

**FACTORS INFLUENCING CONTACT LENSES UPTAKE AMONG SCHOOL-
GOING CHILDREN AND TEENAGERS WITH MYOPIA ATTENDING SELECTED
EYE CLINICS IN KENYA**

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the Degree of Master of Science in Optometry and Vision of Masinde Muliro University of
Science and Technology**

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DECLARATION

This thesis is my original work and has not been presented in any other institution for award of degree or any other purposes.

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ABSTRACT

Myopia affects about 22.9% of the global population while its prevalence in Africa and in Kenya have been reported to be 5.5% and 7% respectively. Myopia pandemic has been associated with sight threatening conditions. The commonly used single vision spectacles among school-going children and teenagers has been reported to increase the risk of myopia progression among users. Contact lens (CL) alternative on the other side, has been shown to have superior advantages over spectacles, yet in Kenya, uptake remains low. This study investigated the factors influencing the uptake of CL in school-going children and teenagers with myopia attending selected CL clinics in Kenya. Specifically, the study determined the factors hindering, and promoting CL uptake, including the roles of parent(s), and eye care practitioners (ECP) on CL uptake. A clinic-based observational, descriptive study design was employed to elicit data relevant to the objectives of this study. Selected participants were sub-grouped into – user, parental, and ECP groups and administered with appropriate pre-validated semi-structured questionnaires. Data collected from participants were analyzed and then presented in proportions and in tables. The results showed 86 user-group participants aged 13.4 ± 2.1 , 86 accompanying parents, and 48 ECPs, from 13 CL clinics, participated in the study. Among the user group, factors found promoting CL uptake were mostly; complaints of the bulkiness of glasses compared to CL (71.8%) and felt reduced self-esteem with spectacle use (69.4%) – although not significant ($P=0.12$, and $P=0.084$ respectively). Conversely, even though most (60.0%, $P<0.01$) user-group participants expressed fear of harm from CL, the concern about parental approval of their CL use was mostly associated with non-uptake of CL (Cramer's V : 0.581, $P<0.01$). For the parental group, while the child's improved class performance with CL (OR: 106, 95% CI: 2.6 – 4290, $P=0.01$) mostly influenced CL uptake, felt concerns about their child not being careful enough to handle CL (OR: 84, 95% CI: 1.8 – 3834, $P=0.02$) had highest hindrance to uptake. Similarly, while the child's motivation to wear CL had the highest likelihood (OR: 34, 95% CI: 1.35 – 878, $P=0.03$) to influence ECPs in fitting CLs, hence improved uptake, lack of adequate knowledge and skills-set required for CL fitting (OR: 77, 95% CI: 1.6 – 3690, $P=0.03$) mostly presented hindrance to them. Therefore, the study concludes that low uptake of CL among children and teenagers with myopia is evident in Kenya. Results show uptake is not only influenced by factors related to the users themselves, but also those associated with both concerns from their accompanying parent(s), and the experiences and skills-set of the ECPs. Thus, the study recommends improved user education to enhance proper awareness of parents and their children with myopia on the safety and benefits of CL, as well as improved practitioners' CL-related education and skills. The findings from this study elicited relevant tools to inform effective public health strategies, particularly improving availability and access of service.

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LIST OF ACRONYMS AND ABBREVIATIONS

α	Alpha
CI	Confidence Interval
CL	Contact Lens
CLIP	Contact Lens in Pediatrics
D	Diopter
DCYL	Diopter Cylinder
ECPs	Eye Care Practitioners
IERC	Institutional Ethics Review Committee
MMUST	Masinde Muliro University
NACOSTI	National Commission for Science, Technology & Innovation
OR	Odds Ratio
Ortho K	Ortho-keratology
PEF	Primary Eye Focus
RGP	Rigid Gas Permeable Lenses
SCL	Soft Contact Lens
UK	United Kingdom
USA	United States of America

OPERATIONAL DEFINITION OF TERMS

Contact lens – In this context is a thin plastic or glass material that is placed directly in front of the eyes to correct vision

Myopia – Is a condition in which an individual is not able to focus a distance object in his/her retina because of their ocular lens or the cornea having a high curvature than that in a normal lens or cornea.

Refraction- Is the process by which light bends at an angle as it passes through a media

Refractive error - The spherical equivalent is the definition to be adopted in this study.

Significant myopia – in this context refers to myopia that is equal or greater than – 0.50 D

School going persons – in this context will be school going children who have the age of 8 years to 18 years old.

Teenagers – In this context persons aged between 13 years to 18 years

Selected contact lens clinics – this are known eye care facilities that are actively involved in contact lens practice; besides this, they are also involved in dispensing glasses to their clients who prefer to use spectacles as a form of correction.

CHAPTER ONE

INTRODUCTION

1.1 Background

The prevalence of myopia has increased tremendously with an estimated 1.89 million people worldwide being myopic (Bourne et al., 2017; Ramamurthy et al., 2012). The increase in myopia prevalence has reached epidemic levels; and has recently been reported to be up to 96 % in young adults and school going children in Asia (Pan et al., 2015) and 20 – 40% in Europe and America (Logan *et al.*, 2011; Williams *et al.*, 2015). While Africa has a lower prevalence of 5.5% (Wolffsohn *et al.*, 2016), a recent study by (Alfred *et al.*, 2020) done among young adults and school going children in Kakamega-Kenya found a prevalence of 7% among respondents.

Currently, the options available for correcting myopia refractive error include the different types of spectacles options specifically, single vision, progressive and bifocal lenses (Sankaridurg *et al.*, 2010). Others options are different types of contact lenses (CL). This includes, rigid gas permeable and soft contact lenses (Miljak, 2018) and refractive surgery (Anderle et al., 2013). Globally the uptake of spectacles is high compared to other forms of correction (Ravipati et al., 2011). However, studies have variously shown that the commonly used single vision spectacle lenses induce ocular peripheral hyperopic defocus, which is believed to promote eye ball axial growth, ultimately, increasing the progression of myopia among users (Berntsen et al., 2013). Contact lens (CL) on the other hand has been shown in literature to provide superior optical properties than its spectacles counterparts (Aller et al., 2016). Users of CL not only enjoy advantages such as inhibition of myopia progression by use of multifocal CL and ortho-keratology, but also will benefit from other superior advantages such as, wider field of view, better comfort, better clarity than spectacles besides the ease of wear (Miljak, 2018). On the other side, all forms of spectacles have been reported to be bulky by users, have a reduced field of vision, break easily, limit children and teenage participation in

some sport activities, and most importantly can have negative affect on a child's social acceptance and self-esteem (Jellesma et al., 2013).

In a Kenyan study done by (Nyamai *et al.*, 2016) a high preference for spectacles than all other forms of ocular correction modalities was shown among the school going children and teenagers with poor vision. The lack of professional advice, fear of CL related complications, and cost issues have been cited among the general reasons for poor uptake of contact lens (Abokyi, Ilechie, et al., 2017; Johnson, 2013; Ravipati Sarathh & Pradesh, 2011). Studies have also shown the importance of parental and practitioners attitudes on children and CL; affecting the general uptake of CL by children and teenagers (Care, 2013; AOA, 2010).

In East Africa particularly in Kenya, even though CL retail shops and clinics are available, to the best of the reviews done so far in Kenya at the time of the study, there is no information with regards to CL on the availability of the service, its acceptability, affordability, accessibility and appropriateness of CL services.

1.2 Statement of the problem

Childhood myopia if undetected and uncorrected has severe consequences on the activities of daily living of school going children and teenagers, particularly their education (Morgan *et al.*, 2006). The struggle to read material on the chalkboard by children due to refractive error can greatly affect a child's participation and overall motivation in education and thus increase their likelihood of dropout (Hussen et al., 2017). The devastating social consequences arising from poor vision besides the bullying by fellow children as a result of using a type of correction further complicates the child's quality of life (Hussen, 2017; Jones *et al.*, 2012). Also, correcting myopia in children present substantial economic burden on low income families (Wong *et al.*, 2001) with the increased risk of blindness a child's economic future is threatened (Holden *et al.*, 2016; Wolffsohn *et al.*, 2016).

Children having significant myopia and are using the common single vision spectacles are at a greater risk of developing myopia progression (Lin *et al.*, 2010; Smith, 2011) Nonetheless, in many developing countries as with Kenya, even though the reported myopia prevalence is slightly low, the common strategy for correcting myopia in school-going children group, are single vision spectacle lenses.(Alfred *et al.*, 2020; Hussien, 2017; Nyamai *et al.*, 2016).

As a result of the low uptake of contact lens globally (Ravipati *et al.*, 2011), study to evaluate attitudes towards CL by (Zeri *et al.*, 2010), noted that in spite the majority of adolescents having good economic ability to be able to afford contact lens besides their knowledge and willingness to use contact lens, there was a general low uptake. The findings from (Zeri *et al.*, 2010), imply that there might be other factors, besides the individual factors identified elsewhere by (Ravipati Sarathh & Pradesh, 2011), that hinder the uptake of CL among teenagers and children. Furthermore, the practitioners' individual attitude on CL among adolescents with myopia were not well explored, the study only reported majority optometrist recommended CL than ophthalmologists. This finding was important per se however, the reason behind this outcome is unknown. This current study has provided an in depth focus on practitioners' attitudes on children and teenagers with myopia and CL. This study sought to identify a Kenyan perspective on factors that positively or negatively influence CL uptake among children and teenagers with myopia who are school going. It has been shown that selection of a particular corrective option varies from place to place and from individual to individual (Dandona *et al.*, 2001). Through this exploration, the study sought to provide comprehensive insights into the decision-making processes surrounding CL adoption within this demographic, thereby contributing to a deeper understanding of the multifaceted factors driving or hindering the acceptance of CL option.

1.3 Objectives

1.3.1 Broad objective of the study

This study aims to determine the factors influencing contact lens uptake amongst school going children and teenagers with myopia attending selected eye clinics in Kenya.

1.3.2 Specific objectives

Specially, the study will seek to;

1. Determine factors promoting uptake of contact lens amongst school going children and teenagers with myopia attending selected eye clinics in Kenya
2. Determine the barriers to contact lens uptake amongst school going children and teenagers with myopia attending selected eye clinics in Kenya
3. Measure the influence of parental and eye care practitioners factors on uptake of contact lens among children and teenagers with significant myopia attending selected eye clinics in Kenya.

1.4 Research questions

In the light of the foregoing problem statement in section 1.4, this study will seek to answer to the following questions;

1. What is the prevalence of CL usage amongst school going children and teenagers with myopia attending selected CL clinics?
2. What are the barriers to CL uptake amongst school going children and teenagers with myopia attending selected CL clinics?
3. What factors promote uptake of CL among school going children and teenagers with myopia attending CL clinics in Kenya?
4. To what extent do the identified parental and ECP barriers and promoting factors influence (extent of associations) CL uptake amongst school going children and teenagers attending CL clinics in Kenya?

1.5 Justification of study

The increasing global prevalence of myopia has turned into a significant issue of public health concern and has been prioritized among other chief causes of significant vision loss globally (Holden *et al.*, 2016). With greater risk of progression of myopia among children and teenage population with significant myopia (Wolffsohn *et al.*, 2016) upscale efforts to control onset as well as progression are essential in managing the disease burden of myopia pandemic. Children with moderate to high myopia are at risk of debilitating eye conditions like cataracts and macular degeneration which may ultimately result to permanent loss of vision (Holden *et al.*, 2016; Wolffsohn *et al.*, 2016). Furthermore, the economic burden of myopia on families having children and teenagers with myopia is substantial; purchase of a corrective intervention, and reduced overall quality of life of individuals having myopia due to uncorrected myopia, or wearing wrong prescription/modality calls to attention an urgent need for action. However, in middle and low-income countries, proper management of myopia besides control of its progression in school-going children has not been embraced by many practitioners or the different eye care institutions (Huang *et al.*, 2016). A major global focus and approach by practitioners has been to correct the medical as well as optical impacts of myopia through use of spectacles (Ravipati *et al.*, 2011) rather than offering school-going population a patient centered treatment that will enable them have better visual development, while also allowing them realize their full potential socially; achievable by use of CL alternative.

Currently no studies have been conducted so far in Kenya relating to the barriers hindering contact lens uptake. This study thus, zeroed down to the Kenyan situation on local specific factors, being also a developing country, the study evaluated the social demographic influences this factors have on CL uptake amongst children and teens with significant myopia. In consideration of the gap in knowledge on barriers to uptake as well as factors influencing CL

uptake in Kenya, this study was essential in bridging this gap besides informing of other confounders for example the role parents and /or practitioners do play in promoting or hindering uptake of CL by children and teenagers' in Kenya.

