteem acted as a resilience factor against such symptoms.

In their study to find out whether self esteem in early adolescence predicted depressive symptoms in late adolescence and early adulthood, Masselink et al. (2018) found that self esteem in early adolescence was directly and indirectly associated with changes in depressive symptoms in late adolescence, and only indirectly to changes in depressive symptoms in early adulthood. Masselink et al. (2018) suggested that having an average self esteem level was better for the physical and mental capacity of individuals, than having a higher or lower self esteem.

Peer Relationships and Symptoms of Depression

Relationships with others can have an influence on the emotional functioning of preadolescent girls. In a study to test the moderating effect of psychosocial

functioning in the relationship between the quality of interpersonal relationships and depressive symptoms, Brito et al. (2016) found that lower levels of psychosocial functioning in the domains of academic achievement and relationship with family and friends were predictive of depressive symptoms. Brito et al. (2016) suggested that, since there is a strong association between poor peer relationships and the development of depressive symptoms in puberty, the key to decreasing the risk of depression was the existence of significant sources of social support for the pubertal children.

Adedeji et al. (2022) conducted a study to determine the association between peer relationships and the severity of depressive symptoms among adolescents. Findings demonstrated that good quality relationships corresponded to lower depressive symptoms for both girls and boys. However, when they conducted gender specific analysis Adedeji et al. (2022) found that peer relationships had more robust predictive capacity for girls' depressive symptoms than boys, and that peer relations had a more substantial buffer effect against depression for girls than for boys. This study concluded that the quality of peer relationships was a significant predator of adolescent's depressive symptoms severity, and that improved peer acceptance, dependability and ease in making new friends were significantly associated with reduced depressive symptoms. Mendle et al. (2018) supported the above findings, when they observed that difficulty in getting along with less physically developed peers, and affiliation with new and often older peers were key risk factors for the

onset of depression and development of antisocial behaviour among early maturing girls.

Self esteem and Peer Relationships

Levels of self esteem can influence how people relate with others. Harris and Orth (2020) carried out a Meta analysis of longitudinal data on the prospective effect of social relationships on self esteem, and the prospective effect of self esteem on social relationships, inorder to answer the question of whether and to what extent a person's social relationships influenced their self esteem. This study found that high self esteem led to improvements in a person's social relationships, and that the link between social relationships and self esteem was reciprocal in all the developmental stages across the life span, reflecting a positive feedback loop between the constructs (Harris & Orth, 2020).

In a study to determine the effect of peer groups on the self esteem of Langung and Java students, Mujiyati and Adiputra (2018) found that peers had a significant influence on the self esteem of students. These researchers argued that peer groups provide encouragement, understanding and the support that students need to thrive, and added that peer groups accounted for 34.9% of students' self esteem. These researchers concluded that when students are accepted, valued and acknowledged by peers their self esteem improves, but when they are rejected or ignored by peers their self esteem deteriorates (Mujiyati & Adiputra, 2018).

Self esteem and Academic Performance

Academic performance and extracurricular activities are considered to be fairly reliable indicators of future wellbeing and success (Kapur, 2018). While there is a general consensus among researchers that there is a relationship between self esteem and academic performance, there is no agreement on the causal relationship of the two variables. Some researchers suggest that good schoolwork leads to high self esteem; hence self esteem is as a result and not a cause of school performance (Doodman et al., 2017). Other researchers argue that high self esteem leads to good academic performance and therefore, self esteem is a cause and not a result of school performance, while yet others argue that self esteem and academic performance are interdependent variables that impact on each other in a continuous cycle (Yazon et al., 2017). Several studies carried out among high school, university and college students of different ages, in different countries, at different time spans and for different lengths of time found positive correlations between self esteem and academic performance.

Doodman et al. (2017) conducted a study among high schoolers in Lamerd, and found a significant relationship between self esteem and academic achievement. Their explanation for this finding was that learners with low self esteem put little or no effort in their academic work and as a result, experienced less success or failed altogether. Doodman et al. (2017) recommended that parents and teachers make

efforts to raise the self esteem of their students, by encouraging them rather than comparing them with their peers.

In another study conducted among undergraduate students from various departments at the University of Swat, Correlating (2018) found that when compared to other variables such as stress and body image, self esteem was one of the key factors that affected an individual's academic performance (Correlating, 2018).

Yazon et al. (2017) conducted a study to assess the level of self esteem, self efficacy and academic performance among college students, to determine the relationship between these variables. This study found positive correlations between self esteem and academic performance. Explaining this finding, Yazon and colleagues wrote that students who had a high self esteem were happier, more resilient, less likely to use drugs and alcohol, more persistent at difficult tasks, more sociable and generally performed better academically (Yazon et al., 2017). On the other hand, college students with low self esteem tended to be less sociable, were more likely to use drugs and alcohol, and were more vulnerable to depression, all of which contributed to low academic achievement. Yazon and colleagues concluded that academic achievement was a major contributory factor to most college student's self esteem.

In a study to determine the level of self esteem and its association with academic achievement among students, Mirzaei- Alavijeh et al. (2018) found that self esteem was significantly correlated with academic achievement. This study recommended planning for psychological interventions to increase student's levels of self esteem, which would in turn increase their academic achievement (Mirzaei-Alavijeh et al., 2018).

Considering the above studies, the present study concludes that: 1) Self esteem is an important variable that influences almost all areas of functioning among young people. 2) Low self esteem is a cause and not a consequence of depression. 3) People with lower levels of self esteem are more vulnerable to depression than those who have moderate or higher levels of self esteem. 4) Strains in peer relationships can lead to depressive symptoms which in turn can lead to other outcomes such as low academic performance and lower levels of global functioning 5) The relationship between peer relationships and depressive symptoms is bidirectional. That is, while strains in peer relationships can lead to symptoms of depression, many depressed people tend to withdraw from people which can lead to strains in peer relationships, 6) There is a bidirectional relationship between self esteem and peer relationships. That is people with lower levels of self esteem have difficulty initiating relationships and strains in or lack of peer relationships can lead to lower levels of self esteem, and 7) There is a bidirectional relationship between self esteem and academic performance. This study recommends that stakeholders such as parents, teachers and

peers do everything within their power to maintain healthy levels of self esteem among children during all levels of development.

Factors that Influence the Relationship between Precocious Puberty and Psychosocial Functioning (moderating variables)

There are many hypotheses as to why some girls mature earlier than others and why the age of puberty has dropped drastically over the years. Villamor and Jansen (2016) observed that the increase in the age of menarche from the Neolithic period to the industrial revolution age and its well documented decline during the 20th and 21st century indicate that the onset of puberty is responsive to the changes in the environment. Greenspan and Lee (2018) supported the arguments above when they wrote that although genetic factors remain the predominant determinant of pubertal timing, the shift towards an earlier age of puberty in the past century coincided with improvements in public health, nutrition, and the influence of endocrine disruptors. The above observations are supported by many population based studies (Brito et al., 2016; Kota and Eliaz, 2019; Li et al., 2017) that have linked the variations in the timing of puberty to genetic, socio economic, nutritional, environmental, and medical factors.

The aforementioned factors are classified as moderating variables in this study because they can influence both the onset of pubertal maturation and the psychosocial functioning of the preadolescent girls. Studying each of the factors is beyond the

scope of this study, however, because some of them are modifiable and can be controlled to prevent the incidence of precocious puberty and its adverse negative outcomes on the psychosocial functioning of the preadolescent girls, each of them is discussed briefly.

Genetic Factors

One of the factors that has been linked with early pubertal maturation is genetic predisposition. According to Lee (2021), genetic factors account for 50-80% of all cases of pubertal timing. The role of genetic factors in the development of early puberty is demonstrated by; comparisons of age at menarche between mothers and their daughters, variations in timing between children of different racial backgrounds, comparison of pubertal timing between monozygotic and dizygotic twins or sibling pairs, familiar trends (the existence of more than one affected member either in the proband generation or in pedigree) and large scale genome wide association studies among others (Calcaterra et al., 2021; Canton et al., 2019).

According to a retrospective single study carried out on 139 families over a period of eight years to establish the relationship between genetic factors and precocious puberty, Durand et al. (2016) found that; 1) a significant number of children were affected by precocious puberty, 2) the number of affected girls was higher than that of boys, 3) all of those affected had at least one relative with precocious puberty and 4) an exclusively maternal mode of transmission was either

inferred or observed in most of the families. Durand and colleagues concluded that genetic factors were the strongest predictors of early puberty in different world populations. Although genetic factors play a major role in the onset of puberty, there is a consensus that environmental variables such as weight, foetal nutrition, childhood dietary habits, physical activities, psychological factors and exposure to electromagnetic fields and endocrine disrupting chemical also play a key role.

Environmental Factors

Environmental toxins have been implicated in earlier than normal maturity among girls. According to Stephanie et al. (2022) industrialization introduces toxic elements and pollutants in the environment, some of which are endocrine disrupting chemicals that have adverse effects on human life. Endocrine disrupting chemicals are exogenous synthetic substances that affect the synthesis, secretion, transportation, metabolism, binding action and catabolism of natural hormones by mimicking, blocking or altering hormone levels and interfering with the regulation of the endocrine system (Stephanie et al., 2022). These substances can either accelerate or delay puberty due to their interruption of normal hormonal activity.

There are several categories of endocrine disrupting chemicals including; 1) Chlorinated hydrocarbons which may cause shorter than average adult heights in females and delayed puberty in males. 2) Plastics that can disrupt the endocrine balance within the body. 3) Prescribed medications such as those used in assisted

reproductive techniques that have untoward effects in foetal or early childhood development of the offspring. 4) Substances such as phthalate esters and surfactants that are commonly used for packaging, storing and preserving food that have been related to earlier menarche in girls. 5) Pesticides such as Dichlorodiphenyl Trchloroethane (DDT) that have estrogenic and antiandrogen effect that can cause reproductive health and developmental problems. 6) Some brands of nail polish, hair spray, deodorants and body fragrances that are high in phthalates and that contain large amounts of oestrogen, which if ingested or inhaled can cause rapid growth and earlier than normal maturity. 7) Isoflavones, a natural substance in soy that acts as a weak form of oestrogen and that has been shown to increase the rate at which breast cells reproduce leading to premature breast development in young girls and 8) chemicals such as Bisphenol which accelerates the timing of pubertal maturation significantly through its estrogenic activity. (Greenspan & Lee, 2018; Stephanie et al., 2022).

The endocrine disrupting chemicals can be transferred from the mother to the foetus through the placenta, to the baby though breastfeeding, or can accumulate in the environment in the long term and get introduced into the human body through water, air, food or through equipment used in the home or office (Stephanie et al., 2022). The prenatal, infancy and childhood periods are considered critical windows of susceptibility due to ongoing developmental processes that are vulnerable to the endocrine disrupting chemicals (Calcaterra et al., 2021). Exposure of the endocrine

disrupting chemicals to human foetuses, new born babies and young girls can alter the growth of mammary glands leading to premature sexual development many years later (Stephanie et al., 2022).

Inorder to minimize the effects of environmental factors on children's development, the following precautions can be taken: 1) thoroughly cleaning of all fruits and vegetables before consumption, 2) avoiding the use of plastic containers in the microwave oven, 3) avoiding the use of harmful pesticides, insecticides or herbicides in farms, 4) reading labels on personal care products and checking out for phthalates and other toxic or hormone mimicking chemicals, 5) teaching children healthy ways of living such as handwashing, proper diet and exercise and 6) ensuring drinking water is free of impurities and toxins.

Medical Factors

Some medical conditions have also been linked to early pubertal maturation among girls. Medical conditions such as; central nervous system tumours, cerebral palsy, head trauma, meningitis, long standing hypothyroidism, defects or tumours to the brain or the spinal cord and ovarian cysts in girls, can lead to early puberty if they are not detected and treated early (Kota & Ejaz, 2021; Pallavee and Samar, 2018). The most common brain lesion that causes central precocious puberty is hypothalamic hamartoma, which presents with precocious puberty in infants as young as one year or less (Kota & Ejaz, 2021).

Diet

Food can be defined as anything solid or liquid which when swallowed, digested, and assimilated provides the body with the essential nutrients for its optimal functioning. According to Kapur (2021), food is a necessity that enables growth, provides the body with energy to perform tasks, repairs the organs and tissues, regulates body functions and protects the body from sickness and diseases. Both micro and macro nutrients such as carbohydrates, proteins, vitamins, minerals, fibre, fats and water are the constituents in food that must be supplied to the body in the right quality and quantity to enable it to function to its full capacity.

Each of the micro and macro nutrients serves a different purpose in the body as expounded by Kapur (2021). Carbohydrates provide the most efficient source of energy for the body because they are easily broken down into simple sugars and are quickly converted into glucose in the liver (Woodhouse & Lamport, 2021). Proteins help in maintaining and repairing body tissues and building new ones, while vitamins facilitate effective growth and normal functioning of the body. Minerals such as calcium, iron, sodium, iodine, phosphorous and potassium help in building of teeth, bones, and soft tissues, and also play a crucial role in the regulation of body processes such as clotting of blood, contraction of muscles and nerve stimuli. Dietary fibre helps in keeping the gut healthy and helps in reducing the risk of diseases such as diabetes. Water is an essential part of the body that accounts for 60% of all body weight and

helps in maintaining the body temperature, utilizing of food substances and the removal of food waste from the body (Kapur, 2021). A balanced diet helps to promote and maintain good health, and also provides a reserve of nutrients to withstand short periods of deprivation.

Intiful (2020) identified several factors that may influence the choice of food people eat including: 1) Culture and religion: Cultural and religious influences have affected food choices for a long time. For example, people in the Hindu religion do not eat beef because the cow is believed to be a sacred animal, and Jews and Muslins do not eat pork because pig is thought to be an unclean animal. 2) Social economic status: Food choices come with a cost. Less nutritious and energy dense food is often cheaper than highly nutritious food. As such, people within a higher social class may differ with those in the lower social class when it comes to food choices. People with a higher socioeconomic status eat healthier diets perhaps because they are more health conscious and can afford high quality food. On the other hand, low income people are more likely to eat poor diets because fresh, healthy and more nutritious food is not accessible to them given their source of income. 3) Social influence: Social influences on food intake refer to the impact that one or more persons have on the eating behaviour of others either directly or indirectly. Attitudes and habits about food develop through interpersonal relationships with family, peers, work and school colleagues. Peers and friends are thought to play an integral role in forming dietary

habits through modelling attitudes about certain foods or putting pressure to take certain food types (Intiful, 2020).

The influence notwithstanding, food has a physical, emotional, mental and spiritual effect on the body and mind, and it is therefore important that everyone eats well balanced meals comprising of all the important micro and macro nutrients for optimum growth and development.

The relationship between diet and precocious puberty. Nutrition is considered one of the most important factors that modulates pubertal development as it accounts for approximately 25% of the variation in the timing of puberty (Calcaterra et al., 2021). Having enough well balanced meals during all the phases of growth (infancy, childhood and puberty) is critical for proper growth and normal pubertal development of children, and severe primary or secondary malnutrition poses a nutritional risk on pubertal development (Calcaterra et al., 2021). Several studies support the central role of nutrition in pubertal maturation as discussed below.

Chen et al. (2018) conducted a cross sectional study in Shanghai China, to examine the role of dietary patterns in pubertal maturation among 6-12 year old children. This study identified two major dietary patterns using the exploratory factor analysis and found that; 1) the unhealthy diet that was heavy in deserts, snacks, soft drinks and fried foods was positively associated with early pubertal maturation in both girls and boys and 2) the traditional dietary pattern which comprised of vegetables,

fruits, and seafood was not associated with early pubertal maturation in either boys or girls. Chen et al. (2018) concluded that greater consumption of fruits and vegetables could be related to later pubertal onset among girls.

Another study by Koc et al. (2018) evaluated the dietary habits and environmental factors in children with precocious puberty and found that high energy foods such as hamburger, chicken, pizza, beef, bread, cheese, French fries and pastries were significantly correlated with the early onset of puberty among girls. This study also found evidence that consumption of animal protein during childhood was related to precocious puberty, while consumption of plant based protein delayed pubertal maturation (Koc et al., 2018). Supporting the above findings, Calcaterra et al. (2021) wrote that children with the highest intake of vegetable protein experience pubertal maturation up to seven months later, compared to those with the highest intake of animal protein.

A study of two schools in Kollam, India by Binu and Thomas (2017) found that, high calorie and protein consumption, more coffee intake and low physical activity were independently associated with earlier age of menarche. This study also found that factors such as obesity, consumption of junk food and lack of physical exercise, played a major role in the development of precocious puberty (Binu & Thomas, 2017).

Consumption of sugar and sweetened soft drinks has also been positively associated with the risk of earlier puberty. According to a prospective study conducted in the United States, the intake of sugar and sweetened beverages was associated with early pubertal maturation in girls (Villamor & Jansen, 2016). This study found that pre menarcheal girls who consumed 1.5 servings of sugar or sweetened beverages per day at ages 9-14 years, had a 24% higher probability of menarche during follow up, when compared with girls who took two servings of the same beverage weekly (Villamor & Jansen, 2016). While this association could be attributed to sugar, Villamor and Jansen (2016) noted that it could as well be linked to other compounds present in these beverages including caffeine.

Obesity. Evidence supporting the role of early nutrition on the timing of pubertal maturation is consistent with regard to the effects of childhood obesity among girls. Most observational studies consistently indicate that rapid weight gain and obesity during childhood were related to an early age at menarche and other signs of pubertal maturation.

In their systematic review and Meta-analysis to determine the association between obesity and pubertal timing, Li et al. (2017) found that obesity contributed to the early onset of puberty in girls. This finding was supported by a large population based cross sectional study that sought to establish the relationship between precocious puberty and obesity in shanghai China. This study found that among

Chinese children, earlier pubertal development was positively associated with obesity (Chen et al., 2017). Similarly, a school based study conducted by Liu et al. (2021) to investigate the prevalence of precocious puberty in Zhongshan, Guangdong, China, found that the prevalence of precocious puberty was high, and that overweight and obesity were related to precocious puberty.

Explaining the role of obesity in early maturation, Greenspan and Lee (2018) wrote that being overweight and obese influenced the endocrine function, which in turn influenced the onset of puberty. Confirming this, Calcaterra et al. (2021) wrote that overweight children had elevated levels of insulin, an increased ability to convert hormones into oestrogen, and an increased ability to store environmental toxins, all of which could contribute to early puberty.

The above studies demonstrate the critical role that diet plays in development and overall wellbeing. Since diet is a modifiable factor, it means that the timing of pubertal maturation can be controlled to some extents. Measures such as; eating well-balanced diets in the right amounts, reducing the amount of unhealthy meals and observing healthy eating habits (such as having a healthy breakfast, eating less food at mealtimes and eating slowly) may help in preventing obesity and precocious puberty .

The Relationship between diet and Psychosocial Functioning.

Diet and Self esteem

Studies show that there is an established relationship between the concepts of body image, self esteem and diet particularly during puberty (Dono & Mucaj, 2016; Latiff et al., 2018; Weinmberger et al., 2016). Although the causal relationships between body image, self esteem and diet can be bi directional, several studies have identified body dissatisfaction as the variable that has an effect on the self esteem and the tendency to go on diet among pubertal girls.

Latiff et al. (2018) conducted a study on body dissatisfaction and its determinants among young primary school adolescents and found that dissatisfaction with one's body during puberty was associated with negative outcomes such as unhealthy weight control behaviours and disordered eating habits. Latiff et al. (2018) blamed the body image dissatisfaction among pubertal girls to the sociocultural pressures that portray thinness as the ideal body type. Latiff and colleagues posited that many pubertal children compare themselves to images of thin models portrayed by the media and perceive themselves as overweight and ugly, which has implications for their self esteem. In an effort to change this perceived look, girls go on excessive dieting just to identify with the unrealistic media models.

In a systematic review to find out the degree of body dissatisfaction in individuals with obesity compared to those with normal weight, Weinmberger et al. (2016) found that dissatisfaction with one's body was identified as one of the psychological correlates of obesity that was related to low self esteem, disordered eating and depression among pubertal girls. Similarly, in a study to establish the relationship between body dissatisfaction and self esteem, Dono and Mucaj (2016) found that higher body dissatisfaction correlated with lower levels of self esteem and a higher tendency to go on diet. Dono and Mucaj also observed that people whose self esteem was based on their body weight and size were constantly preoccupied with food and exercise, in order to change how they looked.

Early maturation seems to intensify body dissatisfaction among girls. This is attributed to the fact that the weight increases and other body changes such as acne that accompany pubertal development, tend to distance the girls from their same age peers at a time that identity is critical (Fraser, 2017). Such girls may suffer from lower levels of self esteem, and result to unhealthy weight control strategies such as excessive dieting and exercise to control their weight. Because low self esteem can contribute to, and sustain disordered eating habits, which may have other negative consequences for their health, this study recommends that parents and teachers encourage girls who struggle with body dissatisfaction and self esteem issues to seek professional help.

Diet and Depression.

There is overwhelming evidence supporting the relationship between diet and mental issues including depression. Chaulan and Chaulan (2019) observed that there had been an increase in the incidence of mental health problems over the last few years, and attributed this to the change in dietary patterns especially among young people. These researchers noted with concern that pubertal children were more inclined towards fast foods such as pizza, burgers and energy drinks, which contained large amounts of refined flour, salt and sugar all of which had been found to increase hyperactivity, levels of depression, anxiety and mood swings. Chaulan and Chaulan (2019) suggested that the consumption of quality meals comprising of fresh fruit and vegetables had better mental health outcomes and could reduce the risk of depression among developing children.

Khannal and Aeri (2016) conducted a study to determine whether there was an association between quality of diet and mental health in childhood and adolescence. This study found that: 1) there were associations between poor eating patterns, obesity and mental health, 2) children suffering from depression and anxiety were typically characterized by poor adherence to self-care activities such as unhealthy eating habits and lack of physical exercise, 3) a healthy dietary pattern comprising of whole grains, vegetables, lean red meats, fish and fruits was associated with reduced risks for, dysthymia, anxiety, bipolar and major depressive disorder, and that 4) an unhealthy

dietary pattern comprising of processed meats, refined carbohydrates, fried food, and sweetened desserts was associated with greater risks for dysthymia, bipolar and major depressive disorder, and that 5) poor quality diets that were lacking in nutrient dense foods could lead to nutrient deficiencies which was associated with mental health issues. Khannal and Aeri (2016) concluded that dietary patterns may have direct effects on various biological systems and mechanisms that underpin depression, including the functioning of the immune system, the oxidative process and levels of salient brain proteins.

A study to evaluate the relationship between patterns in diet and the risk of depression conducted by Li et al. (2016) also supported the role of quality diet in the prevention of depression. Reports from this study demonstrated that a high intake of vegetables, fruits, whole grain, fish, olive oil, low fat dairy and antioxidants was associated with decreased risks of depression, while a diet characterized by high consumption of red and processed meat, sweets, high fat products and refined grains was associated with an increased risk of depression. Similarly, a study by Molendijik (2018) that sought to establish the relationship between quality of diet and depressive disorders, found that adherence to a high quality diet was associated with a lower risk of depressive symptoms over time. This study also found that the consumption of fish and vegetables was associated with lower risk for depression Molendijik (2018).

Grasses et al. (2019) compared the diets of depressed and non depressed individuals and found that; depressed individuals consumed significantly lower amounts of legumes, fruits and vegetables and higher amounts of sweets and refined sugars. A review of 12 epidemiological studies that examined the relationship between consumption of unhealthy diets and depression supported Grasses' findings. In this review, Khalid, et al. (2017) found that there was an overall support for a relationship between the consumption of a high quality diet and lower levels of depression.

Considering the above studies the present study concludes that; 1) a healthy diet characterized by the consumption of fruits, vegetables, lean meat, legumes and other healthy foods is associated with better physical and mental health, 2) the consumption of an unhealthy diet comprising of highly processed foods, red meats, refined carbohydrates, highly fatty, salty or sweetened foods and aerated drinks are associated with poorer physical and mental health and 3) low quality diets and inadequate nutrition are associated with poorer physical and mental health outcomes.

Diet and Peer Relationships.

Although food is a basic physiological necessity that is required for good health and functionality, food also serves as a means by which people come together. As they meet and interact with each other, people develop preferences for particular kinds of food which leads to the development of particular dietary habits (Intiful,

2020). Naturally, the family determines the primary dietary patterns for children as they grow, but as children enter puberty their dietary patterns are mainly influenced by peers.

During puberty peers act as references to provide information that is used by individuals to evaluate their appearance. Miething et al. (2018) noted that interactions with peers amplified girl's body image and weight concerns and noted that because girls want to connect with others who are similar to themselves, they identify desirable attitudes, behaviours and norms to reduce the difference between themselves and their peers. For example, overweight girls may feel safer when engaging with other overweight peers. Similarly, girls who have adopted a certain lifestyle such as excessive dieting and exercise to control their weight may want to stick together because they feel comfortable and safe with each other.

Girls who are teased about their weight, body shape and appearance are likely to feel dissatisfied and resort to excessive dieting to control the weight in order to fit in with peers. Similarly, girls whose weight or body appearance is constantly mocked, criticized, laughed at or looked down upon, may become unhappy with their appearances leading to unhealthy weight control measures such as excessive exercising or disordered eating to control their weight (Miething et al., 2018).

It is interesting to note that while body appearance concerns (which are largely influenced by diet) are a big challenge during puberty, studies show a shift in the dietary patterns in the last few decades. Lieberman (2020) noted that dietary patterns have metamorphosed from less refined low caloric and high dietary fibre foods, to more refined, highly sugary and fatty foods especially among pubertal children. Lieberman also noted that one of the key influences in the choice of unhealthy diets during puberty were peers. An unhealthy diet may lead to weight gain which distances the girls from peers. This may in turn leads to body appearance concerns and disordered eating to control it.

Intiful (2020) described two kinds of peer relationships that influence dietary patterns during adolescence; 1) nourishing relationship styles which are characterized by open and respectful communication, protection, encouragement and support and 2) inhibiting relationship styles characterized by abandonment, humiliation, intimidation, and disdainfulness. While people in nourishing relationships provide a conducive environment for individuals to develop healthy dietary patterns, inhibiting peer relationships more often than not encourage unhealthy dietary patterns either directly or indirectly (Intiful, 2020). For example boys in inhibiting peer relationships may influence girls weight concerns by placing a great deal of importance in body shape and size, which can lead them to disordered eating (Intiful, 2020).

In conclusion, peer relationships play a vital role in dietary choices of individuals and could culminate into short and long term effects on their physical and mental health. In order to maintain healthy relationships, this study recommends that people generally and pubertal girls in particular not only engage in frequent self analysis and constant improvement of their personality, but they should also learn to accept individual differences.

Diet and Academic Performance.

Academic performance involves the high cognitive functions of the brain such as; thinking, reasoning, deciding, comprehension, focus, evaluation and application of knowledge, which are all controlled by the brain. According to Reuter et al. (2020) the brain is an energy expensive organ that requires adequate energy in the form of glucose and sufficient nutrients in order to function optimally. The nutrients contained in food synthesizes the brain chemicals called neurotransmitters that are responsible for carrying information across synapses, and support efficient transmission along these pathways. Reuter and colleagues noted that because neurotransmitters influence thinking and regulates both mood and sleep patterns, long term deficiencies in or excesses of one or more micronutrients can cause malnutrition and damage to the nerves in the brain resulting to; cognitive impairment, limited problem solving ability, changes in memory, and impairment in the general functioning of the brain, which in turn affects academic performance negatively.

A study by Woodhouse and Lamport (2021) found that the consistent consumption of sufficient quantities and varieties of high quality and nutrient dense foods can reduce the potential for the cognitive impairments associated with malnutrition, and improve academic performance. These researchers also found that a higher quality diet comprising of fruits and vegetables and less dietary fat intake were significantly linked to improved academic performance (Woodhouse & Lamport, 2021).

Studies on the relationship between diet and academic performance demonstrate that not only is the quality and quantity of food important, but the timing of food intake also affects academic performance. In a study to establish the influence of eating habits on the academic performance of university students, Reuter et al. (2020) found that having a healthy breakfast had a positive effect on academic performance. This study found that students who had some form of breakfast for five days a week performed better in their exams, compared to those students who had breakfast for three days a week or less. Reuter and colleagues claimed that having a healthy breakfast increased glucose levels, which in turn led to the improvement of memory, attention, recall and concentration span, and subsequently to improved grades. In this study, consumption of a healthy breakfast was also associated with improved school attendance, alertness, cognitive function and general wellbeing, while fasting in the morning negatively affected the ability to remember word lists and lectures (Reuter et al., 2020).

Besides the influence of a healthy breakfast, Reuter and colleagues' study also found that: 1) healthy eating habits had a positive effect on students' academic performance although other factors such as sleep, and study hours contributed to school grades, and that 2) consumption of fast foods (such as French flies, pizza and aerated drinks) had a negative effect on students overall performance. That is; students who had fast food at least seven times in the past week reported significantly lower performance than students who had eaten fast foods less than four times or those who had not eaten any at all (Reuter et al., 2020).

The above studies demonstrate that there are many factors that influence the relationship between pubertal maturation and psychosocial functioning. Although there are many non-modifiable risk factors of precocious puberty, some of the risk factors such as diet, obesity, and exposure to exogenous sex hormones can be controlled. For example, children can be fed with well- balanced diets, be helped and encouraged to maintain healthy weights and parents can take precaution when using chemicals that are known to have endocrine disruptors.

Conclusion

Pubertal maturation has complex physical, psychological, and social implications on children and especially girls. A young girl exhibiting earlier than normal pubertal maturation faces tremendous social stigma with probable negative effects on her health and wellbeing. What happens during puberty contributes to

subsequent levels of physical and psychological health, educational achievements, and financial security for not only the affected individuals, but for their families and communities. Early screening, identification and intervention will ensure optimal health and functioning for the girls. It is therefore important that stakeholders be brought to the awareness of the incidence of precocious puberty and its possible outcomes so that early interventions can be sought. This was the purpose of this study.

Theoretical Framework

This research was guided by Erick Erickson's psychosocial theory of human development (Erickson, 1950). In this theory, Erickson posited that human beings go through eight distinct stages (also known as the psychosocial stages) throughout their lifecycle. Erickson discussed the ages at which each stage occurred, the tasks and challenges that need to be negotiated at each stage, and the expected outcomes of successfully or unsuccessfully negotiating each of the stages.

According to the psychosocial theory, human beings go through eight distinct stages each with two corresponding forces: Infancy (trust versus mistrust), early childhood (autonomy versus shame and doubt), preschool (initiative versus guilt), school age (industry versus inferiority), adolescence (identity versus role confusion), young adulthood (intimacy versus isolation), middle adulthood (generativity versus stagnation) and old age (ego integrity versus despair) before they die (Erickson 1950). Each stage is characterized by a psychosocial challenge of two conflicting forces,

which a person is expected to confront and master before moving on to the next stages. If an individual successfully negotiates the challenge, they emerge from the stage with a corresponding virtue which is carried to the next stage. If an infant enters into the toddler stage with more trust than mistrust for example, they carry the virtue of hope into the remaining stages of life (Erickson, 1950).

The preadolescent stage under discussion in this study (11 and 12 year old girls) falls under Erickson's school age (industry versus inferiority) stage. Erickson (1950) observed that a child in this stage is faced with new social and academic demands, the challenge of developing their own skills, proving their competence and gaining confidence. The outcome of negotiating this stage successfully is competence and self confidence, while unsuccessful negotiation leads to inferiority and lack of confidence (McLeod, 2018).

Precocious puberty occurs when the children are still negotiating the school age (industry versus inferiority) which in and of itself is a difficult stage to manage for many girls. The combined challenges of dealing with new social and academic demands, developing new skills, proving one's competence, gaining confidence, coupled with the radical physical, biological, hormonal and emotional changes that accompany pubertal maturation all at once, may be overwhelming for the preadolescent girls. This coupled with the fact that the girls' cognitive and emotional

abilities to deal with the challenges of life are barely developed can be a huge challenge to the functioning of the preadolescent girls.

This knowledge provides a clear understanding of the tasks and challenges that the preadolescent girls who mature earlier than normal have to go through besides the challenges that the earlier than normal pubertal maturation itself presents to them. This information is necessary for the stakeholders such as parents, caregivers, teachers, therapists and peers so that they can understand how overwhelming it can be for the girls to negotiate these two life transitions at the same time. This understanding could help the stakeholders to be more supportive of the girls, find ways of better caring for them and to put measures in place inorder to prevent the possible negative outcomes resulting from the combined challenges of this stage and earlier than normal maturation. Below is a diagram highlighting the industry verses inferiority stage.

Figure 2.1

Diagram Showing Industry vs. Inferiority Stage

Stage	Basic conflict	Virtue	Important event	Outcomes
School age (6-12 years)	Industry vs. inferiority	Competence	School	Children are faced with new social and academic demands. Successful negotiation of this stage leads to a sense of competence while unsuccessful negotiation leads to feelings of inferiority and lack of confidence.

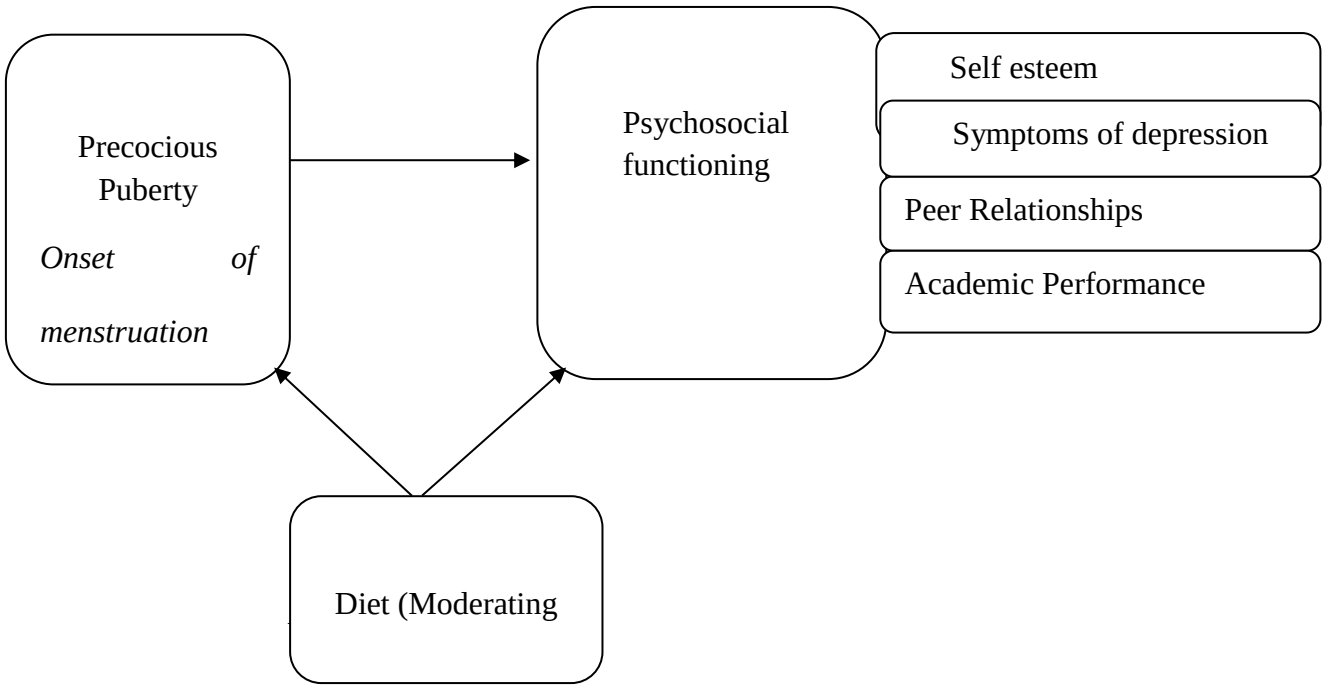
Source: Erickson, 1950.

Conceptual Framework

In the conceptual framework below, the independent variable precocious puberty influences the dependent variable psychosocial functioning, which for this study is defined by four variables (self esteem, symptoms of depression, peer relationships and academic performance). The four variables have an influence on each other. For example, low self esteem can lead to depression, cause problems in peer relationships and affect learning, while depression can lead to low self esteem, withdrawal from peers and a decline in academic performance. Diet is a moderating variable that can influence the relationship between precocious puberty and psychosocial functioning. The conceptual framework of the study showing the graphical relationship between precocious puberty and the psychosocial functioning of preadolescent girls is shown in figure 2.2 below.

Figure 2.2

Conceptual Framework of the Study



Note. Source: Kawira, 2021

Summary of Findings

The literature review demonstrated that:

- There is a decline in the age at which pubertal maturation begins in girls across the globe.
- The incidence of precocious puberty is on the increase worldwide and girls are more affected than boys.
- A number of factors including genetic, environmental, medical and nutritional factors can influence the onset of pubertal maturation.
- Some of the factors that influence pubertal maturation such as nutritional, environmental and medical factors are modifiable and therefore, to some extent precocious puberty can be controlled.
- Puberty as a developmental stage presents challenges for most girls even when it comes on time. Therefore, when it sets in early the challenges may intensify.
- Early puberty can negatively influence the psychosocial functioning of preadolescent girls.
- Diet may influence both the timing of pubertal maturation and the psychosocial functioning of preadolescent girls.

Synthesis of the Research Gap

This study found the following gaps, 1) the studies on precocious puberty are scanty and far between especially in Africa and Kenya, 2) the ages where precocious puberty has been investigated varies for example, most studies in Africa have focused on abnormal pubertal maturation on very young children, 3) most of the studies on precocious puberty have been done in clinical settings, and 4) to the best of the researchers knowledge no study has investigated the prevalence of precocious puberty and its relationship with the psychosocial functioning (with the self esteem, symptoms of depression, peer relationships and academic performance as variables) of preadolescent girls.

Considering the above findings and gaps, it is evident that a significant number of girls in Kenya are at risk for precocious puberty and its adverse outcomes, if this issue is not addressed. The lack of studies in this area creates a knowledge gap on the incidence of precocious puberty and its influence on the functioning of the girl child. This study therefore, sought to fill the existing knowledge gap with the hope that the findings will enable stakeholders such as parents, teachers, peers, therapists, and policy makers to seek better ways of taking care of the girl child.

Chapter Summary

This chapter reviewed documented literature on precocious puberty, including the introduction, an overview of pubertal maturation, the prevalence of precocious puberty, overview of psychosocial functioning and the relationship between early puberty and psychosocial functioning. The chapter also discussed the relationship between the four variables, the factors that influence precocious puberty, the theoretical and conceptual frameworks of the study and synthesized the study gap. Chapter three discussed the research methodology.

CHAPTER THREE

RESEARCH METHODOLOGY

Introduction

This chapter presents the methodology that was used to meet the preset study objectives. Specifically, the chapter covered the research philosophy and design, the study population and site, data collection instruments and procedures, data analysis and ethical considerations.

Research Philosophy

According to Kivunja and Kuyini (2017), a research philosophy or a philosophical worldview is a term used to refer to a system of assumptions and beliefs about the development of knowledge. Kivunja and Kuyini (2017) noted that a research philosophy informs the researcher's view of the world and shapes all aspects of the study. This study adopted the pragmatic research philosophy which postulates that; it is not possible to access the truth about the world solely by virtue of a single scientific method (Saunders, 2016).

Pragmatists advocate for a worldview that allows for: 1) research designs and methodologies that are best suited to the purpose of the study, 2) the use of what works so as to allow the researcher to address the questions being investigated without worrying as to whether the questions are wholly quantitative or qualitative in

nature, 3) a choice of research methods depending on the purpose of the study, 4) an emphasis on workability in research, and 5) seeking to utilize the best approaches in order to gain knowledge using every methodology that helps that knowledge discovery (Saunders, 2016).

Research conducted within this paradigm draws from methodologies taken from both quantitative and qualitative fields such as, narrative inquiries, naturalistic methodology, action research, case studies, ethnography and causal comparative methodologies (Kivunja & Kuyini, 2017). Researchers, who adapt the pragmatic philosophy deal with facts, believe that the choice of research methodology is determined by the research problem, and are free to choose the methods, techniques and procedures that best meet their needs and scientific research aims (Saunders, 2016).

Informed by the nature of the study and the pragmatic worldview, a mixed method (combination of both quantitative and qualitative approaches) were used to collect data for this study. Dawadi et al. (2021) described a mixed method as a design that includes philosophical assumptions to provide directions for the collection and analysis of data from multiple sources in a single study. A mixed approach integrates both qualitative and quantitative data in a way that research issues are explained meaningfully. Mixed methods enables researchers to answer research questions with sufficient depth and breadth and enable the generalization of findings and

implications of the researched issues to the whole population (Dawadi et al., 2021). That is, the quantitative approach helps the researcher to collect data from a large number of participants thus increasing the possibility of generalizing the findings, while the qualitative approach provides a deeper understanding of the issue being investigated.

Inorder to establish the prevalence of precocious puberty and its relationship with the psychosocial functioning of the preadolescent girls, this study needed statistical data which would be obtained through quantitative methods, hence the use of a questionnaire. Owing to the fact that precocious puberty is an emerging issue, this study found it important to obtain first hand experiences regarding the incidence from the preadolescent girls and their female class teachers, hence the use of focus group discussions and structured interviews. All the other aspects of this study including, the determination of research objectives and questions, the use of correlational research design, the choice of 11 and 12 year old girls and their female class teachers as respondents, the use of questionnaires, focus group discussions and structured interviews as research instruments, and the use of frequency distributions, regression models, Chi Squares tests and the thematic analysis as data analysis methods were all guided by the needs of the study as advocated for by the pragmatic philosophy.

Research Design

A research design is the plan of the proposed research work, the glue that holds the elements of the research project together (Akhtar, 2016). This study used both correlational and comparative research designs to achieve the study objectives. A correlational research design is a type of descriptive research design that seeks to establish the relationship between two or more variables without the researcher controlling either of them (McCombes, 2019). Correlational research designs can be used in situations where the researcher wants to find out if there is a relationship between two variables but doesn't expect to find a causal relationship between them, or when the researcher thinks that there is a causal relationship between two variables, but it is impractical or unethical to conduct experimental research that manipulates one of the variables (McCombes, 2019). This research design was selected because this study hypothesized that there were causal relationships between precocious puberty and the psychosocial functioning of preadolescent girls in primary schools in Kiambu Country.

Besides the correlational design, this study also used a comparative study design. Comparative analysis are conducted mainly to explain and gain a better understanding of the causal process involved in the creation of events, features or relationships by bringing together variations in the explanatory variables (Adiya & Ashton, 2017). This approach was included in the study inorder to establish whether

it was pubertal maturation in general or precocious puberty in particular that accounted for the psychosocial changes among the preadolescent girls. In bringing together variations in the explanatory variable precocious puberty, this study divided the respondents into 3 groups: the non-precocious 11 year old girls, the precocious 11 year old girls and the normal maturation 12 year old girls. The psychosocial functioning of the three groups was compared to establish which of the three groups accounted for the psychosocial changes in the larger group.