1.6 Significance of the study

Findings from this study elicited relevant tools to inform effective public health strategies, particularly public health education on benefits of CL options for myopia control in school children and teenagers both for practitioners and users' benefits. Furthermore, the findings of this study was essential in providing information on CL as a better refractive correction method that will enhance the improvement of quality of life among teenagers and children, thus a justification for the need to promote access as well as behavior change with regards CL practice both from a clinical and patient perspective. Furthermore, the study highlighted the significance of intentional promotion of public eye health through the address of the critical underlying determinants that influence the uptake of CL these findings will influence policy formulation in public eye health and the education sector as well as emphasize on the need for proper public as well as patient education particularly on the benefits of CL in myopia control amongst school going children while removing the barriers hindering the availability of the service. The results will be disseminated through presentations in conferences and collaborations made with the university, policy makers and the ministry of education besides other interested community groups to create an awareness on the great importance and safety of contact lens in school going children and teens not only to those with significant myopia but correction of general refractive errors in Africa.

1.7 Scope of the study

The focus of this study is to identify the different factors hindering as well as those that promote the uptake of CL among school going persons who have significant myopia. School going

persons in this regard will include school going children aged 8 years to 12 years and school going teenagers aged 13 years to 18 years. For the purpose of this study, significant myopia will be defined as myopia in either or both eyes of spherical equivalent $\geq 0.50D$. Spherical equivalent has become the conventional epidemiological approach in research for defining ocular refractive error (Cumberland *et al.*, 2018; Holden *et al.*, 2015). This is the definition that will be adopted accordingly in presentation and sub categorization of significant myopia in this study. Hence, this study will further sub-categorize myopia as spherical equivalent of $\geq 0.50D$ (low or mild myopia); spherical equivalent of $\geq 3.00D$ (moderate myopia); and spherical equivalent of $\geq 5.00D$ (high myopia) (Cumberland *et al.*, 2018; Holden *et al.*, 2016; Williams & Bertelsen, *et al.*, 2015). Finally, the study will be conducted in the several selected clinics in Kenya. The selected clinics will include different clinics in Kenya known to be practicing both glasses and contact lens in various Kenyan counties.

1.8 Theoretical framework

This study will utilize the (Levesque *et al.*, 2013) theoretical model of health care access. This is a model on patient centered healthcare access and utilization at the interface of health systems and population's model

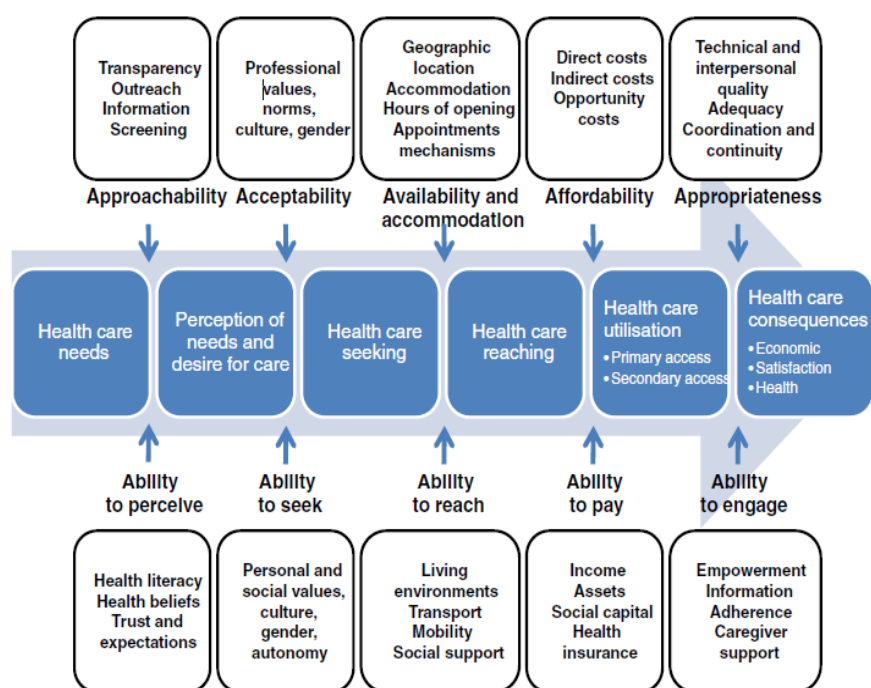


Figure 1.1: theoretical model of health care access. (Image copyright Levesque et al., 2013)

Access has been defined in this model as ‘ability of a patient to reach and get suitable healthcare amenities or services in a state of apparent healthcare need’ (Levesque et al., 2013). Using this framework in regard to the barriers or influencing factors on the uptake and utilization of CL services by pediatric populations in a given society can be broken down into children and teenagers (user group) factors, parents related factors and ECPs’ related factors that relate to clients/patients’ approachability to CL service, availability of service, acceptability, affordability, and lastly the appropriateness of service, these are according to other literature proposed dimensions (Haddad et al., 2002; Penchansky, 1981; Shengilia et al., 2003). Approachability can be related to the reality that people in communities having myopia refractive error can be able to recognize that actually some form of CL service for their need does exist, acceptability does relate to the cultural and social factors e.g gender and age (Levesque et al., 2013).

Availability and accommodation constitute the physical presence and or existence and in a timely manner of health facilities or a health service, this will include factors such as availability of qualified professional personnel, access is limited if at all the resources available are not distributed evenly over a region, or even across the different levels of care. The ability to reach health care service in this regard will relate the awareness about health services that will allow one to be able to physically reach health care providers. Affordability relates to cost of service and time (e.g. travel time) to use the said appropriate service and opportunity cost with regard to alternative options, this will include factors such as income. Appropriateness has to do with the fitness between the healthcare services offered and the children and teenagers individual needs, its aptness besides the given social standard/quality of service.

1.9 Conceptual framework

The conceptual model adopted in this study for eye care service utilization is illustrated below figure 1.2, note that the author has separated the interconnected factors as either relating to children user group category, and parent factors and ECP factors.

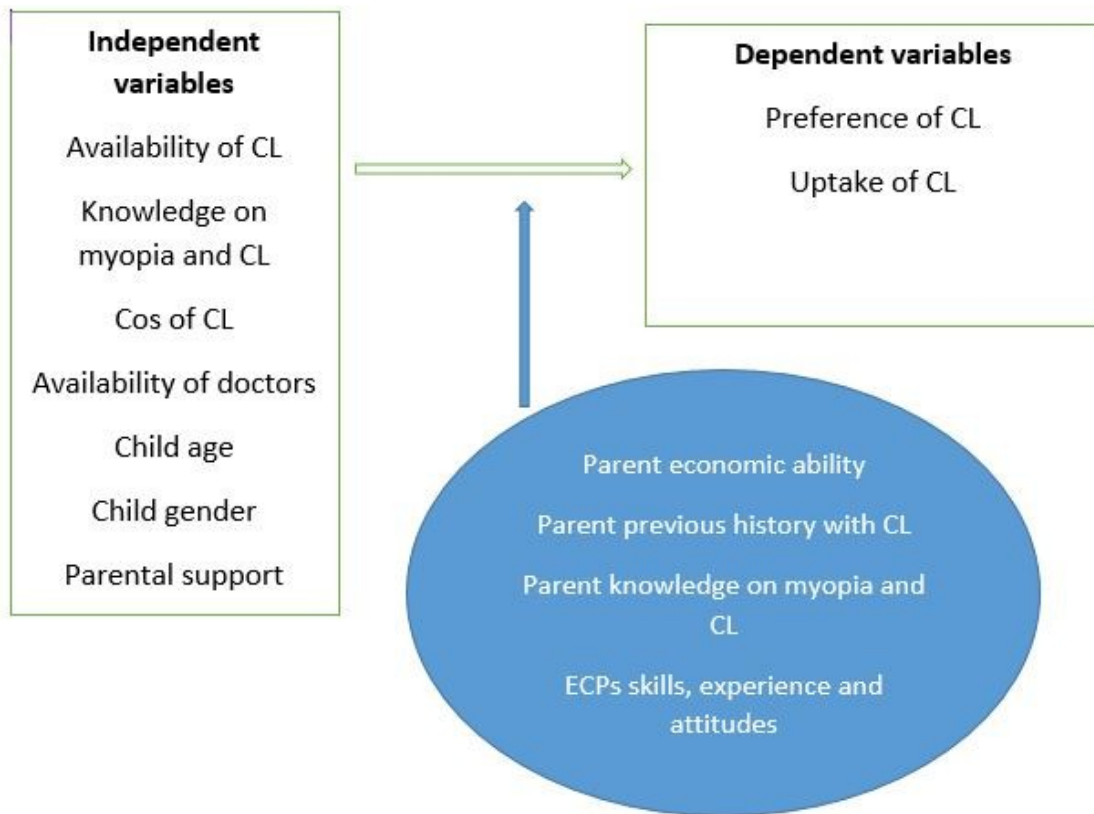


Figure 1.2: Interconnected determinants in eye care service (awareness and utilization)

CHAPTER TWO

LITERATURE REVIEW

This chapter will focus on myopia pandemic as well its effect on the children, teenage and young adult populations. It will further focus on the possible remedies and chiefly the role of contact lens in children with myopia. Also, the chapter will explore on the reasons for low uptake despite the good social economic statuses of patients with myopia. Much of the information for this study reviews will be accessed from book libraries, PubMed, and Google scholar websites. Researcher in obtaining information regarding this study review used words such as ‘barriers to uptake of contact lenses,’ ‘contact lens in children and teenagers with myopia among other key words.

2.1. Prevalence of myopia

Visual impairment (VI) due to myopia, affects approximately 22.9% of global population. Approximately 1 individual in every 6 of the global population has myopia (Holden *et al.*, 2016; Pan *et al.*, 2012). Myopia is reported to be the most common cause of VI amongst teenagers and children (TNS, 2008). Study indicates that about 4% of adolescents aged 6 to 18 years in USA and 27.5% of young adults aged 16 to 24 years in France, Germany, Italy, and UK have needs to correct their VI (TNS, 2008). The economic burden due to myopia is also estimated to result in about 202\$ billion global gross domestic product loss (Fricke *et al.*, 2012; Smith *et al.*, 2009).

There are very few data on the prevalence and distribution of mild to moderate myopia in school going children in Kenya. However, school-based studies on childhood myopia, elsewhere in east Africa, have shown myopia prevalence to be 26.7%, in Ethiopia (Nebiyat *et al.*, 2014) and 5.6% in Tanzania (Wedner *et al.*, 2002). Meanwhile, an overall prevalence of myopia in Africa is estimated at 5.5% (Wolffsohn *et al.*, 2016). A recent Kenya study (Ragot *et*

al., 2020) estimated the prevalence of myopia among their school going children study participants to be 7%, while previous estimate puts the prevalence of significant visual loss attributable refractive errors in general in Kenya to be responsible for up to 13% of significant visual loss.

2.1.1. Changes of ocular refractive status among children and teenagers

The increasing global prevalence of myopia, (Holden et al., 2016) it has made it to be prioritized among other major causes of significant vision loss globally– glaucoma, cataract, diabetic retinopathy, corneal opacities and age-related macular degeneration – in the global initiative for elimination of avoidable blindness (Holden *et al.*, 2015; Chua *et al.*, 2016). Studies comparing myopia onset in relation to its prevalence (1983 to 2000) have shown the mean age for the onset of myopia as at 1983 to be 11 years, while as at the year 2000 myopia onset was shown to have greatly reduced to age of 8 years (Lin *et al.*, 2004). The early onset of myopia has been associated with faster progression and greater severity over time, implying a greater risk of accompanying incapacitating eye conditions for individuals subjected to earlier onset (Holden *et al.*, 2014). In addition, early onset of myopia in the recent generations were variously associated with factors such as; reduced outdoor activities (French *et al.*, 2013), genetic predisposition, increased time spent on near-related works (Gwiazda *et al.*, 2011). Also, the magnitude of peripheral defocus (Smith *et al.*, 2009; Smith, 2011) and low lighting levels (French *et al.*, 2013), were equally reported to contribute to early myopia onset.

2.1.2. Burden of myopia refractive error

The effect of myopia that is undetected and uncorrected, as with all refractive errors, is serious. However, this implication is even more serious with young school-going population. A reduced vision and inability of affected individuals to see clearly on the board can hinder their participation in school activities (Gizachew et al., 2017). Nonetheless, reduced vision due to

myopia can be corrected in three available optical options; contact lens, spectacles and refractive surgeries (Kumari et al., 2017; Ravipati et al., 2011). Even though each of these corrective options have their advantages and disadvantages, spectacles have been reported to be the most commonly used optical correction option, globally (Kumari et al., 2017).

2.2 The Prevalence of contact lens wear

Approximately one hundred and twenty-five million individuals use contact lens globally with 45 million of these living in USA alone (Cope *et al.*, 2015). It is further reported that millions of children and teenagers use CLs, globally, to correct their refractive errors including myopia (Bullimore, 2017). According to the US center for disease control (Demirjian et al., 2015), it is estimated that 8% of CL wearers in the US are under 18 years old. In a National Health Interview Survey of 2016 in USA it was found that, in that year, the population of girls was higher (36.2%) as compared to boys (29.1%) in wearing CL or glasses for corrective purposes among children aged between 6 to 17 years. In Europe, EuroLens Research, undertook several surveys since 1990s majorly on the CL prescribing trends. Nevertheless, in their study between 2005 and 2009, even though they never focused on the prevalence of CL on children and teenage population; they however found out that the patterns of prescribing CL to the children and infants by eye care practitioners is noticeably different in several ways to those of prescribing to adults and teenagers (Bowen et al., 2015).

To the best of the reviews done in this study, there is limited data on the scale, nature and scope of CL practice in Africa, in relation to children having myopia and using CL as a corrective option. In Kenya there is no policy or guideline by the ministry on prescribing and use of CL both in general population and pediatric population.

2.3 The usage and advantages of contact lens among school going children

Unlike in adults, children vision is constantly undergoing development due to the plasticity of their brain thus it's very important to provide them with the best possible visual input of monocular and binocular vision essential for development of best vision to prevent amblyopia (Miljak, 2018). Gas permeable CL for example, has been shown to give sharpest vision in children having astigmatism or any other irregularities of the cornea, thus facilitating better visual development (Uzunel et al., 2016).

Contact lens usage among children and teenagers has proved beneficial through; usage in correction of refractive errors, improvement of binocular vision, improved cosmetic appearance especially in pediatric patients having disfigured eyes besides inhibition of myopia progression (Walline *et al.*, 2007; 2011; Walline *et al.*, 2007). Furthermore, a comparison between CL and spectacles has shown wearers to have improved field of view, comfort, better clarity, and the ease of wear (Miljak, 2018; Walline *et al.*, 2007). Still, other studies found success in the reduction of myopia progression by use of multi-focal CLs, which was attributed to their optics (Aller *et al.*, 2008; Anstice *et al.*, 2011; Gwiazda *et al.*, 2003).

A meta-analysis study found multifocal lenses can cause up to an average of 45% reduction in axial elongation in progressing myopes (Walline et al., 2013). This reduction was reported to be informed by how well the wearer's position of gaze aligns with the near portion, known as the treatment zone. One other major advancement in the CL options in the management and control of myopia progression has been the use of ortho-keratology technology (Ortho-K) rigid gas permeable lenses (González-Méjome *et al.*, 2016).

2.4 Factors promoting uptake of contact lens among children and teenagers

There has been growing evidence supporting CL fitting to children and teenagers over the years (Bullimore, 2017). Current trends in production and improved CL materials having improved oxygen permeability, general design of CL surface and solutions leading to an increased (Nicolson et al., 2001). However, the increasing demand from parents and children has majorly been shown to be due to a reported improved athletic competence and improved confidence by children. The availability of daily disposables has greatly reduced risks of CL related infections while improving self-perception in teenagers (Plowright et al., 2015). These improvements have been a great motivator for practitioners to undertake CL fitting for children (Foulks, 2006). Studies done to determine the factors promoting or hindering uptake of contact lens have majorly concluded on the need to improve awareness and knowledge of contact lens among users to improve uptake (Abahussin et al., 2014; Tchiakpe et al., 2017). However, there is a general consensus irrespective of a country's level of development, providing education and knowledge at an individual level are not adequate enough to elicit individual behavior change (Mackian, 2002). This view is further supported by Zeri et al. (2010), in a study that found that most (77.5%) teenagers have awareness about CL and were willing to wear prescribed CLs, but most (88%) of them currently wore spectacles (Zeri et al., 2010). This study findings brings to attention the big role played by confounders not explored in previous studies among the children and parents affecting the association between knowledge awareness and eventual uptake of CL.

According to Market Research Future(MRFR, 2019), the positive growth in global CL market is being associated by general promoting influences for example; an increasing demand and usage among the teenage and youth generations, a growing purchasing power besides an increasing demand of CL in the entertainment industry(Watch, 2020). This brings to question the role of age, as it has been shown children have a high probability of undertaking risk behaviors than their parents which may be due to peer pressure among other individual

psychological as well as physiological factors (Academy, 2017). Thus it may be argued that parents are more conservative in health decision making and would be more prone to put a limit on the choices and decisions made by teenagers and children basing on their perceived risks and benefits. This study sought to fill these gaps in knowledge.

More so, Walline and Gaume (2009), in a Singapore Contact Lens in Pediatrics (CLIP) study found that children who use CLs have an advantage over their counterparts' using spectacles. The study showed that the overall quality of vision, the comfort at end of day and the "contact lens overall comfort by patients" were considerably better for those wearing CLs than those wearing spectacles at every follow up point of the study which lasted for three months. The study compared well with a similar CLIP study in the US, where parents and children preferred to continue using CL over glasses due to a variety of reasons ranging from comfort, the ease of handling CL, better appearance, improved self-esteem to better vision (Walline *et al.*, 2009). These experiences were thought to be key factors influencing CL uptake among children and youth who were already users of CL. However, these study did not examine the extent of parental factors on the uptake of CL in children.

2.5 Barriers to contact lens uptake among children and teenagers

CL uptake particularly in developing countries has been shown to be low (Ravipati *et al.*, 2011). Various studies have shown that different factors, such as individual attitudes (Care, 2013; Zeri *et al.*, 2010), external factors like, availability and cost to doctor's knowledge and experience on current trends on CL and myopia (Thite *et al.*, 2015), may intrinsically hinder CL uptake. However, these factors can well be explored in the context of social determinants of health of children and teens and most importantly of parents who are chief decision makers for their children as well as teenagers, this factors include level of education, employment status, access to health care, neighborhood, social economic status and physical environment. This study

sought to determine why in spite children and parents having good social determinants of health would not wish to undertake CL wear.

2.6 Practitioners factors that influence fitting CL among children and teenagers.

In a USA survey (AOA Research and Information Center, 2010), nearly all (97 %) practitioners who participated in the survey indicated fitting children and teenagers, aged 8 to 18 years, with CL. The finding of this survey, negates an earlier anecdotal belief that children may not be good candidates for CL, for the reason of they being too young, thus being at greater risk of CL related complications or non-compliance (Lindsay *et al.*, 2011). Another initial belief that, fitting children resulted to an increased chair time for practitioners and a more difficulty in training pediatrics, has been debunked by recent studies (Efron *et al.*, 2011; Ehsaei *et al.*, 2011; Thite *et al.*, 2015; Walline *et al.*, 2007). From these studies, it has been shown that children, though may require more time than teenagers in the initial training, will adapt well with required wearing and removal schedules, once trained, even as much as their teenage counterparts will do (Li *et al.*, 2009; walline *et al.*, 2007; Woods *et al.*, 2012).

2.6.1 Promoting factors that influence practitioners to fit children and teenagers with CL

The studies on conversion of spectacles to contact lenses have shown practitioners do play an essential role on proactive conversion of glasses to contact lens (Kumari *et al.*, 2017). Practitioners' role is not only that of treating of patients and dispensing of CL but also to the creation of awareness since several studies have indicated lack of awareness and professional advice by patients as a hindrance to the uptake of CL (Ravipati Sarathh & Pradesh, 2011; Thite *et al.*, 2015). Studies recommended the significance of active involvement of practitioner in discussing the importance of contact lens option over other corrective options thus increasing the uptake of contact lens as well raise awareness (Kumari *et al.*, 2017).

In the US CLIP study, it was found that majority of doctors in the US indicated that CL properties such as ability to achieve a clearer image, ease of handling, oxygen permeability and comfort were major properties of CL that influenced practitioner's decision in fitting CLs in children (Walline *et al.*, 2007). Meanwhile, a different US survey (AOA, 2010), conducted to access practitioners attitudes for CL fitting in children showed that the major child-specific factors influencing a practitioner's decision to fit a child included child's motivation and interest to undertake CL wearing, the capacity of a child of taking good care of lenses by him/herself, participation in sports and the overall effect of CL on a child's self-esteem (AOA, 2010). In this same regard, although most practitioners preferred to start fitting children with CL at an average age of 13 years, still, age was shown not to be a factor when it comes to determination of suitable candidates for CL wear (Walline *et al.*, 2007). Walline and colleagues in comparing the level of lens care between children (aged 8-11 years) and teenagers, found similar results in the two groups (Walline *et al.*, 2007). Lately, there has been abundance of evidence supporting the ability younger aged children for independent CL wear (Walline and Gaume 2007). The findings of these studies have proved of greater rate of success as well as better level of satisfaction with CL use among children (Li *et al.*, 2009; Walline *et al.*, 2007). This study provided a Kenyan perspective on the practitioners' attitude on children and contact lens.

2.6.2 Factors that hinder practitioners to fit children and teenagers with CL

Majority of eye care practitioners in a Contact lens in pediatric study (CLIP) in USA were shown to support CL as safe for young children and teenagers (Newman, 2011). Generally, there has been an undocumented initial belief that children may not be good candidates for contact lens by the fact that they are too young, thus being at a greater risk of developing CL induced complications or non-compliance however, recent research studies have found that

fitting of CL to pediatrics' can be rewarding both to the child as well as to the practitioner (Lindsay et al., 2011; Newman, 2011). In USA, it has been shown that gender has not been a factor in practitioners' decision to fit children with CL nevertheless, majority of optometrist have been shown to fit girls more than boys in the younger age group (AOA, 2010) this might be due to better handling in girls than in boy. Even though his study was very informative, its major setback was that it had a low response rate of 14.4%, another limitation was that the study participants (optometrist in USA) were self-selected with no sampling done which does mean that this study possibly attracted a majority of practitioners who have strong opinion on the topic of CL in children.

Multifocal contact lens modality (MFCL) are essential in inhibiting the progression of myopia in children, however in a research by (Thite *et al.*, 2015) done to determine the potential barriers and enablers for multifocal CL prescribing among eye care practitioners in Mumbai. They found out that a majority (75%) of eye care practitioners indicted increased chair time as the most potential barrier to prescribing these contact lens modalities while other factors included; unavailability of trial contact lenses (69%) and power range limitation. Besides this, graduate optometrist felt that multifocal contact lens prescribing was not offering good business proposition to them. From the patients outlook the eye care practitioners in the study indicated lack of patient awareness also a barrier to prescribe MFCL. In spite of good socioeconomic status by patients, but owing to the absence of CL awareness, the unavailability of appropriate expert instructions or advice, as well as data on the motivational factors that do relate to patients' utilization and satisfaction of using contact lenses locally may be attributed to cause a low uptake of CL.

2.7 The role of parents in promoting uptake of CL in children and teenagers

Parents play an important role in influencing a child decision to or not to prefer a particular correction modality. Since parents are the chief financial sponsors to children and teens health care service, general factors for an individuals' family such as; lifestyle, income, culture and level of education may be factors that may ultimately affect uptake and growth of contact lens (Ravipati Sarathh & Pradesh, 2011). Parental experience can also influence the choice of a corrective option for children. As a US survey findings shown, 19% of practicing Optometrists were willing to fit a child with CL if they received a fitting request from a child's parent however the study did not involve parents to determine their agreeableness when requested by a doctor to fit their child (AOA, 2010). In addition, a different UK study found that 56% of parents who preferred CL for their children had previously worn or are currently wearing CL (Johnson, 2013). More so, the US survey further highlighted on the role of sports in influencing parent's decision in CL preference for their children once a parent notes that their child's current spectacles were interfering with sports (AOA, 2010). Another 16% of the US study participants indicated parents would prefer CL if the current spectacles prescription was interfering with the child's daily activities. More so, a Johnson and Johnson survey, found that parents had a likelihood of preferring CL for their children because it resulted to improved performance, confidence and self-esteem (Johnson, 2013). The survey further showed more children using CL reporting they feel better when participating in sports or physical activities than those using spectacles (Johnson, 2013).

2.8 Role of parents in hindering uptake of CL among children and teenagers

Analysis done in other fields of health care have indicated that parents' beliefs and attitudes does exert a significant effect on the teenagers' health related behavior this is for example, parental influence on reinforcement of nonsmoking decisions (Johnson, 2013). A major reason for low uptake of contact lens not only in children but also teens has been indicated in one study

to be fear of complications (Chwala *et al.*, 2010). This may arise from the parental attitude that CL use in children will ultimately harm their eyes, other parents also fear that children and teens are too young to handle or maintain CL (Li *et al.*, 2009). However, the reason for these fears have not been identified among the parent group. On the other hand, (Thite 2015), indicated general factors which may affect a child indirectly such as lifestyle, income, availability of contact lens, difficulty in maintaining the lenses, lack of proper professional advice to parents or guardians by eye care professionals may pose as hindering factors to CL uptake and ultimately growth of contact lens.