Study Population

The study population were girls aged 11 and 12 years who were in class five and their female class teachers sampled from 13 selected public schools in Kiambu County. According to the Kenyan system of education 11 and 12 year old girls are ideally in class 6 and 7 considering that children start grade one at the age of six years. However, the pretest revealed that majority of the 11 year old children were in class five in most of the schools, although there were other age groups in the same class. Class 5 was specifically selected for the study because majority of the targeted respondents (11 year old girls) and some 12 year old girls would be found in this class. Choosing one class with the majority of the respondents minimized interruption of school programs, thereby making it easier to get permissions to collect data.

Study Site

This study was conducted in Kiambu County, Kenya. Kiambu County is located in the central region of Kenya and borders Nairobi and Kajiado Counties to the South, Machakos County to the East, Murang'a Country to the North and Nakuru County to the West (County Government of Kiambu, 2018). The County has 13 Sub Counties namely; Githunguri, Kiambaa, Kabete, Limuru, Lari, Gatundu North, Gatundu South, Ruiru, Kikuyu, Juja, Thika West, Thika East and Kiambu (County Government of Kiambu, 2018). The County occupies an area of approximately 2449 square kilometres and has a population of approximately 2,417,735 people, of which 1,187,146 are males and 1,230,589 are females (CGK, 2018). The County is 40 % rural and 60 % urban owing to Nairobi's consistent growth northwards. The dominant community living in Kiambu County is the Kikuyu, although other ethnic communities also occupy the County.

Kiambu County has 1225 primary schools; 576 public schools, while 649 are private schools. The distribution of public primary schools per Sub County is as follows. Gatundu North (49), Gatundu South (57), Githunguri (55), Juja (25), Kabete (29), Kiambaa (31), Kiambu (49), Kikuyu (51), Lari (64), Limuru (44), Ruiru (39), Thika East (45) and Thika West (38) primary schools (County Government of Kiambu, 2018). There are 229,285 pupils comprising of 115,375 males and 113,910 females in primary schools in Kiambu County (CGK, 2018). Most public schools are

three streamed with approximately 35 to 45 pupils per class. According to the Kiambu Education and Literacy Report (2018), there are approximately 8000 girls who are enrolled in class 5 in public primary schools in Kiambu County. This is the population from where the sample size was drawn.

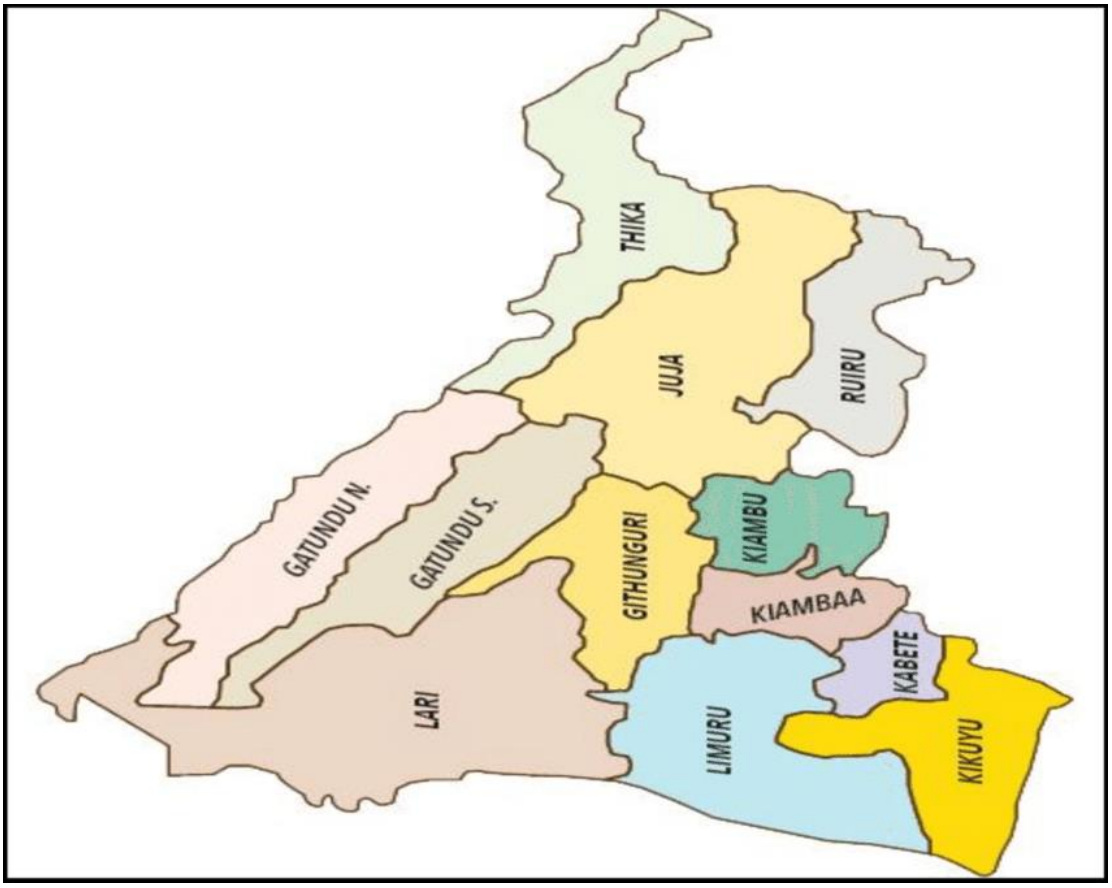
Figure 3.1

A Map of Kenya Showing the Location of Kiambu

Source: County (http//:www. google.com/search/kiambu/county/map.

Figure 3.2

A Map Showing the Sub Counties of Kiambu



Source: County (http//:www. google.com/search/kiambu/county/map).

Study Sample

A sample size of 380 preadolescent girls aged 11 and 12 years was selected for this study. This number was calculated using a formula suggested by Yamane (1967) which has been used widely in social science studies to determine sample sizes.

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n = sample size

N = population size

e = level of precision

Substituting for the values in the formula, a population of 8000 girls will give a sample size of 380 preadolescent girls.

$$n = \frac{8000}{1 + 8000(0.05)^2}$$

$$n = \frac{8000}{21} = 380.$$

Although the calculated sample above indicated that a minimum of 380 girls were sufficient for the study, the total number of respondents who actually participated in the study was 468 girls. The increase resulted from the need to study every willing respondent in each school. Studying whole populations of girls not only

encouraged the respondents to willingly participate in the study (singling out those who were menstruating in mixed gender schools caused shyness and embarrassment but when all girls were called together it made it easier for them to willingly participate), it also provided comparison groups and took care of irregularities such as incomplete questionnaires.

Sampling Procedures

Sampling is the process, technique or act of selecting a suitable sample or a representative portion of a population for the purpose of determining characteristics or parameters of the whole population (Mujere, 2016). This study used the stratified random sampling method to select schools for the study. In this method, the entire population is divided into a number of homogenous groups known as strata, then units are sampled at random from each of the strata (Alvi, 2016). This type of sampling is used when elements of a population differ from one another on certain characteristic, so that the subgroups that are formed are homogenous i.e. all the elements within a group contain the same kind of characteristics (Alvi, 2016). A list of all the elements of the strata is made, then the participants are selected from each stratum through the lottery method (Alvi, 2016). Following this sampling method, this study divided Kiambu Country into 13 Sub Counties. All the public schools in each Sub Country were grouped together and then one school was randomly selected from each Sub County.

At the school level, whole populations of girls who were 11 and 12 years, enrolled in class five and who were willing to participate in the study were included. This increased the number of respondents from the calculated sample of 380 (which was the minimum number of respondents for this study) to 468. Out of this number, 40 girls also participated in focus group discussions. In addition, one female class teacher from each of the 13 selected schools was invited to take part in the study in order to provide collaborative information.

Data Collection Instruments

The questionnaire was the main data collection tool for this study. The questionnaire had six sessions; a social demographic characteristics part, a self-rating pubertal development scale, a self esteem scale, a depression scale, a peer relationship quality scale and an academic performance rating scale. Apart from the social demographic session which was developed by the researcher, all the other parts of the questionnaire were adopted from standardized tools which had been used across time, space, populations, languages and ages with proven reliability and validity. Slight modifications were made to the tools to ease understanding given the age of the respondents and also to contextualize them to Kenya (For example Swahili which was not in the original tool was added to the Academic Scale).

The questionnaire was self-administered, so the girls wrote the answers themselves. To ease this process, the researcher read out the questions, explained what needed to be done, answered any question and concerns the girls raised and with the aid of the research assistant, helped them to fill in the questionnaire. The research assistant was a colleague in the same profession as the researcher. This individual was selected for this role because of their experience in research and because they understood the ethics of working with children. In addition to the questionnaire, this study used focus group discussions with the preadolescent girls and a structured interview with the female class teachers to substantiate the quantitative data.

The Self Rating Scale for Pubertal Development

The self-rating Pubertal Development Scale (PDS) was adapted from an instrument described in Petersen et al. (1988). The scale is an adaptation interview based on Petersen's puberty rating scale, that measures children's pubertal status without pictorial representation or interviews (Petersen et al., 1988). The PDS assesses secondary sex characteristics, in a self reported way and it is easily administered (Krasniqi & Cakirpaloglu, 2020).

Reliability and validity of the self rating scale for pubertal development. The psychometric properties of the self rating scale for pubertal development have been proved over time. In a study of 133 children and adolescents aged between 9 and 17 years, to determine whether scores in the adapted version of the pubertal maturation

scale matched with the tanner scale, Pompel et al. (2019) found significant associations between the two measures, and concluded that the pubertal development scale was a reliable scale for assessing pubertal maturation in large scale studies.

Another study involving 252 participants aged between 7.8 to 17 years compared the child and parent reports with clinician rated tanner staging, to establish the internal consistency and test retest reliability of the Pubertal Development Scale (Koopman- Verhoeff, et al., 2019). The findings demonstrated that both the self and parent reported pubertal development scales had good internal consistency with Cronbach's alpha of between .91 and .96, and high test retest reliability with interclass correlation coefficient of between .81 and .92. This study concluded that the Pubertal Development Scale was a reliable tool for assessing pubertal maturation (Koopman -Verhoeff, et al., 2019).

After using the tool twice annually over a period of three years in a longitudinal study of 335 young adolescents boys and girls, Petersen et al. (1993) found that the scale showed good reliability as indicated by the coefficient alpha. The researchers concluded that the pubertal developmental scale was useful in measuring maturation in settings like schools where more direct measures of pubertal maturation such as examinations were not possible (Petersen et al., 1993).

The Rosenberg's Self esteem Scale

The Rosenberg's self esteem scale was adopted to measure the girls' self esteem. The scale, which was developed by Mike Rosenberg in 1965, is a Likert scale type test with 10 items designed to represent a continuum of self worth statements. The scale contains five positively worded and five negatively worded items and is scored on a four point scale with responses ranging from strongly disagree to strongly agree (Akhter, 2019; Pan et al., 2018). The total scores range from 10 - 40 with higher scores indicating higher global self esteem (Pan et al., 2018).

Psychometric properties of the Rosenberg self esteem scale. Although several tools have been used to measure self esteem, the Rosenberg self esteem scale is the most common and popularly used instrument perhaps because of its straightforwardness, brevity, ease in administration and scoring (Akhter, 2019; Li et al., 2019). A computerized search showed that the scale has enjoyed widespread use and utility with over 1000 American studies using it with high school and junior college populations. The scale has been translated into different languages and used as a measure of self esteem with diverse groups with good reliability and validity, suggesting that it has strong cross cultural validity (Akhter, 2019; Li et al., 2019; Panm et al., 2018).

The Chinese version of the self esteem scale demonstrated that the measure had good reliability and validity, with a Cronbach alpha of .88 (Panm et al., 2018). In a study to determine the reliability and validity of the Rosenberg scale among high school student in Malaysia, Li et al (2019) found good reliability and validity and concluded that the scale was a valid and reliable measure of self esteem in upper school going students.

Use of the scale with a sample of 531 university students in Bangladesh demonstrated that the tool had good levels of internal consistency among undergraduate and graduate students (Akhter, 2019). The coefficient of Cronbach's alpha was 0.86, while the Pearson correlation of the test –retest reliability showed significant temporal stability ($r=0.91$, $p<0.001$) after a three weeks interval. Akhter (2019) concluded that the Bengali version of the Rosenberg self esteem scale was a valid and reliable measure for assessing the global self esteem.

The Revised Children's Anxiety and Depression Scale and Subscales (RCARDS)

The children's depression scale was adopted from the Revised Children's Anxiety and Depression Scale, RCARDS. The RCARDS is a 47 item youth self report questionnaire with subscales including: Separation Anxiety Disorder, Social Phobia, Generalized Anxiety Disorder, Panic Disorder, Obsessive Compulsive Disorder and Major Depressive Disorder (Chorpita et al., 2015). The Major Depressive Disorder Subscale, which was used in this study, is a 10-item Likert self-

administered youth questionnaire, that is used to track depressive symptoms in young people. The scale can be completed by young people aged between 8 and 18 years and it takes between five to ten minutes to administer (Chorpita et al., 2015). The RCARDS can either be scored manually or through standardized means. Manual scoring is done by assigning each item a numerical value from 0-3 where 0 represents never, 1 represents sometimes, 2 represents often and 3 represents always. The numerical values for each item are added together to get the total scores. Higher scores indicate higher depressive symptoms (Chorpita et al., 2015).

Psychometric properties of the RCARDS. The RCARDS have shown good reliability on both the total scale and the subscales in different assessment settings and languages (Chorpita et al., 2015; Piquera et al., 2017). A study conducted by Donnelly et al. (2019) to investigate the psychometric properties of RCARDS in a non-clinical sample of Irish adolescents, found that the internal consistency for the RCARDS ranged from adequate (.65) to excellent (.85). This study also found that the tool had good concurrent validity with the Children Depression Inventory and the Revised Children's Manifest. Donnelly et al. (2019) concluded that the RCARDS could reasonably be used without adjustment in younger and older adolescents of both genders.

In a study to examine the mean reliability of the RCADS and the influence of the moderators on the RCADS reliability, Piqueras et al. (2017) found robust internal

consistency and reliability in different countries, settings, and languages. These researchers concluded that the RCADS was a reliable tool for cross cultural use. The RCARDS have been translated into various languages including English, Chinese, Danish, Dutch, French, German, Greek, Swedish and Urdu and has been used in different Countries and populations with good outcomes (Chorpita et al., 2015).

The Peer Relationship Quality Scale

The quality of peer relationships among the girls was assessed using an instrument adapted from the Hemingway Measure of Adolescent Connectedness to Peers Subscale. This measure consists of 72 items designed to measure the adolescent's degree of caring for and involvement in 15 relationships and institutional contexts (Karcher & Sass, 2010). The peer connectedness subscale, which was utilized in this study, is a 6 item scale that measures young people's positive feelings of connection with their peers. This scale assesses the extent to which young people feel positive about their peers and enjoy working with them on projects and school related tasks (Karcher & Sass, 2010). The scale has versions for 3 to 18 year old individuals and for college students. Sample items include; "I like working with my classmates" and "I get along well with the other students in my class". Each item is scored on a five point scale from 1(not at all) to 5(very true). A total score is computed by averaging across all items, and higher scores reflect stronger connectedness to peers at school (Karcher & Sass, 2010).

Psychometric properties of the peer relationship quality scale. This measure was selected because of its grounding in theory, wide developmental applicability and evidence of reliability and validity. The tool has been used in diverse populations and has been translated into various languages including Spanish, French and Chinese (Karcher & Sass, 2010). In a study to examine the reliability, validity and correlation of the adolescent connectedness scale, Karcher and Lee (2002) sampled 322 junior high school students. The reliability of the scale was measured using Cronbach's alpha and item total correlations. Concurrent and divergent validity were estimated using a multitrait correlation matrix that included connectedness composite scales, and corresponding self esteem scales. All the connectedness scales demonstrated exemplary inter item reliability with Cronbach alpha of more than .80 (Karcher & Lee, 2002).

The Youth Academic Performance Rating Scale

The academic performance of the students was measured using the youth academic performance rating scale. This subscale was adapted from a toolkit that was developed by the National Mentoring Resource Centre (NMRC, 2014). The original purpose of the tool kit was to provide well vetted recommendations for instruments that were suitable for use by mentoring programs (NMRC, 2014). The toolkit is built around six domains of youth outcomes that the NMRC board identified as the most common areas in which mentoring could expect to have an impact. These areas

include: mental and emotional health, social emotional skills, health and prosocial behaviour, problem behaviour, interpersonal relationships and academics. The tool kit includes recommendations for assessing different types of risk and protective factors, which can be used to capture the challenges and needs that youth bring to mentoring programs, providing valuable context for understanding other outcomes (NMRC, 2014).

The academic performance scale was designed for use by 8-18 years old children and asks questions about how learners performed in five subjects: Mathematics, English, Social studies and Science. Swahili which was not in the original tool was added for the purpose of contextualizing the tool in the Kenyan education system. The measure consists of the following set of questions. Think back to the grades/marks you got on your most recent exams. The response choices are F (Not good at all), D (Not so good), C (Okay), B (Good) and A (Excellent) or I do not have this subject in school. Responses are scored from the box that shows how one performed in each subject. Responses to the individual items in the measure can be used to assess the academic performance in individual subject areas and overall academic work (NMRC, 2014).

Psychometric properties of the youth academic rating scale. The NMRC board engaged in a long process of identifying measures that had been used previously, in order to select tools that provided a brief yet accurate assessment of outcomes, and that had good reliability and validity (NMRC, 2014). They conducted a thorough review of 13 unidimensional, 17 multi faceted and 19 more tailored measures that had been used in youth mentoring studies and reviewed information on the measures characteristics such as strength (for example how well the scales held together, measured what they were intended to measure and related to other youth outcomes) and usage (NMRC, 2014). Variations of this measure have been used in many large scale mentoring studies, and in the youth outcome surveys with good outcomes. Studies comparing responses to these questions with the actual grades, found a correlation with the overall actual grades in individual subject areas (NMRC, 2014).

Qualitative Data

Besides the questionnaire, this study also used focus group discussions with the girls and structured interviews with the female class teachers to gather collaborative information and substantiate the quantitative data.

Focus Group Discussions

Focus group discussions are a qualitative research method and data collection technique in which an experienced moderator or interviewer facilitates a selected group of people (usually between 8 and 12) to discuss a topic or subject in depth (Van & Zuzanna, 2017). During the discussions, participants are asked about their attitudes, beliefs, knowledge, ideas, perceptions, experiences and practices. Focus group discussions encourage group members to talk to each other which allows the investigator to solicit the participant's narratives and their differences in terms of opinions, experiences and worldviews during open discussions (Van & Zuzanna, 2017).

Participants in focus group discussion are actively encouraged to express their own feelings, respond to the questions posed by the leader and respond to the opinion of other members (Van & Zuzanna, 2017). As a result focus groups offer depth, variety and nuance to the discussion that would not be available through other techniques. Focus groups can yield a lot of information in a relatively short time and are a good way to gather in depth information about individuals' or communities' thoughts and opinions on a topic. A downside of using focus group discussion is that some respondents may be reluctant to share some sensitive ideas and concerns publicly, while some others may act unnaturally, hence giving unreliable data during the discussions (Van & Zuzanna, 2017).

Although there are several types of focus groups, this study utilized the natural focus group. This type of focus group consists of multiple participants who belong to a pre existing informal or formal groups (such as family kin, co-workers, elderly groups, students or women self help groups) before the study (Van & Zuzanna, 2017). The preadolescent girls who participated in this study, were pupils who were in class five and who attended public primary schools within Kiambu Country. Van and Zuzanna (2017) suggested that conducting focus group discussions with a natural group may reveal discrepancies and similarities between what people say, how they act and how other participants react and comment in response.

This study conducted one focus group discussion, each comprising of 10 girls in four schools Kiambu County. The participants were selected using both purposive and convenient sampling methods. Purposive because the researcher wanted to select only girls who were 11 years old and who were menstruating, and convenient because the respondents were selected from; 1) schools that had already agreed to participate in the study, 2) schools which had a high turnout of respondents, and 3) girls who had already agreed to participate in the study and were gathered to fill the questionnaire. Selecting these respondents was convenient for the researcher because no further permissions were needed and there were enough available and willing respondents.

When the girls gathered to fill the questionnaire, they were informed that the study involved both quantitative and qualitative methods and so after the

questionnaire, there would also be a focus group discussion. The researcher explained the nature and purpose of focus group discussions in relation to this study (including; what was involved, who could participate and how long it would take) and invited girls who were willing to participate in such a discussion to come forward once the filling of the questionnaire was done. Through a random sampling method, 10 girls were selected from among the volunteers to participate in the focus group discussions. This study conducted 4 focus group discussions lasting for 45 minutes in four schools, bringing the total number of respondents to 40. This was informed by the work of Guest et al. (2017) who after conducting over 40 focus groups in Northern Carolina, found that more than 90 % of all themes were discoverable within three to six focus group discussions. This study also referred to the work of Cassidy (2017) who suggested that 45 to 90 minutes were sufficient for a productive focus group discussion.

Structured Interviews

Structured interviews are a form of qualitative research data collection method, in which the interviewer uses a pre planned set of questions to solicit for information from all the interviewees (Surbhi, 2017). The questions are prepared in advance and are asked in a standardized order and the interviewer does not deviate from the interview schedule or probe beyond the answers received. Structured interviews are fairly easy and quick to conduct, which enables researchers to collect

large amounts of data within a short time, and which makes this method very economical to use with a large sample (Surbhi, 2017). Considering that structured interviews are pre planned and the same set of closed questions are asked to all the candidates, the data yielded is easy to quantify, replicate and to test for reliability (Surbhi, 2017).

This study utilized structured interviews to obtain information from the female class teachers of the preadolescent girls. This method was chosen inorder to collect collaborative information regarding precocious puberty and its relationship with the psychosocial functioning of the preadolescent girls. Based on the objectives of the study, specific questions were prepared ahead of time to achieve this goal. This study interviewed 12 class teachers (one of the schools did not participate) from 12 of the sampled schools for approximately 15 minutes. This was informed by Martin (2018) who suggested that an interview can take 30 or fewer minutes. The participants were selected through both purposive and convenient sampling methods. Purposive because the study specifically targeted one female class five teachers, and convenient because the teachers were selected from schools that had already agreed to participate, and whose classes were participating in the study so they were already involved and available. To select the respondents, the researcher explained the nature and purpose of the study to all the class teachers of the participating classes and requested one female class teacher who was willing, to take part in the study to do so.

Reliability and validity of focus groups and structured interviews. The reliability of focus group discussions and structured interviews is verified by the extent to which other discussions and interviews of similar but different people would give similar answers (Cassidy, 2017). To ensure the reliability of the discussions and interviews, specific questions were asked in all the different focus group discussions and interviews, to find out whether the different groups of girls and individual teachers gave the same answers. Clarifications were also made on each of the questions in the discussions and interviews to ensure that the respondents gave the responses that were expected for each of the specific questions. As well, clarifications were made on the responses to ensure that the respondents were talking about what the researcher thought they were actually talking about, thus ensuring the validity of the instruments.

Data Collection Procedure

The researcher first sought for an approval letter from the Pan Africa Christian University, then applied for a research permit from the National Commission of Science Technology and Innovation (NACOSTI). Permission to collect data from the sampled schools was sought from the County Director of Education Office, Kiambu County, after which the researcher called on the respective school heads to allow for data collection in their schools. Permission to collect data from the girls, who were minors, was sought from the head teachers and from the parents. After permission was granted by the adults, the 11 and 12 year old girls were given an opportunity to

voluntarily choose whether to participate in the study or not. The data was collected from sampled schools on normal school days (Monday to Friday) at a time that was most convenient for the school, and that was agreed upon with the respective head teachers.

Before administering the questionnaire, the researcher gathered all the 11 and 12 years old girls in class five and facilitated an active discussion on general pubertal maturation. The girls were given an opportunity to ask any questions and raise any concerns that they had regarding their development. After this session, the researcher clearly explained the nature and purpose of the study, assured the respondents of confidentiality and informed them of their right to choose whether to participate in the study or not (American Psychological Association, 2017). Even though permission had to be sought from the adults because the participants were minors, the girls themselves were asked whether they were willing to participate in the study, and only those who were willing were given an opportunity to do so. The criteria for the 12 year old girls to participate in the study was that they must have started menstruating at age 12. The researcher read out the questions to the respondents, made clarifications, addressed any questions and concerns that the girls had, and with the help of the research assistant helped them fill the self administered questionnaire.

Besides the questionnaire, focus group discussions and structured interviews were conducted with the girls and their female class teachers respectively. On the focus groups, the researcher facilitated an informative discussion on pubertal

development, allowing time for questions and comments, before inviting the girls to share their personal experiences on pubertal maturation. On the structured interviews, one willing female class teacher from each of the participating classes and schools was individually interviewed by the researcher. A set of guiding questions informed by the study objectives was used in both the focus group discussions and the interviews. Before the commencement of the focus group discussion and interviews, permission was sought from the girls and the teachers to record the sessions for easier transcription later. The research assistant helped to record the sessions and take notes, while the researcher facilitated the groups and interviewed the teachers.

Instrument Pretesting

To find out whether the data collections tools would actually measure what they were supposed to measure, ensure that the wording of the instruments was clear and to help in finding out the response they would invoke, a pretest was carried out on 36 preadolescent girls. Perneger et al. (2015) proposed that 30 participants was a reasonable default value for the pre test of instruments. To do the pretest, the researcher visited three public primary schools within Kiambu County and after seeking permission from the head teachers requested to give the questionnaire to 12 girls aged 11 and 12 who were in class five from each school. The researcher facilitated a brief discussion on pubertal development, explained the nature and purpose of the study and invited the girls to voluntarily participate in the study. The

three schools from where the pretest group were drawn were excluded from the 13 schools from where the actual study respondents were drawn.

Data Analysis Plan

After the data collection exercise was completed, all the questionnaires were collected, checked for completeness and consistency and then packed together with the field notes and the recorded data. Frequency distributions, regression models and Chi square tests were generated using SPSS version 25, to establish whether the independent variable in the study, influenced the dependent variable and consequently answered the research questions. Using the function Yn (Xn and ε) the study assessed whether a regression model could be developed to establish the relationship between the independent variable precocious puberty and the dependent variable psychosocial functioning (Yn) which for this study was defined by four variables (self esteem Y_1, depression Y_2, peer relation Y_3, and academic performance Y_4. From the above function, the following linear relation was developed to show the relationship between the independent variable precocious puberty and the psychosocial functioning variables; self esteem symptoms of depression, peer relationships and academic performance of the preadolescent girls in primary schools in Kiambu County.

$Yn (Y_1, Y_2, Y_3, Y_4) = \beta 0 + \beta Xn + \varepsilon.$

Where:

Yn = psychosocial functioning (the dependent variable)

Y_1 = Self esteem

Y_2 = Symptoms of depression

Y_3 = Peer Relationships

Y_4 = Academic Performance

Xn = Precocious puberty (the independent variable)

B_0, β_1, β_2, β_3, β_4, = Regression model coefficients.

ε = Error Term.

The qualitative data was transcribed, and themes were identified, analysed and described by the aid of Nvivo version 12. The analysed data was presented using tables and thematic descriptions based on the predefined framework from the research objectives.

Ethical Considerations

Informed Consent

The American Psychological Association (APA, 2017) requires that participants in research studies are fully informed of, and understand the nature, purpose and outcomes of a research. The association also requires researchers to gain consent from appropriate adults when working with children under 18. Since this was a non invasive study that took place during school days, the head teachers of the sampled schools had the authority to give permission for data to be collected from the

pupils who were minors (APA, 2017). Although this would have sufficed, permission was also sought from the parents through the help of the head teachers. To enable this, the researcher wrote letters addressed to parents explaining the nature, purpose and expected outcomes of the study, attached a consent form for them to sign and handed them to the head teachers. The letters were to be hand delivered to the parents by the class five girls, who would also bring back the signed consent forms to the head teachers. Based on the parent's feedback, the head teachers with the help of the class teachers prepared the girls ahead of the data collection exercise.

After permission was granted by both the head teachers and parents, the researcher gathered whole populations of girls who were in class five for a girls' only meeting. During the meeting, the researcher facilitated a brief discussion on pubertal development and allowed a question and answer session. After this, the researcher introduced the research topic and explained that this was a non invasive study whose purpose was to establish the prevalence of precocious puberty and determine how it affects the functioning of preadolescent girls. Further, the researcher explained that the expected outcome of the study was to create awareness and provide information on the prevalence of precocious puberty and its effects on the psychosocial functioning of preadolescent girls to parents, teachers, policy makers and other stakeholders, so that better ways of taking care of the girl child could be sought. The researcher then invited those girls who were willing to participate in the study to voluntarily do so. The participants were adequately informed of their voluntary

participation, and their rights to withdraw from the study at any time. They were also informed that there were no rewards for participating in the study, and no negative consequences for not participating or withdrawing from participation.

Confidentiality

In terms of safeguarding children in the context of this study, the researcher ensured that confidentiality was maintained throughout. No names were used either in the questionnaire or during the focus group discussions. This was done to ensure that the information was not traceable to the respondents. The pupils were assured that personal information and their responses would not be released to their teachers, parents, schoolmates or any other person without their consent. The respondents were also informed that the questionnaires, field notes and the recordings would not be used for any other purpose other than the purpose of the study. All the materials would be destroyed once the findings of the research were concluded.

Benefits and Risks

The benefits and risks of participating in the study were discussed with the girls. The girls were informed that there would be no incentives to participate in the study or negative consequences for not participating in the study. Benefits of this study included creating awareness and providing information to parents, therapists, teachers, law makers and other interested parties to the incidence of precocious puberty and its relationship with the psychosocial functioning of preadolescent girls.

This would hopefully enable them to find better ways of taking care for the needs of the early maturing girls.

Risks in the study included discomfort when answering questions about the changes in the body. To alleviate this challenge the following steps were taken; 1) a question and answer time was allowed to address any issues and concerns that the participants had regarding participation in the study, 2) respondents were informed that they could withdraw from the study at any time if they were unable to continue, 3) the researcher and the assistant who were both qualified therapists were available to listen to the girls, and 4) the researcher consulted with the schools inorder to network with therapists within the constituencies, where the girls who needed therapy as a result of participating in the study would be referred.

Chapter Summary

This chapter covered the research methodology including the; research philosophy, design, study population, sampling procedures, data collection instruments and procedure, instruments pretesting, data analysis procedure and ethical considerations. Chapter four covered data analyses and interpretation.

CHAPTER FOUR

PRESENTATION AND INTERPRETATION OF FINDINGS

Introduction

This chapter presents the data analyses and interpretation of the study findings in relation to the research objectives. Data for this study was collected through questionnaires, focus group discussions and structured interviews. The statistics for the quantitative data were generated using the Statistical Package for Social Sciences (SPSS version 25). Specifically, this study used frequency distributions, regression models and Chi square tests to analyse the raw data. The presentation of findings for the quantitative data was given through the use of tables. The focus group discussions and structured interviews were transcribed and analysed using the thematic analysis approach. The key themes that emerged from the data were identified, described and analysed using Nvivo version 12. The results were presented using thematic descriptions based on the predefined framework from the study objectives. The analytical report was developed in consideration of the objectives of the study and the theoretical frameworks of the study.

Response Rate

The calculated sample for this study was 380 respondents. However, because of the decision to study whole populations in each school, the sample population increased to a total of 468 qualified and willing respondents. Therefore, 468 questionnaires were distributed to 11 and 12 year old girls who were in class 5 in 13 public primary schools in Kiambu County. However, only 442 questionnaires were completed satisfactorily, bringing the response rate to 94.4 %. Out of the 442 girls who participated in filling in the questionnaires, 40 of them also participated in four focus group discussions. In addition, this study interviewed 12 female class teachers, who were available and willing to participate in the study.

Demographic Characteristics of the Respondents

This study sought to determine some of the key demographic characteristics of the respondents such as age, school, diet, and residence. This was important because some of the demographic characteristics were indicated as moderating variables, which could affect the relationship between the independent variable precocious puberty, and the dependent variable psychosocial functioning.

Age Distribution

Age was an important parameter for this study, because it helped to determine whether pubertal maturation was early, on time or late. The respondents were asked to indicate their ages and their responses are presented in table 4.1 below.

Table 4.1

Age of the Respondents

Age of the Respondents	Frequency	Per cent
11 Years Old	383	86.7
12 Years Old	59	13.3
Total	442	100

The results above indicate that 383 (86.7%) of the respondents were 11 years old, while 59 (13.3%) of them were 12 years old. This means that the majority of the respondents were 11 years old. This study targeted girls who had begun menstruating before the age of 12 and therefore, age 11 was a critical age for this study. The 12 year old girls were included in the study to form a comparison group inorder to determine whether it was precocious puberty specifically, or pubertal maturation in general that influenced the psychosocial functioning of the preadolescent girls.

Distribution of Schools

In order to capture important demographic characteristics, this study sampled one school from each of the 13 Sub Counties of Kiambu County. The distribution of the schools that participated in the study is shown in table 4.2 below.

Table 4.2

Schools of the Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Gitothua	56	12.7	12.7	12.7
	Ikinu	24	5.4	5.4	18.1
	Ikuma	30	6.8	6.8	24.9
	Kakuzi	28	6.3	6.3	31.2
	Kibii	26	5.9	5.9	37.1
	Kimende	38	8.6	8.6	45.7
	Mukuyuini	40	9	9	54.8
	Musagitau	20	4.5	4.5	59.3
	Muya	38	8.6	8.6	67.9
	Ndumberi	54	12.2	12.2	80.1
	Ngure	25	5.7	5.7	85.7
	St. Pauls	29	6.6	6.6	92.3
	Thika	34	7.7	7.7	100
	Total	442	100	100	

These findings demonstrate that the respondents were from the following primary schools: Gitothua: 56 (12.7%), Ikuma: 30 (6.8%), Kakuzi: 28 (6.3%), Kibii: 26 (5.9%), Kimende: 38 (8.6%), Mukuyuini: 40 (9%), Musagitau 20 (4.5%), Muya: 38 (8.6%), Ndumberi: 54 (12.2%), Ngure: 25 (5.7%), St. Paul's: 29 (6.6%), Ikinu: 24 (5.4%) and Thika: 34 (7.7%). The data above indicates that some schools had more respondents than others. Githothua had the highest number of respondents 56 (12.7%), while Musagitau had the least number of respondents 20 (4.5%). The number of respondents in each school were determined by a number of factors including; the head teachers discretion (some gave a single class while others gave an entire stream), the girl's willingness to participate in the study (some girls were unwilling to participate even though they met the criteria) and the ability of the respondents to complete the questionnaires satisfactorily (some questionnaires were not completed as per the instructions).

Respondent's Diet

According to this study, diet was a moderating variable that could influence the independent variable precocious puberty and the dependent variable psychosocial functioning. The respondents were asked to indicate whether they had enough well balanced meals to eat at breakfast, lunch and dinner. Their responses are as shown below.

Table 4.3

Respondents Diet

Diet	Frequency	Per cent
Yes	407	92.1
No	35	7.9
Total	442	100

The results above show that 407 (92.1%) respondents had enough and well balanced meals through ought the day, while the minority 35 (7.9%) of them did not have enough and well balanced meals through ought the day.

Residence of the Respondents

Inorder to capture the diverse demographic characteristics of Kiambu County, each of the Sub Counties was included in the study. Table 4.5 shows the Sub Counties from where the respondents were drawn.

Table 4.4

Residence of the Respondents

	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	Gatundu North	40	9	9	9
	Gatundu South	30	6.8	7	16.1
	Githunguri	24	5.4	5.4	21.5
	Juja	26	5.9	5.9	27.4
	Kabete	25	5.7	5.7	32.8
	Kiambaa	38	8.6	8.6	42.3
	Kiambu	54	12.2	12.2	54.5
	Kikuyu	20	4.5	4.5	59
	Lari	38	8.6	8.6	67.6
	Limuru	29	6.6	6.6	74.2
	Ruiru	56	12.7	12.7	86.9
	Thika East	28	6.3	6.3	93.2
	Thika West	34	7.7	7.7	100
	Total	442	100	100	

The above findings show that the respondents were from the following Sub Counties of Kiambu County: Gatundu North: 40 (9%), Gatundu South: 30 (6.8%), Githunguri: 24 (5.4%), Juja: 26 (5.9), Kabete: 25 (5.7%), Kiambaa: 38 (8.6%), Kiambu: 54 (12.2%), Kikuyu: 20 (4.5%), Lari: 38 (8.6%), Limuru: 29 (6.6 %),

Ruiru: 56 (12.7%), Thika East: 28 (6.3%) and Thika West: 34 (7.7 %). These results indicate that the respondents were spread all over Kiambu County which has diverse demographic characteristics such as; socioeconomic backgrounds (Affluent and disadvantaged backgrounds), climatic conditions (warm, moderate and cold weather), environmental factors (urban and rural residents) and ethnic backgrounds (people from different ethnic groups) were represented in the study. The results of this study may therefore, be generalizable to the Country.

Objective one: To Establish the Prevalence of Precocious Puberty among Preadolescent Girls in Primary Schools in Kiambu County

In order to estimate the prevalence of precocious puberty and answer research question number one, this study sought to find out the number of girls who had started developing secondary sexual characteristics using the self rating scale for pubertal development (that showed observable changes in the body such as: increases in height, growth of body hair, changes in the breasts, and the onset of menstruation). The findings are presented below.

Observable Changes in the Body

Height. The respondents were asked whether they had seen any changes in their height in the previous months. The responses are shown below.

Table 4.5

Heights of the Respondents

	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	No I have not grown taller	57	12.9	12.9	12.9
	No I do not think there is a difference	29	6.6	6.6	19.5
	Yes I have grown a little taller	349	79	79	98.4
	I do not seem to grow any more	7	1.6	1.6	100
	Total	442	100	100	

The above results indicate that 57 (12.9%) of the respondents had not grown taller, 29 (6.6%) of them did not think there was a difference in their height, 349 (79%) said that they had grown a little taller, while 7 (1.6%) of the respondents said that they did not seem to grow anymore. These results demonstrated that majority of the girls in this study had grown taller. Rapid increases in height and weight are among the first changes that occur during pubertal maturation, meaning that majority of the respondents in this study had began to experience pubertal maturation.

Growth of pubic hair. Growth of pubic hair is another characteristic of pubertal maturation in girls. To the question whether their pubic hair had started growing, the respondents answered as follows.

Table 4.6

Growth of Pubic and Underarm Hair among the Residents

	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	Hair has not started growing	77	17.4	17.4	17.4
	Hair has started growing	241	54.5	54.5	71.9
	Hair has grown a lot	119	26.9	26.9	98.9
	Hair is fully grown	5	1.1	1.1	100
	Total	442	100	100	

The responses above demonstrate that hair growth had not started in 77 (17.4%) of the respondents, hair had just started growing in 241 (54.5%) of them, hair had grown a lot in 119 (26.9%) of the girls, and hair had fully grown in 5 (1.1%) of them. Growth of pubic hair is a clear sign of sexual maturation. These results indicate that majority of the girls had begun experiencing pubertal maturation, which is normal for this age.

Age when pubic hair started growing. The age when the secondary sexual characteristics begun, helped to determine whether pubertal maturation was early, normal or late. The respondents were asked when their pubic hair started developing and the responses are shown below.

Table 4.7

Age When Hair Started Growing Among the Residents

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Before age 8	65	14.7	17.3	17.3
	At or after age 8	310	70.1	82.7	100
	Total	375	84.8	100	
Missing	System	67	15.2		
Total	442	100			

The above results show that 65 (14.7%) out of the 442 respondents had noticed hair growth before age 8, 310 (70.1%) had noticed hair growth at or after age 8, while 67 (15.2%) of them had not noticed any hair growth. Growth of pubic hair before age 8 is an indication of precocious puberty. These results indicate that majority of the girls had their pubic hair growth at the normal time.

Changes in breasts. The development of breast is a clear sign of pubertal maturation. The respondents were asked whether they had noticed any changes in their breast and they responded as recorded below.

Table 4.8

Changes in the Breast among the Residents

	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	No breasts have not changed	12	2.7	2.7	2.7
	Yes breasts have just started growing	240	54.3	54.3	57
	Yes breasts have grown quite a bit	182	41.2	41.2	98.2
	Yes breasts are fully grown	8	1.8	1.8	100
	Total	442	100	100	

The above findings indicate that breast changes had not started in 12 (2.7%) of the respondents, breasts changes had just started in 240 (54.3%) of them, breasts had grown quite a bit in 182 (41.2%) of the girls, while 8 (1.8%) of the respondents had full grown breasts. These results indicate that breast development had begun in majority of the respondents which is expected at these ages.

Age when breasts began changing. To determine whether pubertal maturation was early, on time or late, the respondents were asked when the changes in their breasts began. Their responses were as follows.

Table 4.9

Age When Breast Began Changing

	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	Before age 8	127	28.7	29.5	29.5
	At age 8 or after age 8	303	68.6	70.5	100
	Total	430	97.3	100	
Missing	System	12	2.7		
Total	442	100			

These findings demonstrate that 127 (28.7%) of the respondents had noticed breast changes before age 8, 303 (68.6%) of them had noticed breast changes at or after the age of 8, while 12 (2.7%) respondents had not noticed any changes in their breasts. These findings demonstrate that a significant number of girls had developed breasts before age 8 which is a clear indication of precious puberty.

Onset of menstruation. Menstruation was a key factor in assessing the incidence of precocious puberty among the preadolescent girls in this study. When asked whether their menstruation had begun, the participants responded as follows.

Table 4.10

Onset of Menstruation

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	237	53.6	53.6	53.6
	No	205	46.4	46.4	100
	Total	442	100	100	

The above responses indicate that 237 (53.6%) of the respondents had begun menstruating, while 205 (46.4%) of them had not begun menstruating. As the onset of menstruation is the final stage of pubertal maturation in girls, these results indicate that a significant number of girls in schools in Kiambu County had gone through the pubertal maturation process.

Age at menstruation. The age at menstruation was the defining factor for determining the incidence of precocious puberty in this study. The respondents were asked when their menstruation begun and their responses are as recorded below.

Table 4.11

Age When Menstruation Began

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	At or before age 11	178	40.3	75.1	75.1
	At age 12	59	13.3	24.9	100
	Total	237	53.6	100	
Missing	System	205	46.4		
Total	442	100			

The results above demonstrate that 178 (40.3%) of the respondents had begun menstruating at or before age 11, 59 (13.3%) of them had begun menstruating at age 12, while 205 (46.4%) of the respondents had not begun menstruating. These findings indicate that a significant number of girls had begun menstruating before the age of 12 years. Experiencing menstruation before the age of 12 was the criteria for determining precocious puberty in this study. These results indicate that a significant number of girls in this study met the criteria for precocious puberty.