2.9 Gaps in Literature

To the best of this review, so far there's been a huge knowledge gap in Kenya relating to the barriers to contact lens uptake in children and teenagers. This study focused on the Kenyan perspective, as a developing country, on local specific factors both hindering and influencing CL uptake amongst children and teenagers with myopia. The study aimed to bridge the gap in knowledge by evaluating the associations between relevant factors and uptake. So far, based on knowledge from elsewhere, the study has successfully delineated the roles of parents and practitioners in influencing children and teenagers' uptake of CL.

Studies done to determine the factors promoting or hindering uptake of contact lens have majorly concluded on the need to improve awareness and knowledge of contact lens among users to improve uptake (Abahussin *et al.*, 2014; Tchiakpe *et al.*, 2017). However, Zeri *et al.* (2010), found that most respondents had awareness about CL and were willing to wear CLs, but most wore spectacles (Zeri *et al.*, 2010). Role of confounders were not explored in previous studies among the children and parents which affect the association between knowledge awareness and eventual uptake of CL. Furthermore, previous studies as discussed earlier did not show the level of agreeableness of parents if practitioners requested a fit on their children.

The important need to better understanding these viewpoints and influencing factors informing uptake or lake thereof, from a Kenya perspective, cannot be overemphasized. This need is further important to informing future evidence-based CL clinical care and practice, usage and promotion in children and teenage groups in this demographic.

CHAPTER THREE

MATERIALS AND METHODS

3.0 Introduction

This section provides a detailed overview of the methodological processes that would be applied towards achieving the objectives of this study. It provides a more comprehensive description of the techniques to be applied in the selection of the study locations and participants, field processes relevant to elicitation of data required to achieving the study objectives, including the validation plan (pilot study) of data collection instruments, analytical and ethical processes that were employed in line with the study objectives.

3.1 Study Area

This was a countrywide study involving different cities and towns that have eye clinics having clinics that offer both spectacle and contact lens (CL) services across Kenya. In the absence of a structured database of clinics in Kenya, a pre-study mapping conducted by the help of Optometry Association of Kenya; the preliminary finding of this study showed that there are about 23 eye clinics (see table 3.1) at the time of the study providing both spectacle and contact lens (CL) services in Kenya. These 23 identified facilities were contacted physically and offered request letters for participation in the study, however only 13 approved the participation request after follow up by telephone or email. The facilities that approved the study request and were enrolled included, Mombasa light house, Baus Nakuru, Optica, Kikuyu Eye Hospital, Lions Eye Hospital Nairobi, Dr Argawal Eye Hospital, Lions Eye Hospital Mombasa, Trinity Bungoma, Baus Nairobi, Eagle Eye and Laser Center, City Eye Hospital, Optics Eye Center, Kwale Eye Center. The facilities were either privately owned or are faith-based eye health facilities. In addition, the preliminary finding further showed that most (~40%) of these facilities are located in Nairobi. The few other clinics offering both spectacles and contact lens services had satellite clinics around other cities and towns specifically, Mombasa, Kisumu,

Eldoret, Nakuru, Bungoma, Kiambu, kitale and Kwale as shown in table 3.1. The nature of the distribution, number and spread of the facilities makes this study feasible and even more so is relevant to the objectives of this study as it represents distribution between both urban and sub-urban population groups in Kenya.

Table 3. 1 Study Area

Name of eye clinics offering CL services	Location (County)
lions eye hospital	Nairobi, Mombasa
Optica ltd	Nairobi, Kisii, Nakuru, Mombasa, Eldoret, Meru etc
Baus	Nairobi, Nakuru, Eldoret
Eagle eye and laser	Nairobi
Optics eye center	Nairobi
Dr Agrawal's eye hospital	Nairobi
City eye hospital	Nairobi
KK optics	Nairobi, Mombasa, Kiambu
Mama Jimmy Clinic	Nairobi
Kikuyu eye hospital	Kiambu
Trinity opticals	Kisumu, Bungoma
Kwale eye center	Kwale
Mombasa Light House	Mombasa

3.2 Research Design

An observational research design, that involved use of descriptive cross-sectional study approach to elicit responses of selected participants (who were school going children and teenagers having myopia, their accompanying parents/legal care givers) who attended the enrolled participating CL clinics at the time of the study.

Observational study- allowed the researcher to explore answers to questions of this study, while not controlling the independent variables because of ethical reasons. Also, the study employed a descriptive cross sectional approach because this design allowed researcher to

observe and describe the distribution of data from the various respondent groups at very specific period of time.

Furthermore, the study adopted quantitative approach component by use of validated semi-structured questionnaires discussed in detail later in the chapter to collect numerical data that was analyzed. These components used in this study were used to elicit the various factors that influence uptake of CLs among school-going children and teenagers having significant myopia health state, in accordance with study objectives.

3.3 Study population

The study population involved school-going children of age 8 to 12 years and teens of 13 to 19 years (Li *et al.*, 2009; Walline *et al.*, 2007), with significant myopia denoted as myopia with spherical power corresponding to that $\geq |-0.50D|$ (Holden *et al.*, 2016). These were individuals who visited selected eye clinics providing both spectacle and contact lens (CL) services for either general eye checkup, CL scheduled clinic or those seeking to purchase spectacles. These population groups involved those who were currently using contact lens and/or glasses or those who were currently not using any correction modality. The population for this study also included practitioners of the selected institutions/hospitals as well as parents/legal caregivers who were accompany or nominated by the children or teens visiting the clinics during the period of data collection.

3.3.1 Inclusion criteria

The selection of participants in this study was based on the below listed criteria:

1. Age: school going children and teenagers aged 9 to 19 years and having a clinic visit at time of study

2. Having myopia: all identified candidates having myopia defined as significant (spherical equivalent $\geq -0.50D$) for the purpose of the objectives of this study and those with astigmatism of up to -2.75 dcyl.
3. Having accessed selected facilities: all identified candidates who accessed any of the selected facilities, having significant myopia and using/not any of the corrective options for myopia – spectacles, CLs.
4. Parental factor: all parents/legal caregiver of identified candidates, regardless of whether their child is using/not any of the corrective options for myopia.
5. Selected eye clinics: all eye clinics actively dispensing both spectacles and contact lens services in Kenya.
6. Practitioner factor: all eye care practitioners (ECPs) in identified facilities who were involved actively in practice of fitting CLs and spectacles to children and teenagers. Active involvement in CL care for the purpose of this study was defined as fitting and dispensing CL to at least one child and/or teenager per two months.
7. Willingness to give and sign a written assent/consent certificate to participate in the study

3.3.2 Exclusion criteria

1. Any included participant having prosthetic eye in any eye or for who any eye may have been surgically removed
2. Participants with other ocular co-morbidity or using bandage/therapeutic CLs in any eye for example patients who have been diagnosed of pellucid marginal degeneration, keratoconus, or any other corneal degeneration or dystrophy
3. Participants who have under gone any other form of refractive or cornea surgery not targeted at myopia correction.

4. Selected participants who are unwilling to either give assent/consent nor participate in the study.
5. Participants with incomplete questionnaires.
6. Finally, any participants from any of the groups who may have speech or hearing impairment or who lacked ability to give sound judgment and had no legally appointed significant other who is willing to represent them were equally excluded. Inability to give sound judgment was based on being challenged mentally or having a medical condition that impairs sound judgement like chronic alcoholism.
7. Participants with high astigmatism $\geq -3.00\text{DCyl}$

3.4 Sample size

The minimum sample size needed for the study was estimated by employing the use of a power analysis (g*power® analytical output)(Erdfelder *et al.*, 2009), under the assumption of a moderate effect size – the strength of the relationship between means – as shown below;

F tests - ANOVA: Fixed effects, omnibus, one-way.

Analysis: A priori: Compute required sample size .

Input: Effect size f = 0.25 (assuming a medium/moderate Cohen's f effect size for the population means difference (Salkind, 2010)

α err prob = 0.05 (95% confidence level)

Power ($1-\beta$ err prob) = 0.80 (80% power to detect mean difference)

Number of groups = 3

Output: Non-centrality parameter λ = 9.9375000

Critical F = 3.0540042

Numerator df = 2

Denominator df = 156

Total sample size = 159 (total for all three groups)

Actual power = 0.8048873

From the above power analysis computation, using g*power® application, the total minimum sample size needed for this study was calculated by applying a one-way a priori ANOVA analysis of three independent groups. This is = 180 + 10% allowance for contingency. The total minimum sample size for all three groups, plus 10% contingency allowance (particularly expected to occur due to lost to attrition or lost to follow-up and incomplete responses) is = 159 + 15.9 = 174.9 $\cong$ 180 (to the nearest upward 10) participants.

Thus, for three independent groups (user, parental and ECP groups). Therefore, for this study, an 80% Power for a 2-tailed test hypothesis at $\alpha = 0.05$ and 10% allowance for contingencies due to possible lose to attrition and implausible or inconsistent responses, This study required at least a total of **180 participants** to detect a 10% mean response difference for CL uptake, consistent with the objectives of the study.

3.4.1 Sampling technique

This study required a minimum of 180 participants were selected from a sampling frame of 13 CL practicing facilities distributed across the country, Kenya. To achieve this, the study employed a 4-multistage sampling technique.

A sample frame consisting of purposively selected list of all 13 facilities that approved the study participation request, regardless of location. From this sampling frame the multistage sampling technique for this study was derived as below:

1. Stage 1: Purposive selection of all CL practicing clinics that approved request to participating in the study.
2. Stage 2: Stratified random sampling technique of all participants in all CL facilities into

groups of User category, parental category and ECP category in line with the objectives of this study.

3. Stage 3: Computer-generated simple random sampling to select 60 participants from each study group (category) if more than 60. Or purposive selection of all participants (from each category/study group) if less than 60, in so far as they meet the minimum selection criteria for this study.

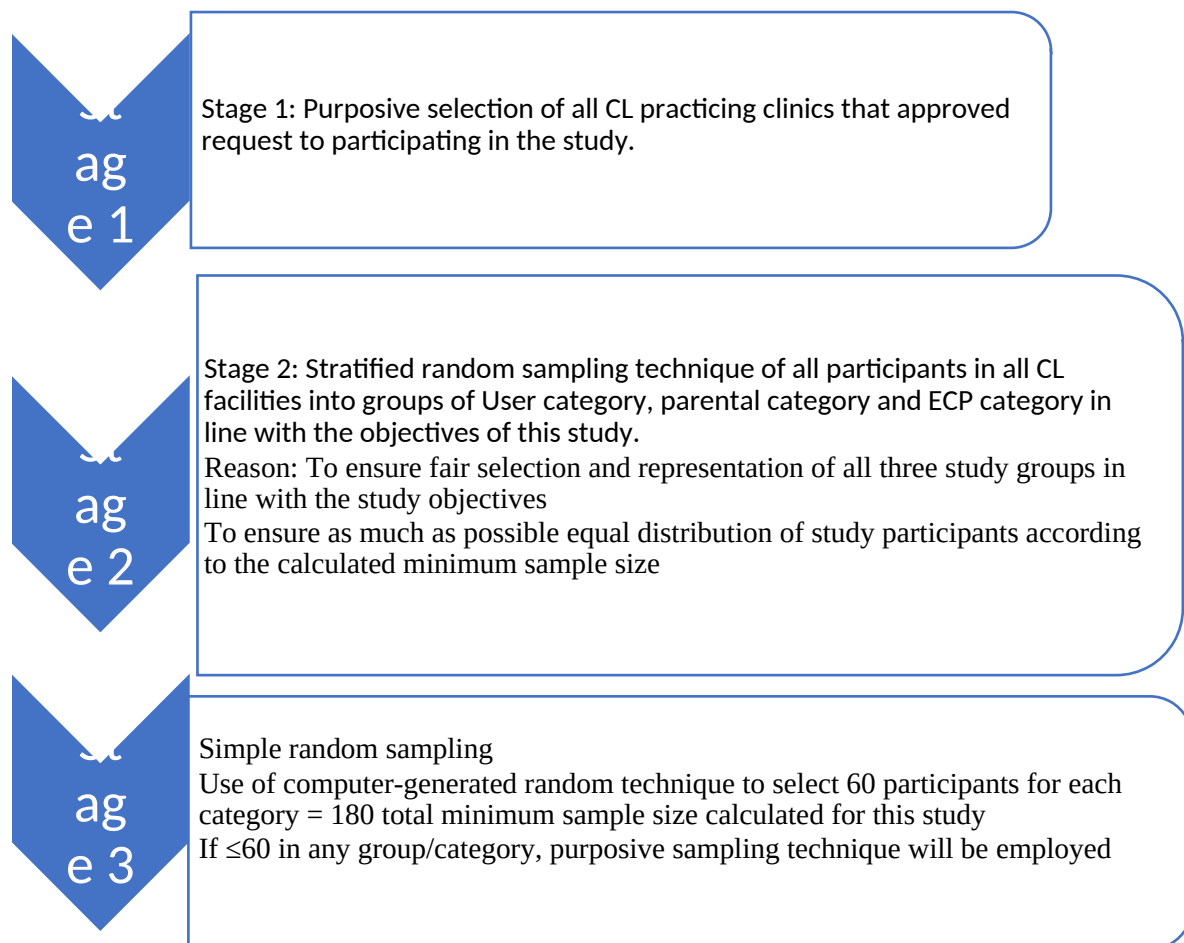


Figure 3. 1: Flow Diagram of Sampling Technique – A 3-stage sampling was employed in selecting the required total minimum sample size of 180 all identified 13 CL practicing facilities in Kenya that participated in the study.