In summary, findings from the Pubertal Development Scale (as assessed by the observable changes in the body) demonstrated that 349 respondents had grown taller, 365 had pubic hair, 430 had breast development and 237 had begun

menstruating. The findings also showed that 65 respondents had pubic hair before age 8, 127 of them had breast development before age 8, and 178 girls had begun menstruating before the age of 12. Development of secondary sexual characteristics before the age of 8 or experiencing menstruation before the age of 12 are clear signs of precocious puberty. For this study, the defining factor for precocious puberty was the onset of menstruation before the age of 12. Findings from this study indicated that 178 (40.3%) out of 442 study participants met the criteria for precocious puberty. This number was significant, meaning that the prevalence of precocious puberty was relatively high among girls in public primary schools in Kiambu County.

The Relationship between Precocious Puberty and the Psychosocial Functioning of the Preadolescent Girls

Inorder to establish the relationship between precocious puberty and the psychosocial functioning of the preadolescent girls and answer research question numbers 2, 3, 4, and 5, this study conducted regression models and Chi Square tests for the relationship between precocious puberty and the; self esteem, symptoms of depression, peer relationships and the academic performance of the preadolescent girls. The results are discussed below.

Objective Two: To Determine the Relationship between Precocious Puberty and the Self esteem of the Preadolescent Girls in Schools in Kiambu County.

This study conducted a simple regression to establish the relationship between precocious puberty (Xn) and the self esteem (Y_1) of the preadolescent girls. The results are as shown below.

Table 4.12

A Regression analysis showing the Relationship between Xn (Precocious Puberty) and Y_1 (Self esteem) among Preadolescent girls in Kiambu County.

Variables Entered/Removed [a]

Model	Variables Entered	Variables Removed	Method
1	Precocious Puberty Xn [b]	.	Enter

a. Dependent Variable: Y_1 Self esteem

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.146[a]	.021	.019	.36378

a. Predictors: (Constant), Xn Precocious puberty

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.269	1	1.269	9.593	.002[b]
	Residual	58.226	440	.132		
	Total	59.496	441			

a. Dependent Variable: Y_1 Self esteem
b. b. Predictors: (Constant), Xn Precocious Puberty

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.299	.104		22.179	.000
	Xn Precocious Puberty	-.154	.050	-.146	-3.097	.002

a. Dependent Variable: Y_1 Self esteem

The p value for the relationship between precocious puberty and self esteem is given as 0.002, which is less than the significance value 0.05. This implies that there was a statistically significant relationship between precocious puberty and the self esteem of the preadolescent girls. To confirm this statistic a Chi square test was ran for the same relationship as shown below.

Table 4.13

Chi Square Test for the Relationship between Precocious Puberty (Xn) and Self esteem (Y_1)

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Precocious Puberty Xn * Y_1 Self esteem	442	100.0%	0	0.0%	442	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	79.485[a]	38	.000
Likelihood Ratio	78.384	38	.000
Linear-by-Linear Association	4.354	1	.037
N of Valid Cases	442		

The Chi square test for the relationship between precocious puberty and self esteem above, gave a p value of 0.000, which is less that the standard error 0.05. This implies that there was a significant relationship between precocious puberty and the self esteem of the preadolescent girls.

In summary, both regression models and Chi square tests gave a p value of less than the standard error 0.05 (P=0.002, P= 0.000), for the relationship between precocious puberty and self esteem, indicating that a significant relationship existed between the two variables. This means that early pubertal maturation influenced the self esteem of preadolescent girls in schools in Kiambu County.

Objective Three: To Describe the Relationship between Xn (Precocious Puberty) and Y_2 (Symptoms of Depression) among Preadolescent Girls in Schools in Kiambu County

Inorder to determine the relationship between precocious puberty and symptoms of depression among the preadolescent girls, both regression and Chi Square tests were conducted and the results are shown below.

Table 4.14

The relationship between Xn (Precocious Puberty) and Y_2 (Symptoms of Depression)

Variables Entered/Removed [a]

Model	Variables Entered	Variables Removed	Method
1	Precocious Puberty Xn [b]	.	Enter

a. Dependent Variable: Y_2 Symptoms of Depression.

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.268[a]	.057	.055	.49474

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.469	1	6.469	26.427	.000 [b]
	Residual	107.699	440	.245		
	Total	114.168	441			

a. Dependent Variable: Y_2 Symptoms of Depression

a. Predictors: (Constant), Xn Precocious Puberty

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2. 174	.064		33.820	.000
	Precocious Puberty Xn	-178	.035	-.238	-5.141	.000

a. Dependent Variable: Y_2 Symptoms of Depression

The simple regression between precocious puberty and symptoms of depression above gave a p value of 0.000 which is less than the standard error 0.05. These results indicate that the relationship between precocious puberty and symptoms of depression among preadolescent girls in schools in Kiambu County was statistically significant. To confirm this finding, a Chi square test was conducted for the two variables and the results are as follows.

Table 4.15

Chi Square Test for the Relationship between Precocious Puberty (Xn) and Symptoms of Depression (Y_2)

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Precocious Puberty Xn * Y_2 Depression	442	100.0%	0	0.0%	442	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	81.020[a]	52	.006
Likelihood Ratio	95.071	52	.000
Linear-by-Linear Association	24.986	1	.000
N of Valid Cases	442		

The Chi square test for the relationship between precocious puberty and symptoms of depression gave a p value of 0.006. As the p value is less than the standard error 0.05, the relationship between the two values is statistically significant.

The two statistical tests for the relationship between precocious puberty and symptoms of depression among the preadolescent girls gave a p value of less than 0.05 (P=0.000, P=0.006), implying that the relationship between the two variables was statistically significant. This means that early pubertal maturation had an influence on the emotional functioning of preadolescent girls in primary schools in Kiambu County.

Objective Four: To Investigate the Relationship between Xn (Precocious Puberty) and Y_3 (Peer Relationships) among Preadolescent Girls in Schools in Kiambu County

This study conducted a simple regression model and a Chi Square test to find out whether a relationship existed between precocious puberty and the peer relationships of preadolescent girls in schools in Kiambu County. The results are discussed below.

Table 4.16

The Relationship between Xn (Precocious Puberty) and Y_3 (Peer Relationships)

Variables Entered/Removed [a]

Model	Variables Entered	Variables Removed	Method
1	Precocious Puberty Xn	.	Enter

a. Dependent Variable: Y_3 Peer Relationships

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.249[a]	.062	.060	.78463

a. Predictors: (Constant), Precocious Puberty Xn

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.938	1	17.938	29.137	.000[b]
	Residual	270.886	440	.616		
	Total	288.824	441			

a. Dependent Variable: Y_3 Peer Relationships

c. Predictors: (Constant), Xn Precocious Puberty

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.177	.224		9.737	.000
	Precocious Puberty Xn	.578	.107	.249	5.398	.000

a. Dependent Variable: Y_3 Peer Relationships

The simple regression between precocious puberty and peer relationships above gave a p value of 0.000. As the p value is less than the standard error 0.05, it means that the relationship between the two variables was statistically significant. A Chi test was also done to verify this finding and the results were as follows.

Table 4.17

Chi Square Test for the Relationship between Precocious Puberty (Xn) and Peer Relationships (Y_3)

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Precocious Puberty (Xn) * Y_3 Peer Relationships	442	100.0%	0	0.0%	442	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	171.625[a]	48	.000
Likelihood Ratio	191.293	48	.000
Linear-by-Linear Association	23.533	1	.000
N of Valid Cases	442		

The p value for the relationship between precocious puberty and peer relationships is given as p= 0.000. A p value of less than 0.05 indicates that a statistically significant relationship existed between the two variables. This implies that precocious puberty had a significant impact on the quality of peer relationships among preadolescent girls in schools in Kiambu County.

The two statistical tests for the relationship between precocious puberty and peer relationships above gave (p= 0.000, P=0.000.) which is less than the significance level 0.05 indicating that the relationship between the two variables was statistically significant. This means that an early onset of puberty can affect the way preadolescent girls relate with their peers.

Objective Five: To Examine the Relationship between Xn (Precocious Puberty) and Y_4 (Academic Performance) among the Preadolescent Girls in Schools in Kiambu County

This study sought to determine whether a relationship existed between precious puberty and the academic performance of the preadolescent girls. To do this, a simple regression was done as shown below.

Table 4.18

The Relationship between Xn (Precocious Puberty) and Y_4 (Academic Performance)

Variables Entered/Removed [a]

Model	Variables Entered	Variables Removed	Method
1	Precocious Puberty Xn [b]	.	Enter

a. Dependent Variable: Y_4 Academic P.

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.272[a]	.074	.072	.96204

a. Predictors: (Constant), Xn Precocious Puberty

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	32.657	1	32.657	35.285	.000[b]
	Residual	407.226	440	.926		
	Total	439.883	441			

a. Dependent Variable: Y_4 Academic Performance

b. Predictors: (Constant), Xn Precocious Puberty

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.542	.274		5.626	.000
	Precocious Puberty Xn	.780	.131	.272	5.940	.000

a. Dependent Variable: Y_4 Academic Performance

The p value for the relationship between precocious puberty and the academic performance of the preadolescent girls in primary schools in Kiambu County was given as 0.000. This value is less than the significant value 0.05, implying that there was a statistically significant relationship between the two variables. A Chi square test for this relationship gave the results below.

Table 4.19

Chi Square Test for the Relationship between Precocious Puberty (Xn) and Academic Performance (Y_4)

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Precocious Puberty * Y_4 Academic Performance	442	100.0%	0	0.0%	442	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	125.957[a]	40	.000
Likelihood Ratio	137.325	40	.000
Linear-by-Linear Association	13.129	1	.000
N of Valid Cases	442		

The P value for the relationship between precocious puberty and academic performance of the preadolescent girls above is given as 0.000, which is less than the significance level 0.05. This indicated that a statistically significant relationship existed between the two variables.

The statistical analysis for the relationship between precocious puberty and academic performance of the preadolescent girls gave p values of less than the standard error 0.05 (p=0,000, 0.000). These statistics are interpreted to mean that the relationship between the two variables was statistically significant. This means that earlier than normal pubertal maturation significantly affected the academic performance of preadolescent girls in schools in Kiambu County.

Hypothesis Testing

This study tested the hypothesis for the relationship between precocious puberty and the four psychosocial functioning variables using the regression outputs. The results are discussed below.

$HO_{1.}$ There was no significant relationship between precocious puberty and the self esteem of preadolescent girls in primary schools in Kiambu County. Results gave a p value of 0.002, which is less than the significant value 0.05. This means that there was a significant relationship between precocious puberty and the self esteem of the preadolescent girls. Therefore, the null hypothesis was rejected in favour of the

alternative hypothesis that, there was a significant relationship between precocious puberty and the self esteem of preadolescent girls in schools in Kiambu County.

HO_2: There was no significant relationship between precocious puberty and symptoms of depression among preadolescent girls in primary schools in Kiambu County. The results gave a p value of 0.000, which is less than the significant value 0.05, implying that the relationship between the two variables was statistically significant. As a result, the null hypothesis was rejected meaning that the relationship between precocious puberty and symptoms of depression among preadolescent girls in schools in Kiambu County was statistically significant.

$HO_{3:}$ There was no significant relationship between precocious puberty and peer relationships among preadolescent girls in primary schools in Kiambu County. Results revealed that the p value was 0.000, which is less than the standard error 0.05. Considering these statistics, the null hypothesis was rejected indicating that there was a statistically significant relationship between precocious puberty and the peer relationships of preadolescent girls in schools in Kiambu County.

$HO_{4.}$ There was no significant relationship between precocious puberty and the academic performance of preadolescent girls in primary schools in Kiambu County. The results gave a p value of 0.000, which is less than the standard error 0.05, implying that the relationship between the two variables is statistically significant. The null hypothesis is therefore rejected in favour of the alternative hypothesis that

there was a significant relationship between precocious puberty and the academic performance of the preadolescent girls in schools in Kiambu County.

In summary, both regression models and Chi Square tests indicated that there were statistically significant relationships between precocious puberty and the four psychosocial functioning variables; self esteem, symptoms of depression, peer relationships and academic performance. Testing the hypothesis for these relationships using the regression models demonstrated that there was a statistically significant relationship between precocious puberty and the four psychosocial functioning variables among preadolescent girls in schools in Kiambu County. Testing the hypothesis using the Chi square outputs would yield similar results as all the p values given were less than 0.05.This means that an earlier onset of puberty can affect the psychological, emotional, social and occupational functioning of preadolescent girls.

Comparisons of Outcomes between the Groups

In order to ascertain whether the psychosocial functioning outcomes among the preadolescent girls were influenced by precocious puberty specifically or by pubertal maturation in general, this study compared the regression outputs of the 178 girls with precocious puberty, the 205 girls without precocious puberty and the 59 girls who had matured at the right time. The results are shown below.

Table 4.20

Regression Analysis for the Relationship between Precocious Puberty and the Psychosocial Functioning for the 178 Precocious Girls.

Variables Entered/Removed [a]

Model	Variables Entered	Variables Removed	Method
1	Precocious Puberty Xn [b]	.	Enter

a. Dependent Variable: Yn Psychosocial Functioning.

b. All requested variables entered.

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.197[a]	.039	.033	.32184	.039	7.125	1	176	.008	1.538

A. Predictors: (Constant), Xn Precocious puberty

B. Dependent Variable: Yn Psychosocial functioning

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	.738	1	.738	7.125	.008[b]
	Residual	18.230	176	.104		
	Total	18.968	177			

a. Dependent Variable: Yn Psychosocial Functioning

c. Predictors: (Constant), Xn Precocious Puberty.

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.842	.235		7.827	.000
	Precocious Puberty Xn	.347	.130	.197	2.669	.008

a. Dependent Variable: Yn Psychosocial Functioning

The p value for the relationship between precocious puberty and the psychosocial functioning of the precocious girls (those who had started menstruating before the age of 12) was 0.008 which is less that the standard error 0.05. This means that the relationship between precocious puberty and the psychosocial functioning of the precocious girls was statistically significant.

Table 4.21

Regression analysis showing the relationship between precocious puberty and the psychosocial functioning for the 205 without precocious girls.

Variables Entered/Removed [a]

Model	Variables Entered	Variables Removed	Method
1	Precocious puberty Xn [b]	.	Enter

a. Dependent Variable: Yn Psychosocial Functioning.

b. All requested variables entered.

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.076[a]	.006	.001	.33619	1.731

a. Predictors: (Constant), Xn Precocious puberty

b. Dependent Variable: Yn Psychosocial Functioning

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.132	1	.132	1.171	.281[b]
	Residual	22.944	203	.113		
	Total	23.076	204			

a. Dependent Variable: Yn Psychosocial Functioning

b. Predictors: (Constant), Precocious Puberty

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.573	.150		17.159	.000
	Precocious Puberty Xn	.071	.066	.076	1.082	.281

a. Dependent Variable: Yn Psychosocial Functioning

The relationship between precocious puberty and the psychosocial functioning for the non-precocious girls gave a p value of 0.281 which is greater that the significance level 0.05. This means that the relationship between precocious puberty and the psychosocial functioning for the 205 non precocious girls was statistically insignificant.

Table 4.22

Regression Analysis Showing the Relationship between Precocious Puberty and the Psychosocial Functioning for the 59 Girls with Normal Pubertal Maturation.

Variables Entered/Removed [a]

Model	Variables Entered	Variables Removed	Method
1	Precocious puberty Xn [b]	.	Enter

a. Dependent Variable: Yn Psychosocial Functioning.

c. All requested variables entered.

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.154[a]	.024	.007	.23748	2.332

a. Predictors: (Constant), Xn Precocious puberty
b. Dependent Variable: Yn Psychosocial Functioning

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.078	1	.078	1.380	.245[b]
	Residual	3.215	57	.056		
	Total	3.292	58			

a. Dependent Variable: Yn Psychosocial Functioning

d. Predictors: (Constant), Xn Precocious puberty

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.968	.431		4.569	.000
	Precocious puberty Xn	.233	.198	.154	1.175	.245

a. Dependent Variable: Yn Psychosocial Functioning

The p value for the relationship between precocious puberty and the psychosocial functioning for the 59 girls who had matured at the normal time was given as 0.245. The p value is greater than the standard error 0.05 implying that the relationship between the two variables in this particular group was statistically insignificant.

The comparison results demonstrate that the relationship between precocious puberty and psychosocial functioning of both the non precocious group and the normal pubertal maturation group was statistically insignificant. This means that precocious puberty had no influence on the psychosocial functioning of these two groups. However, the regression results for the precocious group showed a significant relationship between precocious puberty and psychosocial functioning. This means that the precocious group accounted for the psychosocial functioning changes in the combined results. This study therefore, concludes that precocious puberty specifically, and not pubertal maturation generally, accounted for the changes in the psychosocial functioning among the preadolescent girls.

Objective Six: The Relationship between Diet, Precocious Puberty and the Psychosocial Functioning of Preadolescent Girls in Primary Schools in Kiambu County.

Inorder to establish whether diet had any relationship with the independent variable precocious puberty, and the dependent variable psychosocial functioning, Chi square tests were conducted as discussed below.

Table 4.23

Chi Square Tests Showing the Relationship between Diet, and Precocious Puberty among the Preadolescent Girls.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Diet * Precocious Puberty Xn	442	100.0%	0	0.0%	442	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.636[a]	2	.022

Likelihood Ratio	6.206	2	.045
Linear-by-Linear Association	3.679	1	.055
N of Valid Cases	442		

The relationship between diet and the psychosocial functioning of the preadolescent girls gave a p value of 0.022, which is less than the standard error 0.05. These results indicate that there was a significant relationship between diet and precocious puberty. This means that the quality and quantity of food can influence the onset of pubertal maturation among preadolescent girls.

Table 4.24

Chi Square Tests for the Relationship between Diet, and Psychosocial Functioning among Preadolescent Girls.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Diet * Psychological Functioning Yn	442	100.0%	0	0.0%	442	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	442.000[a]	42	.000
Likelihood Ratio	244.670	42	.000
Linear-by-Linear Association	27.689	1	.000
N of Valid Cases	442		

The relationship between diet and the psychosocial functioning of the preadolescent girls above gave a p value of 0.000 which is less than the significant value 0.05. This implies that there was a statistically significant relationship between diet and psychosocial functioning. This means that the quality and quantity of food can influence the psychological, emotional, social, and occupational functioning of developing girls.

In summary the quantitative data indicates that: 1) a significant number of girls in school in Kiambu County met the criteria for precocious puberty, 2) there was a significant relationship between precocious puberty and; self esteem, symptoms of depression, peer relationships and academic performance, and 3) there was a significant relationship between diet and both precocious puberty and the psychosocial functioning of the preadolescent girls in primary schools in Kiambu

County. Inorder to ascertain the nature of these relationships this study also collected qualitative data. The results are discussed below.

Qualitative Data Analysis

In addition to the questionnaire, this study conducted focus group discussions with the preadolescent girls and structured interviews with their class teachers.

Focus Group Analysis

This study conducted four focus group discussions each comprising of 10 girls, in four schools, bringing the total number of participants to 40. The participants were selected from the larger group of participants who had already participated in filling the questionnaire. After explaining the nature, purpose and expected outcomes of the study, the researcher requested girls who were 11 years old, who had already started menstruating and who were willing to participate in a focus group discussion to come forward. From the group of volunteers, 10 girls were randomly sampled to participate in the focus group discussions.

The discussions began with a general conversation about pubertal maturation, and a question and answer session. This normalized the group and the girls who were initially shy opened up to share their experiences. A set of predetermined questions informed by the study objectives was used to guide the discussions. Before the study commenced, the researcher asked permission from the girls to record the sessions.

The raw data was transcribed and key themes that emerged from the data were identified, analysed and described using Nvivo version 12. The focus group discussion results are discussed below using a thematic approach based on the study objectives

Theme 1: Experiences of precocious puberty. In this session, the girls were asked to share their experiences when pubertal maturation began in their bodies. All the respondents in all the four groups admitted to having experienced body changes related to pubertal maturation such as; increases in weight and height, growth of pubic hair, breast development and the onset of menstruation. Some of the girls shared that they were unprepared for the body changes which caused some levels of distress as shared below.

"I was at school studying as usual, but when I stood up to go for break, I realized my dress was wet. I asked another girl to check my dress and she said my dress was stained with blood. I was embarrassed and did not know what to do next R1."

"*I was at home alone when I started having a stomach-ache. When I went to the toilet I found that I was bleeding, I had to use a piece of cloth before my mum came back and bought pads for me R2."*

"I was not prepared when my periods started.R3"

My periods came when I was in the sitting room watching TV with my parents and siblings. I was embarrassed R4."

However not everyone was completely unprepared for the body changes during pubertal maturation. Some girls shared that a sister, a mother, a grandmother,

or a teacher had prepared them for the pubertal changes and so when they occurred, they were happy as the responses below confirm.

"When my periods started, I was excited because my grandmother had told me that getting periods means I was fertile and I could be a mother one dayR1."

"My mother and sister had talked to me about periods and showed me how to use pads, so I was not surprised when my periods came, even if it was earlier than I expected R3."

Our school had brought someone to talk to us about growing up, so I was ready for the periods. We were also given pads at school so I used to keep mine waiting for the big day R4."

As their bodies changed some girls developed diverse coping mechanism as shared below.

"I did not want people to see that my chest was changing, so I used to wear a t shirt inside my uniform to try and hide my breasts R3."

"When my breasts started growing, I would wear a sweater all the time, whether it was cold or hot, I never removed it R2."

This session revealed that most of the girls had their pubertal maturation earlier than they expected. Their narrated experiences demonstrate unpreparedness, embarrassment and desperate attempts to hide their pubertal maturation characteristics. The narratives also show that girls who were prepared and supported by significant others coped better than those who were not.

Theme 2: Feelings about self /levels of self esteem. The participants were asked to share how they felt about themselves when pubertal maturation began. They shared their diverse feelings as follows. This respondents felt good about herself indicating high levels of self esteem.

"It was a good feeling to know that I was now a woman! My mother told me if I play around with boys I could get pregnantR4."

Some girls had mixed feelings as shared by this respondent

When my breasts started to grow, I was very shocked, but I was also happy that I had breasts like my mum R1."

The physical body changes brought shame and embarrassment to some other girls as revealed in the response below.

"One day I woke up and I had an ugly pimple. After a while my face was full of pimples and it changed completely. I was unable to look at people directly and I really hated myself R4."

Another girl who increased in weight shared that,

"All over a sudden I started adding weight and becoming bigger. People started asking me whether I was pregnant. I felt so bad about my weight that I just refused to eat for days R3."

The way some of the girls felt about themselves was informed by how different they felt from their peers as shared by these two girls.

"*I hated my body that seemed to grow faster than everyone else' body R1."*

"When my body started changing, I felt different from everyone else and I hated it R4."

The girls' shared experiences demonstrated that even though some girls felt good about the onset of pubertal maturation leading to higher levels of self esteem, majority of the girls felt bad about their experiences and hated their bodies which are indications of low self esteem. These experiences are supported by the study of Fraser (2017) which found that early maturing girls were more likely to report body dissatisfaction and poor self esteem than their later maturing counterparts. Fraser (2017) wrote that, because menarche incited weight gain physically distances early maturing girls from both the current idealized thin body type, and the bodies of their less developed peers, a comparatively earlier age of menarche confers increased risk for eating pathology by triggering body dissatisfaction and low self esteem.

Theme 3: Emotional response. The girls were asked to share how their emotional functioning changed when their pubertal maturation begun. The discussions demonstrated that when they began to develop pubertal maturation characteristics, the girls had diverse emotional responses. Some of the girls reported being withdrawn, others lost interest in activities previously enjoyed, while others were just sad. The girls' shared experiences are highlighted below.

"I was very depressed when my periods started. I stayed alone and did not want to talk or eat. My mother came and asked me whether I was sick and I told her no R1."
"My moods were very bad at that time I did not want anyone to talk to me or ask me anythingR2"

"I felt so helpless when I started my periods. I did not want to do anything R3."

"I was very sad when my periods started because I never liked periods R4."

Some of the feelings and emotional responses shared in this session such as; loneliness, withdrawing from people, helplessness, lack of energy and sadness are clear symptoms of depression. However, not everyone had a negative emotional experience. This girl was one among the few who were happy about earlier pubertal development perhaps because of the support from significant others.

"I was happy because my mum and my sister were there for me R2."

These experiences demonstrate that except for a few girls who had a positive emotional response, majority of the girls had responses that were characteristic of depressive symptoms. This finding is explained well by McGuire et al. (2019) who wrote that the physical, hormonal and psychological changes that accompany puberty, coupled with the academic and social demands, and the search for identity and meaning were significant stressors that could cause emotional challenges among pubertal girls.

Theme 4: Relationship with others. In this session, the participants were asked to share how pubertal maturation before the expected time changed their relationship with peers. Some girls felt like they were too old for their friends so they had to look for other friends as shared below.

"I did not feel like playing with my friends when my body started changing because I felt like I was a grown up and they were children R1."

"I felt that they would not understand me because they were not having the changes I had R2."

"When the changes started to happen, I had to look for new friends who had already grown like me R3."

"I felt uncomfortable around my old friends so I had to look for new friends who were like me and who I felt more comfortable with R4."

Some of the girls shared that they did not trust their friends and could not bring themselves to share their experiences with them as these respondents shared.

"I did not trust any of my friends, so I did not tell them what was happening to me R2."

"Before my body started changing, I had heard girls gossiping those who had their periods. If someone had a stain in her dress, other girls would gossip about her. So I said when I have my periods no one will ever knowR3."

Some girls kept previous relationships and there were no changes as these respondents indicate.

"When my best friend had her periods before me, our friendship did not change. When my periods came I was happy that I had a friend who would understand me R2."

"A few of my friends had started their menstruation already, so they talked to me about periods and showed me how to use pads R4."

The above experiences show that maturing earlier than normal affected peer relationships in different ways, that is; some relationships remained the same and some ended altogether. However, majority of the experiences symbolize significant

strains in peer relationships as demonstrated by discomfort with previous relationships, lack of trust, and gossip.

Theme 5: Changes in academic performance. In this session, the girls were asked to share how maturing earlier than expected affected their academic work. Some girls feared that they might stain their dresses and that affected their performance as these responses demonstrate.

"When my periods began, I was uncomfortable most of the time. I was worried that I would stain my dress and the boys will see and laugh at me. I did not perform well in school that term R1."

"Staining my dress at school was my biggest worry. I was scared of going to school during my periods and even when I went, I was not comfortable. This affected my school work and I failed in my exams R4."

This girl actually stained her dress at school and that changed her behaviour.

"One day at school I stained my dress and some of my classmates saw it. That made me feel so bad because I knew people would gossip and laugh at me. I became shy and that affected my school work badly R3."

Some girls had pain that prevented them from concentrating in class as shared below.

"Every time I had my periods, I had a stomach ache. Sometimes I just rolled on the floor and cry. When my periods came and I had to go to school, I could not pay attention in classR1."

"I usually have a lot of pain during my periods. During the first months after my periods started, I could not attend school when I had periods and this made me fail in my examsR2."

The girls' shared experiences indicate that the onset of menstruation is one of the key signs of pubertal maturation that impacts negatively on academic performance. This finding is supported by the sentiments of Kiesner et al. (2019) who

noted that menarche in and of itself can cause a negative impact on the academic performance of the early maturers.

Theme 6: Support from significant others. One of the reasons that make early pubertal maturation difficult to cope with is lack of support by stakeholders such as peers, parents and teachers. When asked what kind of support pubertal girls would benefit from as they negotiated the earlier than normal pubertal changes, the girls had several recommendations some of which are highlighted below. These two girls recommended that pads and pants be provided in schools.

"If parents are not able to buy pads for the girls, then the school should help them so that they do not have to miss school because they have nothing to use for their period R3."

"Sometimes girls have pads from school but they do not have good pants. I think it will help if the schools can provide pants too R4."

These girls suggested that preparing the girls ahead of the changes would be helpful.
"I think if girls are talked to about the changes before they come, they would be more prepared R1."

"Sometime we girls have questions and we have no one to ask. I think adults should be there to talk to us before our periods come and answer our questions R2."

This girl suggested that sensitizing the boys on what girls go through would go a long way

"Boys do not understand what girls have to go through during their periods and they are not kind sometimes. Teachers should tell them to understand girls and their development and treat them well R3."

This respondent summed it all up well when she said that

"Girls should be prepared before their periods come, provided with enough pads and pants and someone should be there to help them solve their problems R4."

In summary, the focus group results demonstrate that even though some participants had positive experiences which elevated their self esteem, uplifted their emotions and improved their peer relationships and academic performance, majority of the participants had negative experiences that resulted to low self esteem, depressive symptoms, and challenges in both peer relationships and academic performance. These findings demonstrated the critical role that the qualitative data played in this study. While the quantitative data showed significant relationships between precocious puberty and all the psychosocial functioning variables, it did not indicate whether the relationships were positive, negative or neutral. The qualitative data therefore filled this gap. To substantiate these findings 12 female class teachers were interviewed as discussed below.

Structured Interview Analysis

To collect collaborative information and substantiate the girl's experiences from an adult's perspective, this study interviewed 12 female class teachers in 12 of the sampled schools. The teachers were selected from the participating classes and schools using a purposive (so as to include only female class teachers) and convenient (so as to include teachers who were already involved, available and willing to participate) sampling methods. A set of specific questions informed by the study

objectives, were prepared ahead of time and used with all the teachers. The interview questions were intentionally prepared in a manner that would make it easy to quantify the results. The researcher sought the teacher's permission to record the sessions for easier transcription. The results were transcribed and themes were identified and analysed using Nvivo version 12. The results are presented below using a thematic approach.

Theme 1: Pubertal maturation. When the teachers were asked to share some of the physical changes that they had noticed in the girls, all the 12 teachers acknowledged having noticed sexual maturation characteristics such as changes in weight and height, breast development and skin changes before age 8 and the onset of menstruation in girls younger than 12 years old.

Theme 2: Changes in self esteem. The researcher asked the teachers how the pubertal development characteristics before the expected age affected the girl's self esteem. Six out of the 12 class teachers said that pubertal maturation led to low self esteem. Three of the class teachers noticed that the girls' self esteem improved significantly when they began maturing, while another three teachers said that the self esteem remained the same. These results indicate that majority of the girls' experienced low self esteem when pubertal maturation began.

Theme 3: Emotional functioning. To help answer the third research objective, the teachers were asked to share ways that the girls' emotional functioning was affected by their pubertal maturation. Out of the 12 teachers interviewed, 5 of them said the girls lost interest in school related activities such as class work and sports. Two of the teachers noticed that some girls were always sad when pubertal maturation began. Three of the class teachers noticed that girls withdrew from friends and wanted to be by themselves when they started maturing. One teacher shared that the girls became arrogant and disrespectful, and another teacher said that the girls became more responsible when they matured. According to these responses, majority (10) of the class teachers highlighted characteristics similar to symptoms of depression when the girls started maturing early.

Theme 4: Peer relationships. On objective number four, the teachers were asked whether the pubertal changes affected the girls' peer relationships. To this question, five class teachers shared that when girls started maturing they grouped themselves according to their level of maturity. The other seven class teachers acknowledged noticing behaviours such as: discrimination, envy, bullying, mockery and rejection when pubertal maturation begun. These responses showed that most of the class teachers had observed behaviour characteristic of challenges in peer relationships when girls matured earlier than normal.

Theme 5: Academic performance. Inorder to answer research question number 5, the teachers were asked to share how early pubertal maturation affected the academic performance of the girls. Majority (8) of the teachers cited a decline in academic performance and attributed this to lack of concentration, absenteeism and a decline in participation in class and other school activities. Three of the class teachers said that the academic performance remained the same and one teacher noticed an improvement in performance after pubertal maturation begun. These results indicate that although some girls' academic work improved and others were unaffected, majority of the girls had declines in their academic performance when pubertal maturation began.

Theme 6: Support. In closing, the teachers were asked what interventions they would suggest for girls who matured early. Some of the key responses were; 1) parents should be enlightened on how to handle children who go through early puberty at home and provide the necessary materials, 2) the girls should be sensitized on pubertal maturation and prepared beforehand, 3) guidance and counselling should be offered to girls who experience early puberty and 4) everyone should be understanding and supportive of girls who mature early. Some teachers shared that the government supplied pads in schools and that the guidance and counselling teachers walked with the girls as they developed.

In summary the teacher's interviews demonstrated that although precocious puberty brought about some positive experiences such as elevated levels of self esteem, and improvement in relationships and academic performance, most girls had negative experiences in their psychological, emotional, social and occupational areas of functioning. These resulted to outcomes such as low self esteem, strains in peer relationships, the onset or increase of depressive symptoms and declines in academic performance. These findings support both the quantitative data and the focus group discussions results.

Discussion of findings

The purpose of this study was to establish the prevalence of precocious puberty (as defined by the onset of menstruation before age 12) and then determine its relationship with the psychosocial functioning (as defined by the self esteem, symptoms of depression, peer relationships, and academic performance) of preadolescent girls in primary schools in Kiambu County. The objectives of the study were to : 1) Establish the prevalence of precocious puberty, 2) Determine the relationship between precocious puberty and the self esteem, 3) Describe the relationship between precocious puberty and symptoms of depression, 4) Investigate the relationship between precocious puberty and peer relationships, 5) Examine the relationship between precocious puberty and the academic performance, and 6) Discuss the relationship between diet (a moderating variable), precocious puberty

(independent variable) and the psychosocial functioning(dependent variable) of preadolescent girls in primary schools in Kiambu County.

The data collection was done using questionnaires and focus group discussions for the girls and structured interviews for their female class teachers. The calculated sample population for this study was 380 girls aged 11 and 12 years, selected from class five in 13 public primary schools within Kiambu County. However, because of the need to study whole populations in schools, the total number of available respondents was 468. When the questionnaires were distributed, only 442 were filled satisfactorily bringing the response rate to 94.4 %. Besides the questionnaire, this study conducted one focus group discussion each comprising of 10 girls in four schools and interviewed 12 female class teachers using a structured interview. The Statistical Package for Social Sciences SPSS (version 25) was used to generate frequency distributions, regression models and Chi square tests for the quantitative data, while Nvivo (version 12) was used to identify, analyse and describe the themes for the qualitative data. The results were presented using tables and thematic descriptions based on the predefined study objectives. The findings of the study are summarized below in light of the objectives of the study.

Demographic Characteristics

The results showed that a total of 442 girls from 13 schools (one from each Sub Country of Kiambu County) took part in the study. Different schools

had different numbers of respondents. Githothua and Ndumberi primary schools in Ruiru and Kiambu Sub Counties recorded the highest number of respondents (12.7%) and (12.2%), respectively, while Musagitau primary school in Kikuyu Sub County had the least (4.5%) number of respondents. The difference in the number of respondents per school was informed by a number of factors including; the head teacher's discretion, the willingness of the girls to participate in the study, and the ability to fill in the questionnaires satisfactorily. Some head teachers recommended a smaller number of respondents citing interruptions to learning, while others embraced the study and encouraged as many girls as possible to participate. Some girls were unwilling to participate in the study despite meeting the criteria and others did not complete the questionnaires satisfactorily.

Out of the 442 participants, 383 (86.7%) were 11 years old, while 59 (13.3%) of them were 12 years old. This study specifically targeted 11 year old girls because they would demonstrate the incidence of precocious puberty perfectly based on its definition in this study. That is, the study targeted those girls who had their menstruation at or before age 11. The 12 year old girls were included in the study to provide a comparison group in order to determine whether the psychosocial functioning outcomes in this study were influenced by precocious puberty specifically or by pubertal maturation generally.

All the 442 respondents in this study were in class 5. According to the Kenya education system, 11 year old children are supposed to be in class 6, considering that children start primary school at age 6. However, in reality the ages are spread in every class. For example, most 11 year old girls were in class five in most of the sampled schools, but there were also 10 and 12 years olds in the same class. Class five was selected because this is where the majority of the targeted age group would be found and studying a single class with majority of the respondents helped to minimize learning interruptions in schools.

Diet was included as a moderating variable for this study because of its potential to influence the relationship between the independent variable precocious puberty, and the dependent variable psychosocial functioning. The study findings demonstrated that majority of the respondents 407 (92.1%) had enough well balanced meals at breakfast, lunch and dinner, while the minority 35 (7.9%) did not have enough balanced meals three times a day.

Objective One: Prevalence of Precocious Puberty among Preadolescent Girls in Primary Schools in Kiambu County

In order to estimate the prevalence of precocious puberty and answer research question number one, this study sought to find out the number of girls who had started developing secondary sexual characteristics. This was examined using the self-rating scale for pubertal development (which shows the observable changes in the body such

as growing taller, growth of body hair, changes in the breasts, and the onset of menstruation). To specifically determine the prevalence of precocious puberty in relation to the definition of this study, the researcher asked whether the girls had begun menstruating and the age at the onset of menstruation.

Results from the pubertal development scale demonstrated that out of the 442 girls who participated in the study, 349 had grown taller, 365 had pubic or underarm hair, 430 had breast development and 237 had begun menstruating. The findings also showed that 65 respondents had pubic hair growth before age 8, 127 of them had breast development before age 8, and 178 of the respondents had begun menstruating at or before the age of 11 years.

Because Menstruation is the last sign in the pubertal maturation process among girls, the assumption was that if they were menstruating, they had already experienced all the other signs of pubertal maturation (such as changes in weight and height, growth of pubic hair and development of breasts), therefore even though those were assessed (and confirmed that some girls developed the signs before age 8, which indicated precocious puberty), the defining factor for precocious puberty in this study was the onset of menstruation before the age of 12 years. Out of the 442 girls who participated in this study, 178 (40.3%) girls met the criteria for precocious puberty. The structured interview responses showed that all the 12 class teachers reported noticing signs of earlier than normal pubertal maturation such as the onset of

menstruation in girls who were younger than 12 years. In summary, both the quantitative and qualitative results demonstrated that a significant number of respondents had experienced precocious puberty. This finding indicates that the prevalence of precocious puberty was relatively high among girls in public primary schools in Kiambu County. This finding was supported by several studies which found that there was an increase in the incidence of precocious puberty both globally and locally (Al-Jurayyan et al., 2017; Brito et al., 2016; Leonard et al., 2017) and that girls were more affected than boys (Eyam & Ekpe, 2018; Pallavee & Samal, 2018).

Objective Two: Relationship between Precocious Puberty and the Self esteem of Preadolescent Girls in Kiambu County

In order to establish the relationship between precocious puberty and the self esteem of preadolescent girls in primary schools in Kiambu County, the researcher tested the results of the pubertal development scale against the results of the Rosenberg self esteem scale (which assessed the levels of self esteem) using a simple regression model and a Chi square test. The regression model gave a p value of 0.002, while the Chi square test gave a p value of 0.000. This implies that the relationship between precocious puberty and the self esteem of preadolescent girls in primary schools in Kiambu County was statistically significant. This means that early pubertal maturation influenced the self esteem of the preadolescent girls significantly.

The focus group discussions revealed that when girls started developing pubertal maturation characteristics earlier than normal, most of them had negative experiences as demonstrated by their shared experiences below.

"*I hated my body that seemed to grow faster than the bodies of my age matesR1".*

"One day I woke up and I had an ugly pimple. After a while my face was full of pimples and it changed completely. I was unable to look at people directly and I really hated myself R4."

The above experiences indicate that the girls developed low self esteem characteristics such as; body dissatisfaction, self-hate, shame, and embarrassment when their pubertal maturation began earlier than expected. The structured interview results demonstrated that 6 out of the 12 class teachers reported that early pubertal maturation among the girls led to low self esteem. In summary, the quantitative data indicated that precocious puberty influenced the self esteem of the preadolescent girls significantly, and the qualitative data confirmed this by demonstrating that precocious puberty led to lower levels of self esteem in majority of the girls in primary schools in Kiambu County.

This finding is supported by the study of Gupta (2016) which found that puberty is a time of both physical and psychological changes, which can influence perceptions of self, and dissatisfaction with one's body, both of which are key elements in the development of self esteem. Similarly, Choi & Kim (2016) observed that body dissatisfaction was a wide spread issue among preadolescent girls, and that

there was a well established connection between girls' body dissatisfaction and their self esteem.

Objective 3: Relationship between Precocious Puberty and Symptoms of Depression among Girls in Public Primary schools in Kiambu County.

To determine the relationship between precocious puberty and symptoms of depression among the preadolescent girls, this study carried out a simple regression model and a Chi square test, using the results of the pubertal development scale and those of the RCARDS depression subscale (which screened for symptoms of depression). The regression model gave a p value of 0.000, while the Chi square test gave a p value of 0.006, implying that there was a significant relationship between precocious puberty and symptoms of depression among preadolescent girls in primary schools in Kiambu County. This means that earlier than normal pubertal maturation influenced the emotional functioning of the preadolescent girls significantly. The focus group discussions demonstrated that most of the girls developed symptoms of depression such as loneliness, withdrawal, helplessness, loss of interest and sadness when pubertal changes began before time as shared by these respondents.

"I was very depressed when my periods started. I stayed alone and did not want to talk or eat. My mother came and asked me whether I was sick and I told her no R1."

"I felt so helpless when I started my periods. I did not want to do anything R3."

"I was very sad when my periods started because I never liked periods R4."

The class teachers also confirmed that when pubertal maturation began early, the girls developed emotional challenges such as loss of interest, sadness and withdrawal which are clear symptoms of depression. Out of the 12 teachers interviewed, five of them said the girls lost interest in school related activities such as class work and sports, two noticed that some girls were always sad, three said that the girls withdrew from friends and wanted to be by themselves, one shared that the girls became arrogant and disrespectful, and another teacher said that the girls became more responsible when they matured earlier than expected. In summary, the quantitative data demonstrated that precocious puberty had a statistically significant relationship with symptoms of depression among the preadolescent girls. The qualitative data confirmed this relationship and demonstrated that precocious puberty contributed to depressive symptoms in most of the girls in schools in Kiambu County.

This finding was supported by the study of Jiang et al. (2020) which examined the influence of pubertal development stage on depression, and its psychosocial mechanisms in a non-clinical population in china. This study found that: 1) pubertal development was positively correlated with depression, low self esteem and interpersonal stress, 2) adolescent depression was closely associated with adult depression and suicidal ideations, 3) depression in puberty could affect normal growth, impair social relationships with friends and family and cause serious educational barriers, and that 4) body dissatisfaction was a major predictor of low self esteem, depression, and eating disorders in adolescents. Another study by Mendle et

al. (2018) found that early maturation in girls was associated with higher rates of depressive symptomatology, eating disorders and substance use.