3.4.2 Data collection

The instrument to be used for data collection involved use of pre-validated questionnaires. These included three different semi-structured questionnaires each for the different study groups. The nature and structure of each instrument is detailed below;

3.4.2.1 User group questionnaire (children and teenagers)

The questionnaire used for this study group was adopted from a previously validated instrument for pediatric refractive profile 2 questionnaire (Crescioni *et al.*, 2014). This was edited to align with the objectives of this study and will consist of sections that will elicit information relating to prevalence of CL usage amongst school going children and teenagers (aged 8 to 19 years) having myopia considered significant ($\geq | -0.50D |$). In addition, the questionnaires elicited other relevant data that informed on socio-demographic characteristics, patients' clinical history relating CL or spectacle use, possible history of previous refractive surgery and reasons to choose or not choose CL use (appendix vii). This questionnaire were translated to local Swahili dialect by research assistant for ease of understanding if need arose.

Each participant was expected to respond to a 5-level Likert scale (range of strongly agree to strongly disagree) on a 26-point questionnaire (in two sections, 13 each for barriers and promotive factors). These questions in the Likert scale elicited specific patient-centered barriers and possible factors that influenced their preference to uptake CLs. The 13-point question in each section for which the study participants in this group were required to respond included questions 1 to 11 which were closed ended and requiring them to respond to their levels of agreement to commonly identified factors (barriers and promoters) in literature. Those with Likert scale structure had score points 1 to 5 with a score of 1 for strongly disagree up to a score of 5 for strongly agree (appendix vii). Question 12 to 13 for each section were open ended

and requiring the participants to freely express in their opinion specific barrier and promotive factors hindering or promoting their uptake of CLs.

3.4.2.2 Parental group questionnaire (parents or legal guardian of patients)

For this group a pre-validated questionnaire was applied (appendix viii). The questionnaire was structured to capture parental knowledge and attitude to myopia correction using CLs. The purpose here is to elicit information about parental role in influencing or inhibiting uptake of CL. The questionnaire was structured in 7-points, with the first five questions having open ended questions that will capture information's about their child's age, their child's current mode of vision correction, and their child's history of CL use. The last two questions had a Likert scale to rate their attitudes on children use of CLs. This included reason for preference or lack thereof of CL option compared with other options for myopia correction. The questions were presented on a 5-level Likert scaling ranging from strongly agree to strongly disagree. The Likert scale response as with the user group questions were scored points 1 to 5 with a score of 1 for strongly disagree up to a score of 5 for strongly agree (appendix viii). This questionnaire was translated to local Swahili dialect by research assistant for ease of understanding if there was need.

3.4.2.3 Eye care practitioner (ECP) group questionnaire

The ECP pre-validated questionnaire was structured to capture specific socio-demographic characteristics, and expertise and experience (in years of practice) of selected active CL eye care professionals. The questionnaire further captured practitioner's nature of CL practice and number years in full time practice, type of CL dispensed, as well as their knowledge and attitudes on CL and myopia. The questionnaire have three parts; with one structured to capture relevant socio-demographic data. The second part was filled by practitioners who examined

less than two contact lens patients on average per month. The third was for practitioners who examine more than an average of two patients per month. The essence of separating these two groups of practitioners is to enable the study compare and see how practitioner's experience and other factors influences or inhibits their daily practice in CL care for children and teenagers. This information informed on the role of ECP as influencers or barriers to uptake of CL by the user group.

For the ECP group, a pre-validated questionnaire having multiple choices questions was applied. The practitioner were required to choose one appropriate option from a list of choices. The questions included such questions as for example; average age-specific number of CL patients visit their facilities per month. The age specifics were grouped as; 8 to 9 years, 10 to 12 years, 13 to 14 years, 15 to 17 years and 18 to 19 years. Other questions included; what age group (8 to 12 years or 13 to 19 years) do they feel more comfortable to fit? What gender do they feel more comfortable to fit? And at what age they feel or consider appropriate to introduce CL to children in their practices? The questionnaire for this study group further elicited practitioners' reasons for and reasons not to fit children with CL as well as their approaches in general vision correction for children, i.e. their primary vision correction option and secondary options. Besides this the questionnaire also elicited CL properties and factors, including fit modalities amongst others that influence practitioners' decision to fit children (appendix ix).

3.4.3 Data collection procedure

The study applied pre-validated questionnaires structured for the three different study groups discussed in section (3.4.3) above. The questionnaires were sent to selected CL facilities using the facilities official emails and delivered through each facilities' HR departments as was pre-agreed with each facility. Each participating facility was given three types of questionnaires –

one for each designated CL practitioner(s) in the facility, and the other two for each selected CL user (as per the selection criteria for this study and as was explained to the contact person in each facility) and their identified legal representative/guardian. A trained research assistant was assigned to each facility to assist with the proper filling of each questionnaires and also for the purpose of follow-up with selected participant that may not be available in the participating facility at the scheduled time of data collection. Patients' data enabled the categorization of myopia was obtained from previous hospital records and/or on the basis of new diagnosis made by practitioner. Refractive error was diagnosed by the practitioner who informed patients of the ongoing research and its relevance.

The study lasted for a month. Assent/consent to participate in the study was sought from the children and accompanying or appointed legal guardian as per details in the information document and consent certificate (appendix iv). Relevant study participants detail in line with the study objectives was recorded accordingly as per approved data recording format for this study (appendix v) following completion of patients' ocular examination by the facility designated CL practitioner.

To assure quality and control of data collection process, willing/consenting optometrists as research assistant from each participating facility were recruited and trained. The research assistants were trained along ethics in quality data control processes and also to provide oversight supervision, and giving relevant guidance to study participants. Overall activities involving the data collection process in all facilities were closely monitored by the investigator (GK). All data collected from each facility was counter checked for quality and appropriateness of entry as well as for completeness and consistency, throughout the collection period by the study investigator.

3.5 Summary of Methods

The flowchart below summarizes the research methods adopted by the researcher,

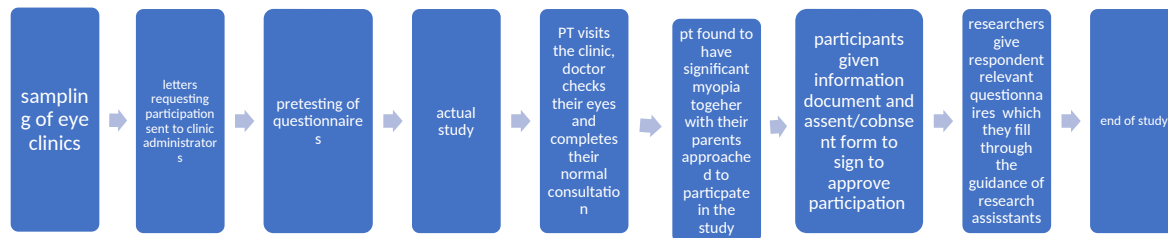


Figure 3.2: A flowchart showing summary of the research methodology

3.6 Data collection instruments validation

In this study, a pilot was conducted to pre-test the validity of the instruments for data collection. The CL clinic at Kikuyu eye unit was used as the setting for the pilot study. Questionnaires for all three study groups was pre-tested using randomly selected CL patients, aged 8 to 19, having myopia who were accessing the CL clinics, for a period of one week preceding the commencement of the study. Their accompanying legal caregivers and the CL clinicians at the facilities were administered the respective questionnaires. The data collected from the pilot was analyzed and the results tested against their ability to satisfying the objectives of this study. Specific areas/sections of the questionnaires needing adjustment was modified with guidance of the study supervisors and adjusted to satisfactorily meet the required study objectives. The questionnaires will further be pre-tested for response time (5 to 10 minutes was acceptable for each group's questionnaire), ease of comprehension and understanding of language, as well as being checked for the need for translation to local common language (Kiswahili). The findings of the pilot was analyzed for validity, consistency and reliability of the data collection instruments.

3.7 Data management

This involved the responsibilities that ensure secure and proper management and accessibility of research data. The entire data management protocol will comply with existing institutional research data management policy of MMUST.

3.7.1 Procedure for data storage and management

Data collected was coded and entered into a Microsoft excel (version 2016) for the purpose of examination of variables. All entered (e-copy) data was cleaned and stored and password protected using the investigator's personal computer. Secure access to all collected data is restricted only to the investigator and his supervisors in e-copies. The hard copies (as back up) were locked-up in a safe with limited access to the investigator alone. These were stored for a minimum of five (5) years before disposal.

3.7.2 Procedure for data analysis and presentation

All data collected were entered into a spreadsheet (Ms excel, v2016) for cleaning and coding. These data was exported into a licensed SPSS (v.25) for appropriate statistical analysis at $\alpha = 0.05$. Analyzed statistical results was presented in tables, graphs and in descriptive statistics – mean, standard deviation, proportions and percentages. Normality was assumed, and parametric inferential statistics were used to explore data structures in this study. Odds (OR at 95% CI) to measure various variables' associations in line with participants' uptake and barrier responses were explored using multivariate logistics regression test of association. The regressions test was particularly relevant to control for intervening variables. Inferential analyses was conducted at $\alpha = 0.05$ and 95% confidence interval (CI) and results presented in the form of tables and graphs as described in Table 3.2.

Table 3. 2 Structured approach to data analysis in this study

s/n	study objectives addressed	variable type	tools for analysis
1.	Prevalence of CL use in school going children and teenagers (aged 8 to 19) having myopia	Proportion – numerical (discrete)	Percentages (descriptive)
2.	Age, gender and other socio-demographic distribution of CL use in school going children and teenagers (aged 8 to 19) having myopia	Proportion – numerical (discrete)	Percentages (descriptive)
3.	Uptake of CL in school going children and teenagers (aged 8 to 19) having myopia	Proportion – numerical (discrete)	Percentages (descriptive)
4.	Barriers to uptake of CL in school going children and teenagers (aged 8 to 19) having myopia	Proportion – numerical (discrete)	Multiple responses in percentages (descriptive)
5.	Factors influencing CL uptake in school going children and teenagers (aged 8 to 19) having myopia	Proportion – numerical (discrete)	Multiple responses in percentages (descriptive)
6.	Association between indices of barriers to uptake and uptake of CL	Comparisons between proportions	Chi square followed by Cremas' V
7.	Association between factors influencing CL uptake and uptake	Comparisons between proportions	Chi square followed by Cremas' V
8.	Measure the influence of parental and eye care practitioners' factors on uptake of CL	Comparison between proportions	Multivariate logistics regression model

3.8 Ethical considerations

This study will adhere to all the detailed human research requirements as per the Helsinki declaration. Ethical authorization to undertake the study was acquired from the Institutional Ethics Review Committee (IERC) of MMUST.

Following approval from MMUST IERC, mandatory research permissions were applied for from the National Commission for Science, Technology and Innovation (NACOSTI). A NACOSTI research permit letter accompanied by a copy of participants' information and consent/assent note – addressing all potential ethical issues from the study (in line with principles of ethical research to be adhered to) was submitted to the entry points. Entry points

defined for this study include; all selected study facilities' heads of administration/HR department and participants' (CL users) legal guardians.

Written consent/assent containing well-understood study information was obtained from each participant before giving them the appropriate questionnaires. To ensure comprehension, research assistants translated the information document and the consent/assent note to the local dialect (Swahili). Furthermore, to enhance individual comprehension, the participants and their legal guardians were given these documents one week prior to study visits through the facilities' administrative/HR heads to have enough time to go through the documents before giving consent and their word to participate in the study. The information/consent/assent document was translated to Kiswahili to ensure effective communication of the contents of the document and to be concise enough to allow for ease of comprehension. Children aged 8 - 12 were required to sign a youth assent, and those aged 13 to 18 were required to sign adolescent consent. Parents of this population involved in this study were required to sign a paternalistic consent to approve the children and youth participation.

To guarantee that the respondents' right to privacy and confidentiality is safeguarded, as assured in the assent/consent letter, all participants' records and all questionnaires to be responded to were personally entered into e-copies by the study investigator. These were coded and password protected. All relevant interviews with participants were conducted within confines that provide privacy for all participants.

The participants' rights to make autonomous decisions to participate in this study were respected. This was explained in detail in the information document given to them through the

facilities' HR department and verbally to them during the study. In addition, respondents' rights to withdraw from the study at any given point or refuse to participate in the study were strictly respected. This was explicitly stated in the information document issued to the participants and explained to each participant before entering the study. This information was equally communicated to them verbally, through the trained research assistants for each facility, in a language most convenient for each participant.

All study facilities and participants were fairly selected without bias of any form. No study participants were coerced to provide assent (e.g. incentives). Potential benefits from the study were fairly distributed amongst participants and stakeholders to the study, including dissemination of the findings of this study.

Potential harm in any form, particularly from the risk of therapeutic misconception by study participants (users and their parents) was avoided as much as possible. The study investigator and the research assistants will ensure, both through the usage of information documents as well as the usage of verbal communication during the data collection period, that they are being recruited for research purposes and that there will be no form of visual aids (glasses or contact lenses) being dispensed to them.

CHAPTER FOUR

RESULTS

4.1 Social demographic information of study participants

A total of 85 children and teenagers, their accompanying parents (n=85) and examining eye care practitioners (n=48) from 13 eye clinics across Kenya that approved the study participation-request were registered. User group (children and teenagers) questionnaires elicited responses from a total of 46 female (54%) and 39 male (45%) participants with ages between 9 and 18 years with mean age 13.4 ± 2.1 . The modal class of the user group age was 13 years to 15 years (49%) as shown in Table 4.1. 39 (46%) of the study participants were shown to have higher preference for CL as means of correcting their significant myopia.

Table 4. 1 Socio-demographic distribution of user group participants in the study

Socio-Demographic Variables	Distribution (n = 85)	
	N	%ages
Age (Children)		
Children 8 - 12 years	28	32.9
Teenagers 13 - 15 years	42	49.4
Teenagers 16 - 18 years	15	17.6
Gender (Children)		
Females	46	54.1
Males	39	45.9
Children's current means of RE correction		
Glasses	43	50.6
Contact lens	15	17.6
Refractive surgery	0	0
No correction	27	31.8
Children's source of CL information		
Eye doctors	46	54.1
Friends	16	18.8
Parents	6	7.1
Media	17	20
Children's preference for correction		
Contact lens	39	45.9
Glasses	46	54.1

Mean age $\pm$ SD, 13.4 ± 2.1 ; RE, refractive error; CL, contact lens;

The socio-demographic data of the user group parents' which relates to CL revealed that while slightly more (38%) parents did not approve CL use for their children, others (35%) approved their children to wear CL with even fewer (27%) indicating to not being sure.

Table 4. 2 Socio-demographic distribution of parent group participants in the study

Socio-Demographic Variables	Distribution (n = 85)	
	N	%ages
Parental history of CL use		
Yes	6	7.1
No	79	92.9
Parental approval to child's CL wear		
Yes	30	35.3
No	32	37.6
Not sure	23	27.1
parents' level of education		
never been to school	1	1.2
primary	8	9.4
secondary	13	15.3
college	36	42.4
Tertiary	27	31.8

CL, contact lens

The ECP related socio-demographic distribution also shown in Table 4.3. The findings revealed that for gender, while most (71%) ECPs were males, only (29%) were females. With regards to the CPs highest educational level attained, the study showed most 58% CL practitioners in the study were bachelor's degree holders. Additionally, most (92%) ECPs who participated in this study did not have any CL related professional membership.

Table 4. 3 Socio-demographic distribution of parent group participants in the study

Socio-Demographic Variables	Distribution (n = 85)	
	N	%ages
Gender (ECP)		
Male	34	70.8
Female	14	29.2
Number of CL children examined monthly (ECP)		
Up to 2 children	35	73.0
More than two children	13	27.0
Highest education level (ECP)		
Vocational/technical	1	2.1
College	17	35.4
Bachelors	28	58.3
Masters	2	4.2
CL professional membership (ECP)		
IACLE member	2	4.2
FIACLE	2	4.2
None	44	91.7

RE, refractive error; CL, contact lens; ECP, eye care practitioner

4.2 Factors promoting uptake of CL amongst school going children and teenagers.

Details of factors promoting uptake of contact lens among the user group of this study are presented in Table 4.4. As shown, most user group respondents agreed that bulky spectacle 61(72%) was the reasons promoting their CL uptake. However, the study found weak associations between bulkiness of spectacles and actual uptake of CL (Cramer's V: 0.223, $p=0.121$). Also, other promoting factors like improved clarity with CL wear (59%) and improved social influence and acceptance with CL (64%) were found to be moderately strong factors associated with promoting CL uptake among the study respondents (Cramer's V: 0.413, $p=0.001$ and 0.351, $p=0.005$ respectively). All the factors identified by the respondent to positively promote user group CL uptake had largely weak to moderately strength of association with actual uptake, which were all significant ($p=0.00$). The only exception was that of spectacle being bulky, and spectacles limit participation in physical activities where as noted above, which had both weak and none significant association with uptake.

Table 4. 4 Presentation of the user group responses on felt positive influencers to contact lens uptake.

Indices of positive influencers	Distribution of responses (n = 85)					
	No idea	Disagree	Agree	X2 –test	p-value	Cramer's V
	N (%tage)	N (%tage)	N (%tage)			
Glasses are bulky	3 (3.5)	21 (24.7)	61(71.8)	5.460	0.121	0.223
Spectacles limit participation in physical activities	10(11.8)	24 (28.2)	51 (60.0)	7.551	0.057	0.260
It is easy to take care of CL	17(20.0)	17 (20.0)	51 (60.0)	11.669	0.013	0.319
Improved self-esteem with CL wear	37(43.5)	27 (31.8)	21 (24.7)	12.325	0.001	0.393
Reduced self-esteem with spectacle wearing	21(24.7)	27 (31.8)	37 (43.5)	18.309	0.001	0.413
Improved clarity with CL wear	26(30.6)	9 (10.6)	50 (58.8)	18.13	0.002	0.387
Useful CL information on hospital website	28 (32.9)	26 (30.6)	31 (36.5)	10.384	0.005	0.355
Improved social influence and acceptance	25(29.4)	6 (7.1)	54 (63.5)	15.409	0.005	0.351
Spectacles is a bother while engaging outdoors	22 (25.9)	9 (10.6)	54 (63.5)	9.278	0.029	0.288

*Multiple responses; CL, contact lens

4.2.1 The parents related factors promoting uptake of CL among their children.

Table 4.5 below shows the presentation of the user group parents' responses on felt positive influencers to contact lens uptake in children with significant myopia. As shown, most parents (54%) would prefer CL to spectacle glasses due to better performance in sports derived from using CL. Conversely, 37% of parents' respondents did not see this factor as reason enough to facilitate uptake; even fewer number of parents (9%) were unsure if this attribute influences them to support CL fitting of their children.

Table 4. 5 Presentation of the user parents' responses on felt positive influencers to contact lens uptake.

	Distribution of responses (n = 85)		
	No idea	Disagree	Agree
	N (%tage)	N (%tage)	N (%tage)
Indices of positive influencers			
Contact lens gives a clearer vision for parents' child	19 (22.4)	27 (31.8)	39 (45.9)
parents' child feels discomfort while using glasses	21 (24.7)	29 (34.1)	35 (41.2)
parents view on CL as affordable	12 (14.1)	37 (43.5)	36 (42.4)
the child can put in and remove contact with ease	14 (16.5)	44 (51.8)	27 (31.8)
Child better performance in class when using contact lens than in glasses	12 (14.1)	33 (38.8)	40 (47.1)
Better performance in sports when in contact lens than in glasses	8 (9.4)	46 31 (36.5)	(54.1)
Contact lens gives better comfort	5 (5.9)	37 (43.5)	43 (50.6)
parent has history with CL (heard or used CL)	7 (8.2)	34 (40.0)	44 (51.8)

*Multiple responses; CL, contact lens

In Table 4.6 below is the results of an analysis to evaluate the extent of interaction of pre-defined parental factors that positively influence CL uptake among children and teenagers included in this study. As shown, improved child's class performance has the greatest likelihood (OR: 106, 95% CI: 2.633 - 4290) to significantly ($p=0.01$) influence parental agreement to CL wear by their children. Conversely, previous parental history of CL use, or have ever heard about CLs, had the least likelihood (OR 0.04, 95% CI: 0.001 – 1.275) to influence CL wear in children and teenagers. However, the odds were not statistically significant ($p=0.068$).

Table 4. 6 Presentation on extent of influence of parents influencing factors on CL uptake among children and teenagers

Uptake of CL in Children ^a		B-coef	Wald	P-value	OR	95% CI	
						Lower Bound	Upper Bound
CL Uptake	Contact lens gives a clearer vision for parents child	3.162	6.861	0.01	23.613	2.216	251.6
	parents' child feels discomfort while using glasses	3.713	5.691	0.02	40.961	1.94	865.0
	parents view on CL as affordable	3.189	6.927	0.01	24.264	2.257	260.81
	the child can put in and remove contact with ease	2.645	3.985	0.05	14.083	1.049	189.05
	child has better performance in class when using contact lens than in glasses	4.666	6.116	0.01	106.28	2.633	4290.0
	child has better performance in sports when in contact lens than in glasses	2.662	4.114	0.04	14.33	1.094	187.69
	Contact lens gives better comfort	3.466	3.843	0.05	32.02	1.000	1025.1
	parent has history with CL (heard or used CL)	-3.209	3.32	0.068	0.04	0.001	1.275

^a The reference category: No CL Uptake

4.2.3 ECP-related factors promoting CL uptake

Shown in Table 4.7 below are eye care practitioners' perspective on the pre-defined factors influencing CL uptake among children and teenagers with myopia. As shown, majority (63%) of the practitioners who participated in the study agreed that administering trial lens, and engaging proactive conversations about CL with their clients both increased their confidence, and success in fitting CL in children and teenagers respectively.

Table 4. 7 Presentation of the ECP's responses on felt positive influencers to contact lens uptake

Indices of positive influencers	Distribution of responses (n =48)		
	No idea	Disagree	Agree
	N (%tage)	N (%tage)	N (%tage)
Trial lenses increase confidence	3 (6.3)	15 (31.3)	30 (62.5)
Child motivation to fit	1 (2.1)	19 (39.6)	28 (58.3)
fitting improves children self-esteem	3 (6.3)	17 (35.4)	28 (58.3)
Market opportunity	4 (8.3)	19 (39.6)	25 (52.1)
Beginning conversations with patient about CL leads to more conversion success	7 (14.6)	11 (22.9)	30 (62.5)
Ability to choose right patients for a fit usually gives desired outcomes	1 (2.1)	21 (43.8)	26 (54.2)

Multiple responses; CL, contact lens;

Results of analyses conducted to explore the extent to which the pre-defined ECP-related factors influenced CL uptake among children and teenagers are presented in Table 4.8. The results showed that practitioners perceived that a child's motivation to fit CL had the greatest likelihood (OR: 34.41, 95% CI: 1.349 – 877.6; $p=0.03$) to influence CL uptake in children and teenagers. Conversely, as much as most practitioners agreed that fitting trial CLs and engaging in prior conversation with clients increased their CL fitting success rates, the finding showed that these factors in the group were least likely (OR: 10.4, 95% CI: 1.199 – 90.12 and OR: 11.71, 95% CI: 1.153– 118.87) to influence uptake of CL in children and teenagers. In both cases, the findings were statistically significant ($p<0.05$).

Table 4. 8 Presentation of ECP-related factors positively influence CL uptake among children and teenagers with significant myopia

Uptake of CL in Children ^a		B-coef	Wald	P-value	OR	95% CI		^a The
						Lower Bound	Upper Bound	
CL Uptake	Trial lenses increase confidence to fit	2.341	4.515	0.03	10.4	1.199	90.12	e
	Child motivation to fit	3.538	4.584	0.03	34.41	1.349	877.55	
	fitting improves children self-esteem	3.443	6.598	0.01	31.29	2.261	432.93	
	Market opportunity in fitting children with myopia	2.923	5.246	0.02	18.59	1.525	226.64	
	Beginning conversations with patient about CL leads to more conversion success	2.46	4.329	0.04	11.71	1.153	118.87	
	Ability to choose right patients for fit usually gives desired outcomes	2.651	4.249	0.04	14.17	1.139	176.30	

reference category: No CL Uptake

4.3. The factors hindering CL uptake amongst school going children and teenagers.

Table 4.9 shows the responses of the user group participants felt barriers to CL uptake. While most (60%) participants of this group agreed they have fear that using CL can harm eyes, the study also found this to present a significant moderate association (Cramer's V: 0.494; P = 0.000) with CL uptake as a barrier factor. . Other barrier factors that were found to have significant moderate associations with their CL uptake included lack of professional doctors (48%; Cramer's V: 0.486; P = 0.000), satisfaction with glasses (47%; Cramer's V: 0.409; P = 0.001), parental hindrance (52%; Cramer's V: 0.539; P = 0.000) perception that using CL will require a lot of training (49%; Cramer's V: 0.403; P = 0.001), cost of CL (45%; Cramer's V: 0.294; P = 0.026) longer distances to eye clinics offering the service (53%; Cramer's V: 0.307; P = 0.018) and ocular discomfort (41%; Cramer's V: 0.468; P = 0.000). Conversely the study found that high cost of traveling to clinics as a barrier had a weak strength of association with uptake of CL (51%; Cramer's V: 0.241; P = 0.085).