Objective Four: Relationship between Precocious Puberty and Peer Relationships among Preadolescent Girls in Primary Schools in Kiambu County.

In order to establish the relationship between precocious puberty and the quality of peer relationships, the results from the self administered pubertal scale were regressed against the results of the peer connectedness scale (which measured levels of peer connectedness among young people). A Chi square test was also done for the same relationship. Findings showed a p value of 0.000 from both tests, implying that there was a significant relationship between precocious puberty and peer relationships. This means that when girls matured earlier than normal, their relationship with same age peers was affected significantly. The focus group responses showed that when girls matured early, their peer relationships were affected in different ways. Some girls were uncomfortable with their same age peers, others felt misunderstood, while others abandoned former friends and found new ones as these narrations indicate.

""I did not feel like playing with my friends when my body started changing because I felt like I was a grown up and they were children R1."

"I felt that they would not understand me because they were not having the changes I had R2."

"When the changes started to happen, I had to look for new friends who had already grown like me R3."

From the structured interviews, 5 out of the 12 class teachers shared that when girls started maturing, they grouped themselves according to their level of maturity. The other seven class teachers reported noticing behaviours characteristics of strained peer relationships such as; discrimination, bullying, mockery and rejection when the girls matured earlier than expected. In summary, the statistical results showed that the relationship between precocious puberty and the peer relationships of the preadolescent girls was statistically significant. This means that when girls matured earlier than expected, their peer relationships were affected significantly. The focus group discussions and the teacher's interview results demonstrated that earlier than normal maturation led to challenges in peer relationships among the preadolescent girls.

The above experiences show that maturing earlier than normal affected peer relationships in different ways, that is; some relationships remained the same and some ended altogether. However, majority of the experiences symbolize significant strains in peer relationships as demonstrated by discomfort with previous relationships, lack of trust, and gossip. These experiences are supported by the sentiments of Kota and Ejaz (2019) who noted that when girls mature early they are forced to make difficult choices as to whether to keep same age peers who are less developed than themselves, or join an older group of peers that are not only more

developed physically, but are also mentally, cognitively and more emotionally developed than them. Similarly, Sackman and Terway (2016) observed that precocious girls who do not fit in or who are rejected by their peers may choose to join older groups who may seem to understand them, but who may introduce them to negative behaviours such as; substance abuse, precocious sexuality, and delinquency.

Objective Five: Relationship between Precocious Puberty and Academic Performance of Preadolescent Girls in Primary Schools in Kiambu County

This study also examined the relationship between precocious puberty and the academic performance of preadolescent girls through a regression model and a Chi square test. This was done using the results of the pubertal development scale and the academic performance scale (which assessed performance in exams). Results of both statistical tests gave a p value of 0.000, implying that there was a significant relationship between precocious puberty and the academic performance of the preadolescent girls in primary schools in Kiambu County. This means that when girls matured earlier than expected, their academic work was affected significantly. The focus group discussions indicated that when girls matured early, they experienced challenges which affected their academic work negatively as these respondents shared.

"When my periods began, I was uncomfortable most of the time. I was worried that I would stain my dress and the boys will see and laugh at me. I did not perform well in school that term R1."

"One day at school I stained my dress and some of my classmates saw it. That made me feel so bad because I knew people would gossip and laugh at me. I became shy and that affected my school work badly R3."

"Staining my dress at school was my biggest worry. I was scared of going to school during my periods and even when I went, I was not comfortable. This affected my school work and I failed in my exams R4."

The structured interviews showed that 6 out of the 12 class teachers, noticed a decline in academic performance of the girls when pubertal maturation begun early. In summary, The quantitative data showed that a statistically significant relationship existed between precocious puberty and the academic performance of the preadolescent girls in schools in Kiambu County. The qualitative data results indicated that majority of the girls who matured earlier than normal had a decline in their academic performance.

This finding is supported by the study of Martin and Steinbeck (2017) which found that the substantial physiological, biological, social and emotional changes that accompany puberty may have significant negative implications for the education of the young people. Similarly Kiesner et al. (2019) supported the above finding when they wrote that menarche in and of itself can cause a negative impact on the academic performance of the early maturers.

In summary, both the regression models and Chi square tests demonstrated that there were significant relationships between precocious puberty and the psychosocial functioning of the preadolescent girls in public primary schools in Kiambu County. The responses from both the focus group discussions and the structured interviews supported the quantitative data, as they demonstrated that when girls matured earlier than normal, most of them had negative experiences such as; lower levels of self esteem, depressive symptoms, strained peer relationships and poor academic performance.

Theoretical Conceptualization

According to the psychosocial theory (Erickson, 1950), the industry versus inferiority stage presents many demands for the preadolescent girls including; dealing with new social and academic demands, developing new skills, proving their competence and gaining confidence. Successful negotiation of this stage leads to feelings of confidence and competence, while failure to negotiate it successfully leads to feelings of inferiority and lack of confidence, which in turn may lead to lower levels of self esteem. As demonstrated by the qualitative results, majority of the girls in this study had low self esteem. This could mean that these girls were not able to negotiate the industry vs inferiority stage successfully perhaps because of the combined challenges of the stage itself and those of precocious puberty.

This study also demonstrated that some of the respondents had symptoms of depression, strained peer relationships and lower academic performance. While the demands of the school age stage could directly lead to these outcomes, studies have also demonstrated that low self esteem (resulting from failure to negotiate the stage successfully in this case) can lead to symptoms of depression (Manna et al., 2016), difficulty in initiating and maintaining peer relationships (Harris & Orth, 2020), and lower academic performance Doodman et al. (2017)

It is worthwhile to note that not all the respondents had a negative experience when pubertal maturation set in early. According to the focus group discussions, some girls had positive experiences as these narratives demonstrate.

"When my periods started, I was excited because my grandmother had told me that getting periods means I was fertile and I could be a mother one dayR1."

"My mother and sister had talked to me about periods and showed me how to use pads, so I was not surprised when my periods came, even though it was earlier than I expected R3."

Our school had brought someone to talk to us about growing up, so I was ready for the periods. We were also given pads at school so I used to keep mine waiting for the big dayR4."

Some of the class teachers also noticed positive experiences such as; higher levels of self esteem, improved emotional functioning, consistent peer relationships and better academic performance even after the girls matured earlier than normal. However, the positive experiences were few compared to the negative experiences. This study found overwhelming evidence supporting negative psychological,

emotional, social and occupational outcomes among preadolescent girls, when pubertal maturation began earlier than expected.

Objective Six: Relationship between Diet, Precocious and the Psychosocial Functioning of Preadolescent Girls in Primary Schools in Kiambu County.

According to the Chi square test conducted to show the relationship between diet and precocious puberty, the p value was given as 0.022 which is less than the standard error 0.05. This demonstrated that the relationship between diet and precocious puberty was statistically significant. This means that diet had a significant influence on the onset of pubertal maturation among preadolescent girls in primary schools in Kiambu County. This finding was supported by Calcaterra et al. (2021) who wrote that having enough well balanced meals during all the phases of growth (infancy, childhood and puberty) is critical for proper growth and normal pubertal development of children, and that severe primary or secondary malnutrition poses a nutritional risk on pubertal development. Similarly, Binu and Thomas (2017) found that high calorie and protein consumption, more coffee intake and low physical activity were independently associated with earlier age of menarche.

To establish whether there was a relationship between diet and the psychosocial functioning of the girls, a Chi Square test was conducted for the two variables. The results gave a p value of 0.000 which means that the relationship between precocious puberty and the psychosocial functioning of the preadolescent

girls was statistically significant. This means that diet had a significant influence on the psychological, emotional, social and occupational functioning of the preadolescent girls.

This finding was supported by several studies that found relationships between; 1) diet and self esteem: Latiff, et al. (2018) found that dissatisfaction with one's body during early puberty was linked to negative outcomes such as low self esteem, unhealthy weight control behaviours and disordered eating habits, 2) diet and symptoms of depression: Molendijik (2018) found that adherence to a high quality diet was associated with a lower risk of depressive symptoms over time, 3) diet and peer relationships: Miething et al. (2018) established that interactions with peers amplified girls body image and weight concerns which lead to unhealthy weight control measures such as disordered eating and 4) diet and academic performance: Woodhouse and Lamport (2021) found that the consistent consumption of sufficient quantities and varieties of high quality and nutrient dense foods, can reduce the potential for the cognitive impairments associated with malnutrition, and improve academic performance.

Conclusion of Findings

This study established that: 1) 178 representing 40.3% of the preadolescent girls who participated in this study met the criteria for precocious puberty, 2) there was a significant relationship between precocious puberty and the four psychosocial

functioning variables; self esteem, symptoms of depression, peer relationships and academic performance and that 3) there was a statistically significant relationship between diet and both precocious puberty and the psychosocial functioning of preadolescent girls in schools in Kiambu County. Given these findings this study concludes that: 1) the prevalence of precocious puberty was relatively high among girls in schools in Kiambu County, 2) maturing earlier than normal can have a negative influence on the psychological, emotional, social and occupational functioning of preadolescent girls and 3) the quality and quantity of meals have the potential to influence both the onset of pubertal maturation and the psychosocial functioning of developing girls.

CHAPTER FIVE

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter summarizes the research findings in relation to the six objectives of the study which were to: 1) establish the prevalence of precocious puberty among preadolescent girls, 2) determine the relationship between precocious puberty and the self esteem, 3) describe the relationship between precocious puberty and symptoms of depression, 4) investigate the relationship between precocious puberty and peer relationships, 5) examine the relationship between precocious puberty and the academic performance of preadolescent girls in primary schools and finally to 6) discuss the relationship between diet, precocious puberty and the psychosocial functioning of preadolescent girls in primary schools in Kiambu County. This chapter also draws conclusions, makes recommendations, and suggests areas of further study.

Demographic Characteristics

A total of 442 preadolescent girls aged 11 and 12 years and 12 female class teachers took part in the study. The participants were sampled from 13 public primary schools from each of the 13 Sub Counties of Kiambu County. The girls filled in a questionnaire and participated in focus group discussions, while their class teachers participated in a structured interview. The quantitative data was analysed using the Statistical Package for Social Sciences (SPSS version 25), while the qualitative data

was analysed using Nvivo version 12. The quantitative results were presented using tables, while the qualitative data was presented using thematic descriptions based on the study objectives. The key findings are summarized below.

The Key Findings

Objective One

The first objective of this study was to establish the prevalence of precocious puberty among preadolescent girls in public primary schools in Kiambu County, Kenya. This study found that, out of the 442 girls who took part in this study, 205 (46.4%) had not started menstruating, 178 (40.3%) had the onset of menstruation at or before age 11, and 59 (13.3%) had begun menstruating at age 12. Because the onset of menstruation is the climax of pubertal maturation in girls, menstruation means that the other secondary sexual characteristics such as increases in height and weight, growth of pubic and underarm hair, and breast development had already occurred. The onset of menstruation before the age of 12 was the defining factor for precocious puberty in this study. Given the high number of girls who were menstruating before age 12 (178) , this study concluded that the prevalence of precocious puberty was relatively high among preadolescent girls in primary schools in Kiambu County.

Objective Two

The second objective of this study was to determine the relationship between precocious puberty and the self esteem of preadolescent girls in primary schools in Kiambu County. The regression models gave a p value of 0.002, while the Chi square tests gave a p value of 0.000 for this relationship. A p value of less than 0.05 implies that the relationship is statistically significant. The qualitative data showed that most of the girls developed low self esteem characteristic such as body dissatisfaction and self hate when their pubertal maturation began early. Majority of the class teachers indicated that girls developed a sense of low self esteem when they began to mature before the expected time. Given these findings, this study concluded that earlier than normal pubertal maturation can lead to lower levels of self esteem among preadolescent girls.

Objective Three

The third objective of this study was to describe the relationship between precocious puberty and symptoms of depression among preadolescent girls in school in Kiambu County. The statistical results showed that there was a significant relationship between precocious puberty and symptoms of depression, as demonstrated by p values of 0.000 and 0.006 for the regression model and Chi square tests respectively. The focus group discussions and the teacher's interviews results revealed that maturing earlier than normal led to symptoms such as hopelessness,

withdrawal from friends and sadness, which are characteristic of depression. Considering these findings, this study concluded that precocious puberty can contribute to depressive symptoms among preadolescent girls.

Objective Four

The fourth objective of this study was to establish the relationship between precocious puberty and the peer relationships of preadolescent girls. Both regressions models and Chi square tests gave a p value of 0.000, which implies that the relationship between the two variables was statistically significant. This finding was supported by the focus group discussions and the structured interviews which demonstrated that most of the girls experienced challenges in peer relationships as indicated by behaviours such as; discrimination, gossip, bullying , and isolation, when they began to show pubertal maturation characteristics before the expected time. In view of these results, this study concludes that earlier than normal maturation can lead to strains in peer relationships among pubertal girls.

Objective Five

The fifth objective of this study was to examine the relationship between precocious puberty and the academic performance of preadolescent girls in primary schools in Kiambu County. The regression model as well as the Chi square tests gave a p value of 0.000 indicating that there was a statistically significant relationship

between precocious puberty and the academic performance of the preadolescent girls. During the focus group discussions, majority of the girls narrated that they had a hard time coping with pubertal maturation and especially the onset of menstruation which affected their academic work negatively. Similarly, majority of the class teachers shared that the academic performance of a significant number of girls dropped drastically when pubertal maturation set in early. Given these results, this study concluded that precocious puberty can cause academic decline among preadolescent girls.

In summary, the quantitative data showed that there was a significant relationship between precocious puberty and the four psychosocial functioning variables; self esteem, symptoms of depression, peer relationships and academic performance among preadolescent girls in schools in Kiambu County. The qualitative data demonstrated that precocious puberty led to low self esteem, depressive symptoms, strained peer relationships and poor academic performance in majority of the participants. However, in some girls (although the minority) the psychosocial functioning remained the same or improved even after pubertal maturation set in early. This study found more evidence for negative outcomes in psychosocial functioning of the preadolescent girls, when they matured earlier than normal and concluded that precocious puberty leads to challenges in psychosocial functioning among preadolescent girls.

Objective Six.

The last objective of this study was to discuss the relationship between diet, precocious puberty and the psychosocial functioning of preadolescent girls in primary schools in Kiambu County. This study found that there was a significant relationship between diet and precocious puberty as indicated by the p value of 0.022 which is less than 0.05. As well, this study found a statistically significant relationship between diet and the psychosocial functioning of the preadolescent girls as demonstrated by the p value of 0.000. Given these findings, this study concludes that the quality and quantity of food can contribute to the onset of pubertal maturation, and to the psychological, emotional, social and occupational functioning of preadolescent girls.

Summary of Key Findings

In summary, this study found that the incidence of precocious puberty was on the rise and that precocious puberty had a negative influence on the psychosocial functioning of preadolescent girls in primary schools in Kiambu County. Further, this study found that diet contributed significantly to the onset of precocious puberty, and to the psychosocial functioning of the preadolescent girls in primary school in Kiambu County. Considering these findings, this study makes the following conclusions: 1) the prevalence of precocious puberty was relatively high among preadolescent girls, 2) precocious puberty can contribute to low self esteem, symptoms of depression, strains in peer relationships and a decline in the academic

performance among preadolescent girls, 3) The quality and quantity of food can contribute to the timing of pubertal maturation and to the psychological, emotional, social and occupational functioning of preadolescent girls.

Recommendations

Based on the findings of the study and the suggestions from both the preadolescent girls and their class teachers, this study makes the following recommendations: 1) Psychoeducation be provided among communities on the incidence of precocious puberty and its influence on the functioning of young girls. This will enable parents, peers, teachers and other stakeholders to be more supportive of girls who experience earlier than normal puberty. 2) Modifiable factors such as diet and the environment be controlled where possible, inorder to reduce the incidence of precocious puberty and its adverse outcomes. 3) Forums that empower children with knowledge about stages of development be incorporated in the curriculum.

This will prepare both girls and boys for pubertal maturation ahead of time and help boys to be more understanding and supportive of the girls. 4) Qualified therapists be deployed in primary schools to walk with the girls in their developmental journey. In so doing, outcomes such as low self esteem, depressive symptoms, strained relationships and poor academic performance resulting from early maturation among preadolescents may be prevented, 5) Menstrual hygiene materials such as pads and pants be provided in schools for girls whose parents cannot afford

them, so that girls can comfortably attend school without worrying about soiling their clothes and 6) Stakeholders pay keen attention to the early signs of anxiety in preadolescents girls. This will enable them to address the anxiety early and prevent it from escalating to other symptoms such as depression.

Suggested Areas for Further Research

This study suggests that further studies be done to:

1. Determine the relationship between delayed pubertal maturation and the psychosocial functioning of post adolescent girls.
2. Determine the relationship between precocious puberty and anxiety

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APPENDIX A

Preadolescent Girls Interview Questionnaires

The transition from child hood to adulthood is known as puberty. Normal puberty is demonstrated by sexual maturation characteristics such as changes in weight and height, changes in the skin, growth of pubic and underarm hair and the development of breast buds. These changes begin at age 8 and culminate with menstruation at around age 12. Precocious Puberty is a condition where the pubertal changes occur before age 8 or menstruation happens before age 12 in girls. The purpose of this study is to find out how many girls begin pubertal maturation early and how that affects their; self esteem, emotional wellbeing, relationships with peers and their learning. The questionnaires are anonymous and you do not have to write your name. No one will ever know what answers you gave so answer the questions truthfully.

Section A: Demographic information (researcher developed social demographic data collection tool).

The questions below are about you and your family. They will help to better understand you as a person and how you live. Please answer them honestly.

1. I am _____years old
2. My school is _____primary school

3. I am in Class _____

4. Do you have enough well balanced food to eat at breakfast, lunch and dinner?
   ( ) Yes
   ( ) No

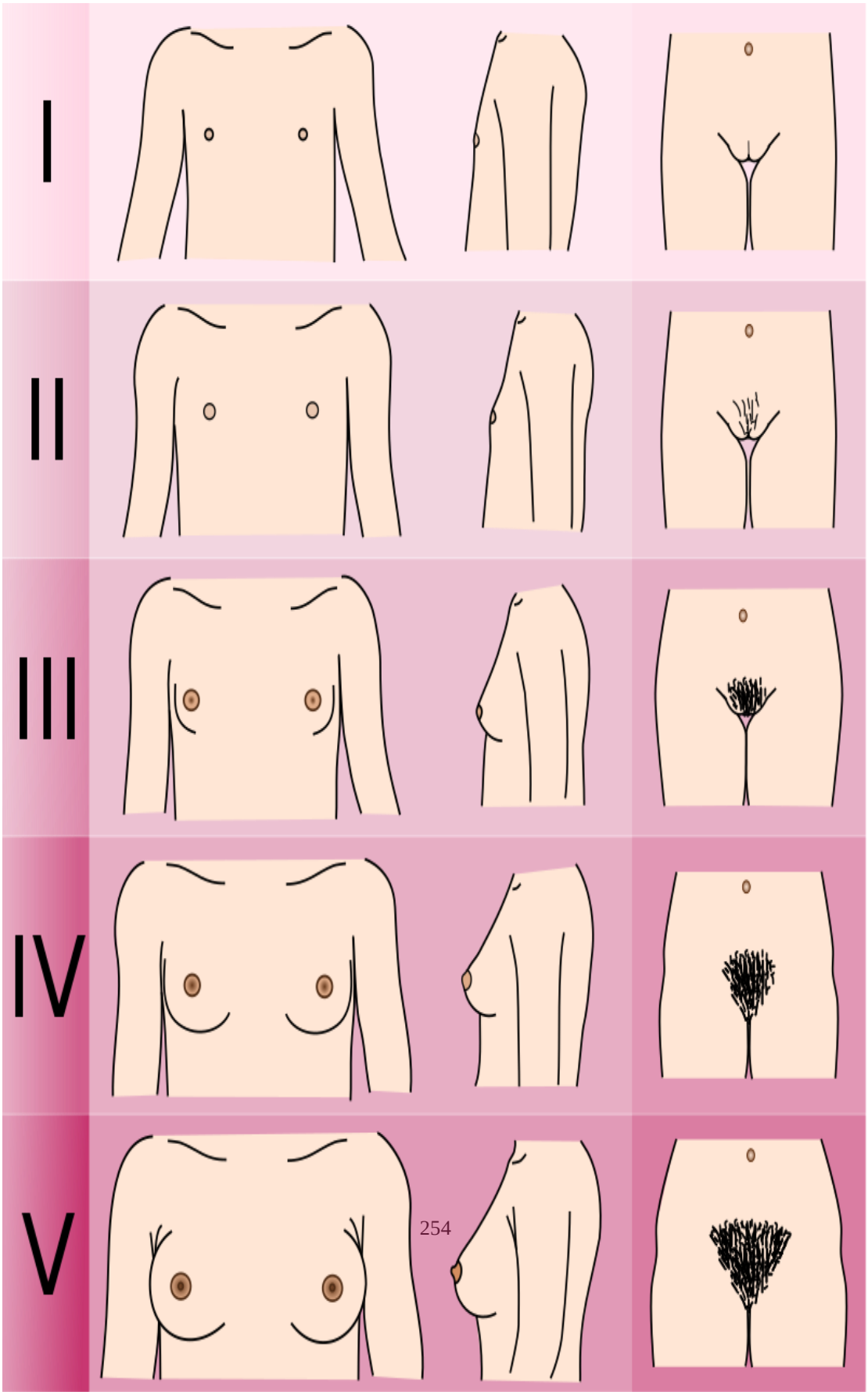
4. What is the name of your Sub County_____?