Table 4. 9 Presentation of the user group responses on felt barriers to contact lens uptake.

Indices of barriers	Distribution of responses (n = 85)					
	No idea	Disagree	Agree	X2 –test	p-value	Cramer's V
	N (%tage)	N (%tage)	N (%tage)			
Lack of general knowledge on contact lens	6 (7.1)	32 (37.6)	47 (55.3)	6.703	0.034	0.282
CL is expensive	12 (14.1)	35 (41.2)	38 (44.7)	8.174	0.026	0.294
CL not easily available	10 (11.8)	32 (37.6)	43 (50.6)	7.701	0.024	0.297
Fear using CL can harm eyes	4 (4.7)	30 (35.3)	51 (60.0)	19.655	0.000	0.494
Parents' approval hinder CL use	9 (10.6)	32 (37.6)	44 (51.8)	29.081	0.000	0.539
A lot of training needed to use CL	10 (11.8)	33 (38.8)	42 (49.4)	15.823	0.001	0.403
Lack of CL professional doctors	8 (9.4)	36(42.4)	41(48.2)	25.078	0.000	0.486
Satisfied with glasses	8 (9.4)	37 (43.5)	40 (47.1)	15.866	0.001	0.409
High cost of travelling to get services	12 (14.1)	30 (35.3)	43 (50.6)	4.772	0.085	0.241
Clinics are very far from our home	5 (5.9)	35 (41.2)	45 (52.9)	8.649	0.018	0.307
Ocular discomfort when using CL	17 (20.0)	33 (33.8)	35 (41.2)	22.653	0.000	0.468
Glasses are a more cheaper option	8 (9.4)	29 (34.1)	48 (56.5)	17.228	0.000	0.452

*Multiple responses; CL, contact lens

4.3.1 The parental-related factors hindering CL uptake

Shown in table 4.10 below are parental-related factors presenting barrier or hindrance to CL uptake among children and teenagers included in this study. As shown, most (61%) parents were of the view that their children were too young to handle CL. While barely over 41% of the respondents disagreed that the cost of CL, and children not being careful enough to handle CL to be of important concern to them, few number of parents in the study had no idea on why they would not accept CL uptake for their child.

Table 4. 10 Presentation of the parents' group responses on felt barriers to contact lens uptake

Indices of barriers	Distribution of responses (n = 85)		
	No idea	Disagree	Agree
	N (%tage)	N (%tage)	N (%tage)
parent view child as too young to handle CL	1 (1.2)	32 (37.6)	52 (61.2)
parent view child as not careful enough to handle CL	3 (3.5)	35 (41.2)	47 (55.3)
Parents of opinion CL is expensive	4 (4.7)	35 (41.2)	46 (54.1)
parents feel CL is not easily available	4 (4.7)	34 (40.0)	46 (54.1)
Parents feel there is lack of CL expert advice	5 (5.9)	32 (37.6)	48 (56.5)
Possibility harm by CL if worn by child.	3 (3.5)	37 (43.5)	45 (52.9)

*Multiple responses; CL, contact lens;

Analyses conducted to explore the influence and extent of influence of identified parental factors hindering the uptake of CL in the user group is shown in Table 4.11. As shown, the greatest parental-related hinderance to uptake of CL was among parents who view their child not careful enough to handle contact lens who have 84 folds more likelihood to reject CL wear for their child(ren) (OR: 84, 95% CI: 1.84 – 3833.65), which was significant ($p=0.02$). Conversely, the concern of lack of CL professional/expert advice, presented the least parental related hindrance to uptake of CL (OR: 25, 95% CI: 1.29 – 488.61). Again, this was significant ($p=0.03$).

Table 4. 11 Presentation on the extent of influence of parental barrier factors on CL uptake among children and teenagers with significant myopia

Uptake of CL in Children ^a		B-coef.	Wald	P-value	OR	95% CI	
						Lower Bound	Upper Bound
No CL Uptake	parent view child as too young to handle CL	4.127	4.954	0.03	62.00	1.64	2348.68
	parent view child as not careful enough to handle CL	4.432	5.171	0.02	84.08	1.84	3833.65
	Parents of opinion CL is expensive	4.229	4.732	0.03	68.66	1.52	3101.51
	parents feel CL is not easily available	3.554	4.253	0.04	34.96	1.19	1024.19
	Parents feel there is lack of CL professional/expert advice	3.224	4.534	0.03	25.13	1.29	488.61
	Possibility of harm by CL if worn by child.	3.351	3.761	0.05	28.54	0.97	843.78

^a The reference category: CL Uptake

4.3.2 The ECP-related factors hindering CL uptake

Practitioners perceived barriers hindering CL uptake in children and teenagers factors are shown in Table 4.12. As shown, most (65%) ECPs perceived that reduced CL awareness among children and teenagers with myopia hinders CL uptake. While most (52%) ECPs disagreed that communication barriers presents important hinderance to CL uptake of their clients, very few practitioners had no idea on factors presenting barriers to uptake of CL in children and teenagers. However, less (52%) practitioner respondents seemed to agree to have a communication barrier when it comes to convincing clients about CL for myopia in children.

Table 4. 12 Presentation of the ECP's responses on felt barrier factors to contact lens uptake

Indices of barriers	Distribution of responses (n = 48)		
	No idea	Disagree	Agree
	N (%tage)	N (%tage)	N (%tage)
Trial lenses are not readily available.	7 (14.6)	19 (39.6)	22 (45.8)
Feeling of lack of knowledge in fitting myopia-control CL for children and teenagers	3 (6.3)	21 (43.8)	24 (50.0)
Parental inhibition	4 (8.3)	20 (41.7)	24 (50.0)
Less CL awareness among users	3 (6.3)	14 (29.2)	31 (64.6)
A communication barrier when it comes to convincing new CL users	4 (8.3)	25 (52.1)	19 (39.6)
Not confident enough in fitting CL	8 (16.7)	15 (31.3)	25 (52.1)

Multiple responses; CL, contact lens;

Results of analyses conducted to explore the extent to which the pre-defined ECP-related barriers hindering CL uptake among children and teenagers are presented in Table 4.13 below. As shown, ECPs who participated in this study perceived that lack of adequate knowledge & skills set needed to fit CL in children and teenagers with myopia was most likelihood (nearly 77 times) to hinder CL uptake (OR: 76.81, 95% CI: 1.6 - 3690.43; $p=0.028$) by their clients. Nonetheless, while most ECPs perceived that having reduced CL awareness presents barriers to their clients, the analysis showed that this factor was least likely to hinder uptake of CL among the user group respondents (OR: 11.03, 95% CI: 1.07 – 114.05; $p=0.03$)

Table 4. 13 Presentation on the extent of influence of ECPs' barrier factors on CL uptake among children and teenagers with significant myopia

Uptake of CL in Children ^a		B coef	Wald	P- value	OR	95% CI	
						Lower Bound	Upper Bound
No CL Uptake	Trial lens not easily available	4.099	5.31	0.021	60.3	1.85	1967.48
	Lack of adequate knowledge & skills to fit CL	4.341	4.83	0.028	76.81	1.6	3690.43
	Parental inhibition	3.623	6.4	0.011	37.46	2.26	620.41
	Less CL awareness among users	2.401	4.06	0.044	11.03	1.07	114.05
	Practitioner communication barrier	3.844	4.3	0.038	46.7	1.24	1765.66
	Not confident enough in fitting CL	3.515	4.79	0.029	33.61	1.44	782.08

^a The reference category: CL Uptake

CHAPTER FIVE

DISCUSSION

5.0 Introduction

This chapter explores a detail discussion of the findings of this study in line with the study objectives. Specifically, the discussion focusses on the nature, implication of the findings, and the extent to which they compare with other similar studies previously conducted elsewhere. The chapter begins with the discussion of baseline socio-demographic findings and concludes with summary of all aspect of the discussion explored in the various sections of the chapter.

The study found that slightly over half of the children and teenagers who participated in this study were females, the cause of this outcome remains unknown and remains an important finding as far as it concerns addressing the accessibility of services with regards to children gender. Also, the study found that respondents from the user group who participated in this study with a mean age of 13.4 ± 2.1 , mostly preferred spectacle correction as their option for significant myopia. While less than a-fifth of the participants in the user group with significant myopia were currently using any type of CL, in comparison, a school-based survey in Kenya (Nyamai et al., 2016), conducted among secondary schools' teenagers with refractive error, found that over two-third of the participants of the study had mostly spectacles corrections. Additionally, another study in western Kenya (Chikasirimobi et al., 2022) conducted among a university population showed a low uptake CL where uptake of CL was only among 1% of the study participants with any form of refractive error. Thus the present study notes, that the differences in the uptake of CLs among the various population groups may largely have been influenced by age's variations in the various studies. This view is consistent with the findings of both a Kenyan study (Chikasirimobi et al., 2022), and that elsewhere in Ghana (Abokyi et al., 2017), whereby in both studies, the study populations were selected from the general public. In

this current study, the user group were selected from children and teenager patients seeking optical solutions from well-known contact lens dispensing centers in Kenya that were participating in the study.

Eye care practitioners were shown to be the chief source of CL information in the study, followed by media (internet and print media). This finding concurs with the finding of studies done in Ghana (Abokyi et al., 2017) and in the United Kingdom (Brogan, 2014), wherein in both studies practitioners were the primary source of CL information superseding other sources available to patients like internet and print media.

Findings of parental preference for optical correction for their child's significant myopia showed that majority of the parents were willing to fulfil a request for their children to have glasses than a contact lens strategy. Contrarily, a study by Zeri and colleagues (Zeri et al., 2010) conducted in Spain and Iberia showed that over two-third of parents included in their study were highly interested in CL. These marked difference in parental preferences for CL may be attributed to the socio-cultural determinant differences explained in an older study by (Dandona et al., 2001) that, preference for corrective options vary with places and among individuals.

The third part of the study involved ECPs who examined and managed the user group participants of this study. Of those included in this study, over three-fourth of them were males. Data from this study showed that majority of the practitioners recorded more spectacle uptake among the children and teenagers as compared to CL option. Furthermore, although most of the practitioners who participated in this study had at least a bachelor's degree qualification in optometry, the study however highlights the need for specialization in CL care among Kenyan eye care practitioners. As discussed later in this chapter, majority of the practitioners in this

study agreed they lacked sufficient knowledge and skills set to confidently fit CL in young children with myopia.

5.1 Factors Influencing Uptake of CL among School-Going Children and Teenagers

In this study, it was found that among participants who constituted the user group, the ease of taking care of CL was a major significant positive influencer to prefer CL over glasses. This finding echoes with previous study conducted in USA (AOA 2010), where 99% of eye care practitioners in the study rated the CL property of being easier to take care of as an influencer factor for them to fit CL in children. Besides this, in another study conducted in Canada among children and youth (Paquette et al., 2015) ECPs were encouraged to fit children and teenagers with no history of CL wear as they were shown to be easily capable of having successful wear and caring for the lenses. In this current study, most of the respondents in user group agreed that they felt improvement in their self-esteem from using CL which positively influenced their uptake. Among the user group enrolled in the study, their appearance and influence among peers were important; analysis conducted to explore the associations between CL uptake and pre-identified factor in the user group revealed moderately significant association with the eventual uptake of CL in the participants of the group (Table 4.2). This finding agrees well with findings by Jellesma and colleagues (F. Jellesma, 2012), that revealed the negative self-esteem experienced from children using spectacles compared to their counterparts using CL. Another earlier study (Walline et al., 2009) in the same line, also illustrated the importance of CL in boosting a child's vision, allowing them to benefit socially from the improvement in their physical appearance and social acceptance.

Furthermore, the results of this current study also demonstrates that improved clarity with wear of CL significantly influenced CL uptake in children and teenagers with myopia (Table 4.2).

Further analysis on the association between this factor and eventual uptake of CL in the user group participants revealed a moderate association. This finding indeed echoed recent studies to evaluate children and teenage priorities when considering CL as an option for refractive error correction (Ravipati et al., 2011; Thite et al., 2015). These studies determined that clarity and comfort properties still ranked top among CL users. Additionally, this current study showed the extent to which improved social influence and acceptance, stood out as an important factor influencing CL uptake among children and teenage wearers. Three out of five respondents in this study agreed that an improved social influence and social acceptance arising from CL wear was an influencer for uptake to them. Further analysis in this study to explore the extent of association between identified factors and uptake (Table 4.2), showed a moderate to strong association between CL uptake and improved social acceptance. This factor was significant compared to any other influencing factor pre-identified in this study. Previous studies elsewhere to evaluate self-perception in children wearing contact lenses showed an improved social acceptance self-perceptions associated with CL wear in children were more likely to influence CL wearers (Walline et al., 2009). On the other hand, negative self-perception as a result of spectacle wear was marked by more urban children showing none compliance to spectacle use due to possible bullying from their peers (F. Jellesma, 2012).