Section B: Observable Changes in the Body

The next questions are about changes that may be happening to your body. These changes normally happen to different young girls at different ages. Please tick inside the box with the answer that best describes the changes in your body. Below the table are pictures showing some body changes. Please study them carefully as you answer questions in this session.

Question	1	2	3	4

1. Would you say you have become taller in the last few months?	No, I have not grown taller.	No, I do not think there is a difference.	Yes I have grown a little taller.	I do not seem to grow any more.
2. What would you say about your pubic hair (hair in private area)	Hair has not started growing.	Hair has started growing.	Hair has grown a lot.	Hair is fully grown.
3. If your answer to 2 above is yes, when did hair start growing? If your answer is no please go to number 4	Before age 8.	At or after age 8.		
4. Have you noticed any changes in your breasts	No, breasts have not changed.	Yes breasts have just started growing	Yes breasts have grown quite a bit.	Yes breasts are fully grown.
5. If your answer to 4 above is yes, when did the changes begin? If your answer is no please go to number 6	Before age 8	At or after age 8.		
6. Have your periods started?	Yes	No		
7. If your answer to 6 above is yes, when did your periods begin? If your answer is no please go to session C	At or before age 11	At age 12.		


I
II
III
IV
V

Section C: Self esteem Scale

Below is a list of statements that deal with general feelings about yourself. Please tick inside the box with the answer that describes how you thought or felt about yourself or how you think other people thought and felt about you when you began maturing/ menstruating.

Question	1	2	3	4
1. On the whole, were you happy with yourself?	Strongly agree- I was very happy.	Agree - I was a little happy.	Strongly disagree - I was very unhappy.	Disagree - I was not happy.
2.Were there times that you thought you were not good enough	Strongly agree - Yes, all the time.	Agree - Many times.	Strongly disagree - No, never.	Disagree – only once in a while
3.Did you feel that you had some good qualities	Strongly agree - Yes, all the time.	Agree - Yes, many times.	Strongly disagree – Never.	Disagree – only once in a while

4. Did you think that you were able to do things as well as most of the other girls?	Strongly agree – Yes, all the time.	Agree – Yes, many times.	Strongly disagree – Never.	Disagree – No, only once in a while
5. Did you like yourself?	Strongly agree- Yes, all the time.	Agree - Yes, many times.	Strongly disagree – Never.	Disagree - No, only once in a while
6. Did you ever feel useless?	Strongly agree- Yes, all the time.	Agree – Yes, many times.	Strongly disagree – Never.	Disagree – No, only once in a while
7. Did you feel that you were as good as other girls?	Strongly agree - Yes, all the time.	Agree – Yes, many times.	Strongly disagree – Never.	Disagree – No, only once in a while
8. Did other people respect you?	Strongly agree- Yes, all the time.	Agree – Yes, many times.	Strongly disagree – Never.	Disagree - No only once in a while
9. Did you ever feel like a failure?	Strongly agree - Yes, all the time.	Agree – Yes, many times.	Strongly disagree – Never.	Disagree - No, only once in a while
10. Did you have a positive attitude towards yourself?	Strongly agree – Yes, all the time.	Agree - Yes, many times.	Strongly disagree – Never.	Disagree - No, only once in a while

Section D: Emotional Functioning Scale

The following questions describe your emotions. Please tick the answer that best describes how often you felt these things happening to you when your body began to mature or when your periods started.

Question	1	2	3	4
1. I felt sad.	Never true.	Sometimes true.	Often true.	Always true.
2.Nothing was much fun anymore (I lost interest in the things that I previously enjoyed)	Never true.	Sometimes true.	Often true.	Always true.
4.I had difficulty sleeping	Never true.	Sometimes true.	Often true.	Always true.

5.I had problems with my appetite	Never true.	Sometimes true.	Often true.	Always true.
6.I had no energy to do things	Never true.	Sometimes true.	Often true.	Always true.
7.I felt tired all the time	Never true.	Sometimes true.	Often true.	Always true.
8. I could not think clearly	Never true.	Sometimes true.	Often true.	Always true.
9.I felt like I was good for nothing	Never true.	Sometimes true.	Often true.	Always true.
10. I felt like I did not want to move	Never true.	Sometimes true.	Often true.	Always true.
11.I felt restless	Never true.	Sometimes true.	Often true.	Always true.

Section E: Peer Relationships Scale

This section describes how you and your age mates responded to each other when you began to mature. Please read each statement and tick the number that best describes how true that statement was for you or how much you would have agreed with it when you first begun to mature/ menstruate.

	Not at all-never	Not really - Rarely	Sort of - sometimes	True-many times	Very true -All the time
1. My classmates often bothered me.	□ 1	□ 2	□ 3	□ 4	□ 5
2. I liked all the children in my class.	□ 1	□ 2	□ 3	□ 4	□ 5
3. I liked working with my classmates.	□ 1	□ 2	□ 3	□ 4	□ 5
4. I got along well with the other children in my classes.	□ 1	□ 2	□ 3	□ 4	□ 5
5. My classmates liked me.	□ 1	□ 2	□ 3	□ 4	□ 5
6. I fought or argued with other children at school.	□ 1	□ 2	□ 3	□ 4	□ 5

Section F: Academic Performance Scale

Think back to that time that you first noticed changes in your body/ started your periods. Please tick the box that shows how you performed in each subject in the exam you wrote following this experience.

	F (0-29)	D (30-49)	C (50-69)	B (70-89)	A (90-100)
1. Math	□ 1	□ 2	□ 3	□ 4	□ 5
2. English	□ 1	□ 2	□ 3	□ 4	□ 5
3.Social studies	□ 1	□ 2	□ 3	□ 4	□ 5
4. Science	□ 1	□ 2	□ 3	□ 4	□ 5
5. Swahili	□ 1	□ 2	□ 3	□ 4	□ 5

Section G: Focus Group Discussion

Growing into a beautiful woman can be both an exciting and scary experience for young girls. Let us start this discussion by talking about the stages of pubertal growth. What are some of the changes that a growing girl goes through?

Changes in height: The fastest rate of height growth usually occurs in girls between when breast buds start to develop and about six months before they get their period.

Body growth: One major noticeable change during puberty is growth spurts (growing faster than one did during childhood). One may notice that the feet and hands get bigger. Next the arms and leg bones grow making one taller. One may gain some weight to match the increase in the bone size.

Breast development: One may notice what feels like little buds or swellings under the nipples. After that the breasts will gradually get bigger and fuller and may become a little sore.

Body hair: One may find hair growing in new places. Curly hair will start growing in the pubic area (the area that extends from the lower stomach to between the legs). At first this hair is soft and there is not much of it. Later the hair grows longer and becomes a little curly and eventually covers the entire pubic area. A few months after pubic hair begins to grow hair will also grow under the arms.

Skin and hair changes: During puberty the pores in the skin produces more oil especially on the face and this may cause acne.

Discharge: Discharge is a clear or crowdy fluid produced by the body to moisten and cleanse the vagina. Before the period start, one may notice yellow or white stains in the underwear. This is normal and it is a sign that menstruation will start 6- 18 months. However, if this is accompanied by other symptoms such as itching one should see the doctor to distinguish what is normal from an infection.

Menstruation: All these changes lead up to the start of the first period. When the first menstruation starts, it can be unpredictable for the first two years. It typically takes 1-2 years for cycles to develop so it might not be regular. Periods begin 2-3 years after the development of breast buds.

Discussion: Think back at that time when you saw one or more of the above signs. Please share how your experience was during that time.

Guiding Questions

1. Please share your experience when your pubertal maturation begun
2. How did you feel about yourself when you began to mature sexually
3. What was your emotional response when your body started changing?
4. In which ways did your relationship with same age peers change when you started developing pubertal maturation characteristics?

5. How did early maturation affect your academic work?
6. What do you suggest that peers, parents, teachers and other adults should do to support girls who mature earlier than the expected time?

Conclusion

We have come to the end of our session. Thank you so much for coming and sharing your experiences, thoughts and opinions with me. If you have additional information that you did not get to share during the group time, please feel free to write it down in the papers provided. Please also feel free to share any feedback you may have on the same pieces of paper. Once again remember that this was a confidential discussion and should not be talked about elsewhere.

Class Teachers' Interview.

To help us understand the incidence of precocious puberty and its relationship with the psychosocial functioning of preadolescent girls, please help us answer the following questions.

1. What are some of the physical changes you have noticed in the girls? (E. g. changes in height, weight, breast development, onset of menstruation).
2. How did these changes affect their self esteem? (Did it become lower, higher or did it remain the same).

3. In which ways did the changes affect their emotional functioning (e. g withdrawal, lack of interest in activities, sadness suicidal ideations?).
4. How did the changes affect their relationship with same age peers?

   Were they rejected/ envied/ bullied/ laughed at /mocked or discriminated against? Did they seek out new friends or did they keep their old friends.
5. In which ways did the changes affect their academic work? (E. g. drop or improvement in grades, participation in class and other activities)?

6. Please share any recommendations or comments.

APPENDIX B: LIST OF SCHOOLS

Number	Name of the school	Sub County
1	Githothua	Ruiru
1.	Ikuma	Gatundu South
2.	Kakuzi	Thika East
3.	Thika	Thika West
4.	Kibii	Juja
5.	Kimende	Lari
6.	Mukuyuini	Gatundu North
7.	Musa Gitau	Kikuyu
8.	Muya	Kiambaa
9.	Ndumberi	Kiambu
10.	Ngure	Kabete
11.	St. Pauls	Limuru
12.	Ikinu	Githunguri

APPENDIX C: CONSENT FORMS

Head Teachers Consent Form

Dear Sir/Madam,

My name is Catherine Kawira. I am a Ph.D. in Marriage and Family therapy student at Pan Africa Christian University. I am carrying out a study titled 'the relationship between precocious puberty and the psychosocial functioning of preadolescent girls in Kiambu County, Kenya.' The purpose of this study is to determine the prevalence of precocious puberty and how it affects the psychosocial functioning of preadolescent girls. This is aimed at creating awareness and providing information to parents, teachers and other stakeholders with the hope that they can find better ways of taking care of the early maturing girls.

I am asking for your permission to let girls in your school participate in the study by completing a questionnaire and participating in a focus group discussion. The questionnaire will ask questions about pubertal maturation and its influence on the; self esteem, symptoms of depression, peer relationships and academic performance of the girls. The questionnaire will take approximately 20 minutes for each girl, while the focus groups will take approximately 45 minutes. The girls can chose to participate in filling the questionnaire only, or also be a part of a focus group discussion. I propose to carry out the study at a time that is most convenient for the school, so that there is as little interference with the normal school routine as possible.

The pupils' responses to the survey will be anonymous and confidential. During the survey and discussions, no identifiable information will be collected and as such, no one will be able to trace the information to the participants. Your consent and your pupil's participation are completely voluntary. Pupils may withdraw from the study at any time and there is no reward for participating or consequence for not participating in the study.

Considering that there may be some discomfort among the girls when answering some of the questions, I have identified therapists within the constituency where the girls can be referred for therapy if that is necessary. It is my hope that data from this study will contribute to a better understanding of the incidence of precocious puberty and its influence on the psychosocial functioning of preadolescent girls, and that better ways of taking care of the developing girls may be found. I am willing to answer any questions you may have, and if you wish to clarify anything further, you can do so at any time.

I believe that you have the authority to give consent for the girls to participate in the study, but I would like to seek their parent's consent through you. I have written a similar letter to the parents; please ensure that it reaches them and that they communicate their feedback to you ahead of the study. I will also seek the girls assent to participate before the study begins.

Consent Form

I_____the head teacher of _____Primary School, having understood the nature of this study agree that the study may be carried out in my school.

Signature: _____

Name: _____

Date: _____

Parent's Consent Form

Dear parent,

My name is Catherine Kawira. I am a Ph.D. in Marriage and Family Therapy student at Pan Africa Christian University. I am carrying out a study titled 'the relationship between precocious puberty and the psychosocial functioning of preadolescent girls in schools in Kiambu County.' The purpose of this study is to determine the prevalence of precocious puberty and then find out how it influences the psychosocial functioning of preadolescent girls. This is aimed at creating awareness to all the stakeholders with the hope that better ways of taking care of the early maturing girls may be found.

I am asking for your permission to let your daughter participate in the study by completing a questionnaire and participating in a focus group discussion. The questionnaire will ask questions about pubertal maturation and its influence on the; self esteem, symptoms of depression, peer relationships and academic performance of the girls. The questionnaire will take approximately 20 minutes for each girl, while the focus groups will take approximately 45 minutes. Your daughter can chose to participate in filling the questionnaire only or also be a part of a focus group discussion. I propose to carry out the study at a time that is most convenient for the school, so that there is as little interference with the normal school routine as possible. Your daughter's response to the survey will be anonymous and confidential. During

the survey no identifiable information will be collected and as such, no one will be able to trace the information to your daughter.

Your consent and your daughter's participation are completely voluntary. She may withdraw from the study at any time. There is no reward for participating or consequence for not participating in the study. I will also seek your daughter's assent to participate before the study begins.

Considering that there may be some discomfort among the girls when answering some of the questions, I have identified therapists within the constituency, where the girls can be referred to for therapy if that is necessary. It is my hope that data from this study will contribute to a better understanding of precocious puberty and that better ways of taking care of the developing girls may be found. Please sign the consent form below and send it back to the head teacher if you consent to your daughter's participation in the study.

Consent Form

I _____, the parent of _____having understood the nature of the study agree that my daughter may participate in the study.

Signature: _____

Name: _____

Date: _____

Fomu ya Idhini ya Mzazi

Kwa Mzazi,

Jina langu ni Catherine Kawira. Mimi ni mwanafunzi wa Ph.D. wa masomo ya Kifamilia na ndoa katika Chuo Kikuu Cha Kikristo cha Pan Africa. Ninafanya utafiti wenye kichwa ‘Uhusiano kati ya kubalehe mapema na utendaji kazi wa kisaikolojia na kijamii, kwa wasichana wadogo katika Kaunti ya Kiambu. Ni matumaini yangu kwamba utafiti huu utachangia katika kuwaangalia vizuri wasichana wanaobalehe mapema.

Mimi naomba ruhusa yako ili binti yako aweze kushiriki katika utafiti huu. Utafiti utauliza maswali kuhusu kubalehe mapema na uhusiano wake na utendakazi wa kisaikolojia na kijamii kwa wasichana wadogo. Kujibu maswali kutachukua takribani dakika ishirini, ili hali majadiliano yatachukua muda wa dakika arobaini na tano. Msichana wako anaweza kuchagua kujibu maswali pekee ama pia kushiriki kwa majadiliano. Napendekeza kufanya utafiti masaa ambayo yanafaa zaidi kwa shule, ili tuzuie jinsi iwezekanavyo kuingilia kati utaratibu wa kawaida wa shule.

Majibu ya binti yako katika utafiti yatakuwa bila majina, na yenye kuhifadhi siri. Wakati wa utafiti, hakuna mambo ya kujitambulisha yatakayokusanywa kwa hivyo hakuna mtu atakayekuwa na uwezo wa kufuatilia habari kwa washiriki. Idhini yako na ushiriki wa binti yako ni kwa hiari kabisa, na anaweza kujiondoa kutoka kwa utafiti huu wakati wowote. Hakuna malipo kwa ajili ya kushiriki, au matokeo

mabaya kwa kutoshiriki. Binti yako pia ataulizwa ruhusa kabla ya kushiriki katika utafiti huu. Kunaweza kuwa na usumbufu kiasi kwa wanafunzi katika kujibu baadhi ya maswali, lakini tumefanya mpango na washauri karibu na shule ili waweze kusaidia wasichana watakaohitaji msaada huo. Ni matumaini yangu kwamba matokeo kutoka utafiti huu, yatachangia kuweka mikakati ya kuwasaidia wasichana wanaobalehe mapema. Tafadhali tia sahihi kwa fomu hii, kisha uirundishe shuleni kama unakubali msichana wako ashiriki kwenye utafiti.

Fomu ya Idhini

Mimi _____ mzazi wa_____ baada ya kuelewa vizuri kuhusu utafiti huu, ninakubali kwamba binti yangu anaweza kushiriki katika utafiti.

Sahihi: _____

Jina: _____

Tarehe: _____

Preadolescent Girls Consent Form

My name is Catherine Kawira. I am a PhD in Marriage and Family Therapy student at the Pan Africa Christian University. I am carrying out a research to understand changes that take place in girls of your age and how those changes affect how girls feel about themselves, how they respond emotionally, how they relate with others and how they learn. The intention of this study is to help parents, teachers and other people to understand these changes and how they affect the girls so that they can take good care of them. I therefore, request your participation in the study. You can choose to answer the questionnaire only or also be a part of a discussion group. The questionnaire will take approximately 20 minutes, while the focus group discussion will take approximately 45 minutes.

Your responses to the survey will be anonymous and confidential. No identifiable information will be collected from you and no personal information that you give in the questionnaires will be shared with your teachers, parents or other pupils. Your consent and participation is voluntary. You may withdraw at any time even after you have begun. There will be no rewards for participating and no negative consequences for not participating or withdrawing from participation. There may be some level of discomfort in answering the questions about the body changes so I have made arrangements with therapists near your school that we can refer you to in case this happens during your participation in the study.

Girls' Consent Form

My name is _____. I attend _____Primary School. I have been talked to about this study and I understand what it is about and agree to participate.

Signature: _____

Name: _____

APPENDIX D: PERMISSIONS

Research Authorization and Ethics Clearance Letter - Pan Africa Christian University

Research Permit - National Commission for Science Technology and Innovation

Research Authorization – Ministry of Education – State Department of Early Learning and Basic Education.

PAN AFRICA CHRISTIAN
PAC UNIVERSITY

P.O. Box 56875 - 00200
Nairobi, Kenya
Lumumba Drive, Roysambu
off Kamiti Rd, off Thika Rd
Tel: 0734 400694/0721 932050
Email: enquiries@pacuniversity.ac.ke
website: www.pacuniversity.ac.ke

27th May, 2020

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION & ETHICS CLEARANCE LETTER FOR JULIUS CATHERINE KAWIRA REG. NO: PMFT/7650/16

Greetings! This is an introduction letter for the above named person a final year student at Pan Africa Christian University (PAC University), pursuing a Doctor of Philosophy in Marriage and Family Therapy (Phd).

She is at the final stage of the programme and she is preparing to collect data to enable her finalise on her dissertation. The dissertation title is **"Precocious Puberty and Psychosocial Functioning of Preadolescent Girls: A Case of Selected Primary Schools in Kiambu County, Kenya".**

We kindly request that you allow her obtain a research permit so as to proceed and conduct research at the selected primary schools in Kiambu County, Kenya.

Warm Regards,

PAN AFRICA CHRISTIAN UNIVERSITY
REGISTRAR
P.O. Box 56875 - 00200
TEL 0721 932050/0734 400694
NAIROBI KENYA

Dr. Lilian Vikiru
Registrar Academic Affairs
Pan Africa Christian University
Lumumba Drive, Roysambu, off Kamiti Rd, off Thika Rd
P.O Box 56875-00200, Nairobi, Kenya
Tel: +254 721-932050/726-595863/734-400694
Email: registrar@pacuniversity.ac.ke
Web: www.pacuniversity.ac.ke

Where Leaders are Made

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR
SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 252751

Date of Issue: 29/June/2020

RESEARCH LICENSE

This is to Certify that Miss.. Catherine Kawira Julius of Pan Africa Christian University, has been licensed to conduct research in Kiambu on the topic: PRECOCIOUS PUBERTY AND PSYCHOSOCIAL FUNCTIONING OF PREADOLESCENT GIRLS: A CASE OF SELECTED PRIMARY SCHOOLS IN KIAMBU COUNTY, KENYA. for the period ending : 29/June/2021.

License No: NACOSTI/P/20/5213

252751

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR
SCIENCE,TECHNOLOGY &
INNOVATION

Verification QR Code

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THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

The Grant of Research Licenses is Guided by the Science, Technology and Innovation (Research Licensing) Regulations, 2014

CONDITIONS

1. The License is valid for the proposed research, location and specified period
2. The License any rights thereunder are non-transferable
3. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research
4. Excavation, filming and collection of specimens are subject to further necessary clearence from relevant Government Agencies
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National Commission for Science, Technology and Innovation
off Waiyuki Way, Upper Kabete,
P. O. Box 30623, 00100 Nairobi, KENYA
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Mobile: 0713 788 787 / 0735 404 245
E-mail: dg@nacosti.go.ke / registry@nacosti.go.ke
Website: www.nacosti.go.ke

MINISTRY OF EDUCATION
State Department of Early Learning & Basic Education

Telephone Kiambu (office) 0788 979412

Email:directoreducation@kiambu@yahoo.com
When replying please quote

COUNTY DIRECTOR OF EDUCATION
KIAMBU COUNTY
P. O. Box 2300
KIAMBU

KBU/CDE/DEPT 8/VOL 1

14th October, 2020

The Sub-County Directors of Education
KIAMBU COUNTY

RE: RESEARCH AUTHORIZATION

Miss Catherine Kawira Julius is authorized to collect research **"Precocious Puberty and Psychosocial Functioning of Preadolescent Girls"** for a period ending 20th June, 2021.

Please accord her the necessary assistance.

COUNTY DIRECTOR OF EDUCATION
KIAMBU COUNTY
14 OCT 2020
P.O. Box 2300 - 00900
KIAMBU

VICTORIA W. MULILI
COUNTY DIRECTOR OF EDUCATION
KIAMBU COUNTY

MY EDUCATION, MY FUTURE *MY EDUCATION, MY FUTURE*