5.2 Barriers to Uptake of CL in School-Going Children and Teenagers

In this study, fear of CL-related ocular harm/complications was shown to be the chief factor in hindering uptake among the user group category (Table 4.7). Similarly, in a previous study by (Abokyi et al., 2017), they found that fear of CL induced ocular harm was mostly a barrier factor among the spectacle wearers in Ghana. As previously demonstrated, the initial fear of ocular harm is attributed to a lack of proper information about the safety and benefits of CL in children (Bullimore, 2017). This was evident in this study as most user group children and

teenagers respondents agreed that they lacked a general knowledge of CL. Analysis conducted in this study to explore association between identified barrier factors and uptake of CL in children and teenagers, showed that lack of general knowledge of CL among the user group was significantly associated with uptake of CL in the user group. This finding emphasizes the role of practitioners in educating their patients on advances in CL safety regimen, as also noted elsewhere (Alonso et al., 2022).

Another important barrier to CL uptake found in this study is the lack of professional CL eye care practitioners. The study noted that about two out of every five user group respondents reported this factor as a barrier to them. Factually, as earlier presented in this chapter, only just about four percent of practitioners who participated in the current study had a specialization in CL at masters' level of study. Additionally, only about eight percent of the ECPs were reported to belong to a CL professional membership body (Table 4.1). Elsewhere Yang and colleagues (Yang et al., 2022), found that over three-quarter of parents who participated in their study relied solely on their ECPs' recommendations on myopia management approach for their child. Thus, this positioned them as crucial influencers as far as the selection of management and corrective strategies is concerned, in this study, the dearth of professional CL practitioners in Kenya present a significant barrier to uptake of CL among children and teenagers with myopia. Furthermore, the cost concerns were also identified to present a barrier to CL uptake (Table 4.7), as most participants in the user group who agreed that the CLs were too expensive, were less likely to procure prescribed CL treatment than otherwise. This factor was also of serious concern to the parents, thus further presenting a significant hinderance to CL uptake among children and teenagers. In health care, parents are the chief financial sponsors for children and teenagers, as such, their decisions carry much significance in health decision-making (Table 4.8). Still, ECPs have been shown to worry about parents' ability to afford an intervention for their children (Yang et al., 2022). This fact was also strongly noted by Abokyi and colleagues,

who recommended that efforts be directed towards reduction as well as standardization of CL cost for children as strategy to improving uptake (Abokyi et al., 2017).

5.3 The influence of parental and ECPs factors on CL uptake in children

This study, also sought to answer the research question; to what extent do the identified parental and ECPs barriers and promoting factors influence (extent of associations) CL uptake amongst school going children and teenagers attending CL clinics in Kenya? Thus the identified factors were grouped into either enhancing factors or barrier factors.

5.3.1 The extent of influence of Parent and ECP factors in enhancing uptake of CL in user group

Among the parent participants in the study, it was found that a child better performance in class when using CL had the greatest odds of about one hundred and six times to significantly influence parental agreement to CL wear by their children (Table 4.3). This finding was similar to an earlier study in the United Kingdom (Johnson, 2013) which revealed that 51% of parents in the study reported their child getting good grades in school to be a positive influencer. In the same study by Johnson, even though 82% of parents deemed their child's self-esteem to be very critical, about 90% of them believed correcting their child's vision with CL would result better class performance (Johnson, 2013). With regards to performance at sporting activities, most parents in this current study agreed their child's performance while using CL to engage in sports was a positive influencer for them to opt for a fit. The same result was reported in study by Bowen and colleagues in the United Kingdom (Bowen et al., 2015), which reported about 60% of ECPs felt reduced interference during physical and sporting activities to be the main reason for many parents to opt for CL instead of spectacles for their children.

Considering the important role of parents in financing health care needs of children and teenagers, family affluence have become very useful consideration in uptake of CL. The results

of this current study showed that most parents who agreed that CL is affordable were more likely to prefer CL uptake for their children by an odd of about twenty-five times (Table 4.3). Similarly, other studies elsewhere have variously demonstrated that the high cost of refractive error correction were important hinderance to CL uptake (Abokyi, Manuh, et al., 2017; Ravipati Sarathh & Pradesh, 2011). These findings thus justifies the need to reduce prices to improve CL service accessibility and affordability for better eye health in children and teenagers with significant myopia. Another important factor found in this current study to influence parents' preference for CL uptake in their children was felt comfort of wear derived from CL. About half of the participating parents in this current study agreed that comfort in wearing CL positively influenced them to support their child's uptake of CL. Similarly, a study by (Johnson, 2013) had previously shown about 58% of participating parents in United Kingdom reporting that a critical factor influencing their support for their child's uptake of CL was the comfort and look of confidence derived from it. In addition, another study (Dias et al., 2018), had also shown that parents ranked comfort and clarity as top priority attributes of CL when considering optical options. Fortunately, advancements in production technology and materials have made this possible in recent years, and as have been shown in this study (Table 4.4), parents who felt their child had discomfort using glasses, had increased odd of about 41 times to support uptake CL option. Finally, the finding of this study showed that parents who agreed that their children could easily handle and wear CL were fourteen times more likely to support their child's uptake of CL (Table 4.4). These finding also supports an early study by Paquette et al, conducted among children and youth who were first wearers and demonstrated ease of wear and care for their CL. This factor was shown to be a single good motivator to fitting CL option, by ECPs, as well as children who were first users (Paquette et al., 2015).

With regards to pre-identified ECP-related factors that influenced uptake of CL in children and teenagers with significant myopia, this study found that majority of practitioners agreed that proactive conversations with clients about CL lead to more conversion success with their patients in the clinic during a regular consultation sessions (Table 4.5). Further analysis showed that practitioners who agreed this to be a promoter for more CL fitting among their clients were twelve times more likely to fit CL among the children than otherwise (Table 4.6). This result echoed the report of an earlier study (Kumari et al., 2017) on the greater need to adopt proactive approaches by ECPs in engaging clients first in a meaningful conversation about CLs rather than embracing a reactive approach when dealing with their patients on a regular consultation visit at the clinic. Evidence from a recent study also confirmed this finding, noting that lack of proper engagement with clients in useful CL-related conversation by ECPs to result in fewer success rate of CL uptake in children (Yang et al., 2022). Additionally, the findings of this current study shows that nearly three of every five practitioners felt that a child's motivation to wear CL was an essential indicator of the success of their endeavor to fit the child. Practitioners who scored highly on this attribute were seen to have more likelihood to fit CL by thirty four times in the user group than otherwise. This aspect was observed to be a chief factor among the ECP group presenting a strength of association that is larger as well as statistically significant compared to other examined factors in the same category in the study. Data on factors that influence CL fitting in the USA (AOA 2010) showed 96% of American optometrists feel that a child's interest in wearing CL was critical when it comes to fitting children.

5.3.2 The extent of influence of Parent and ECP factors hindering uptake of CL in user group

A list key factors in Table (4.8 and 4.9) were identified and agreed by the parents as presenting barriers to their preference and acceptance CL for their children. Among these, most parents who participated in this study indicated that they either felt their child being too young to handle CL, and that their child may not be too careful to handle CL. Even though these factors had a

significant negative impact to influence the choice of CL by parents as a corrective approach for children and teenagers with myopia, this current study notes that these respondent attitudes majorly came from a place of either lack of knowledge or misinformation about the effectiveness of CL as a treatment modality for myopia. These position is consistent with the findings of an earlier study by (Paquette et al., 2015) which had shown that younger children's without previous history of contact lens have the ability to engage in independent CL wear. More so, another study conducted in USA (Walline et al., 2013) among children and teens had previously recommended eye care practitioners not to use child age as a primary determinant in fitting children with CL. Older studies have shown that CL wearing does not require much training, and that if initial requisite guidance is provided, young children would achieve wearing success (Walline *et al.*, 2007). Still with findings in the parents' group (table 4.8), showed that parents felt the unavailability of CL presented barriers to them in accepting opting for CL for their children as compared to the available spectacle alternative. This finding was also consistent with another study which showed that poor availability of CL as a corrective option presented a substantial barrier to uptake among a general population in India (Ravipati Sarathh & Pradesh, 2011).

With regards to results of the ECP group shown in Tables (10 to 11), this study identified a number of ECP-related barriers affecting the uptake of CL among children and teenagers. Among others, the study revealed that reduced CL awareness among users presented more likelihood to hinderance to their uptake of CL option than otherwise by likelihood of eleven times. This was also consistent with a finding in Ghana where it was shown that over a quarter of the study respondents did not prefer to use CL due to inadequate information (Abokyi et al., 2017). Additionally, in another study in India among the general population, it was revealed that nearly one-fifth of patients that attended the selected eye clinics were utterly unaware of what CL is (Ravipati Sarathh & Pradesh, 2011). These findings thus emphasized the need for

more effort on the part of ECPs in educating their patients on the advancements and safety of CL. Another important barrier from the ECP perspectives that hindered CL uptake in children and teenagers was the dearth of adequate knowledge and skills to manage young children with myopia. More than half of the practitioners who participated in this study agreed that they had insufficient knowledge and skill in CL care for children with myopia. This was not surprising as a significant number of the practitioners who participated in this study had either, at most a diploma qualification in Optometry, or no CL-related professional membership, nor further specialist training in CL care as noted earlier in this chapter. However, the finding is in line with a study finding by (Thite et al., 2015), where diploma holders in optometry were less likely to talk about or fit a contact lens to their clients as they felt incompetent to handle CL as compared to their counterparts with graduate and postgraduate qualifications. In this study, further analysis conducted to determine the extent of influence of ECPs barrier factors on the uptake of CL among children and teenagers (Table 11) showed that, lack of competence or training related confidence on the part of practitioners has seventy seven times increased likelihood in comparison to all other practitioner-related hindering factors to present a barrier among participants in the ECP group in promoting uptake of CL among the user group participants. Furthermore, this study found that communication barrier between the ECPs and their clients did pose a substantial barrier to uptake (Table 4.11). The user group respondents who attended clinics with ECPs who scored that they had a communication challenge in convincing clients about CL were seen to be less likely to undergo a fit than otherwise by about forty eight times. Other earlier studies elsewhere in United kingdom and India (Brogan, 2014; Kumari et al., 2017) have also variously shown the importance of patient-practitioner conversations in not only promoting conversion success from spectacle users to active, long-term users of CL, but also in promoting success of fitting children users.

Finally, less confidence among ECPs to fit children with CL did account for a substantial influence for a no uptake than otherwise among user group respondents who attended participating clinics. In a study by (Thite et al., 2015) among ECPs to determine barriers to recommendation of CL wear, mentions that joint efforts should be put in place to enable local eye care practitioners to attain higher levels of professionalism to build capacity in order to increase confidence in practice. Well-utilized continuous professional development programs in the region could increase their knowledge of contact lenses in myopia correction and their safety in children and teenagers, who will benefit from a boost in ECPs' confidence since they are crucial influencers to the uptake of CL as noted by (Yang et al., 2022) study in China.

5.4 Chapter Summary

This chapter discussed the pre-identified factors that hinder and promote uptake of CL in children and teenagers from three study participant group registered in the study. Lack of awareness on the benefits and safety of CL service was shown to be a major hinderance among the user group and their parents while among the ECPs, the lack of knowledge and skill set required in fitting children with significant myopia was identified as a major barrier that relate to other studies elsewhere. The contact lens properties that allow for comfort, clarity, ease of handling were shown to influence uptake among children and teenagers participants. The next chapter will discuss the conclusions, recommendations and limitations encountered in the study

CHAPTER SIX

RECOMMENDATIONS AND CONCLUSIONS

6.0 Introduction

This chapter presents summary of the key research findings in relation to the study objectives, the research questions and the values and contributions thereof. Also this chapter will address the relevant limitations encountered in the study as well as propose opportunities for future studies.

This study aim was to determine the barriers and factors influencing uptake of contact lens in school-going children with myopia attending selected clinics in Kenya.

6.1 Socio-Demographic factors associated with CL uptake in children and teenagers with myopia

The study socio demographic findings showed the study involved more male than female user-group participants with majority using glasses as current means for correcting myopia refractive error. The prevalence and preference for CL use was found to be low, possibly due to barriers factors reported in this study. In this study, eye care practitioners were the major source of CL information to patients (Table 4.1), implying that there knowledge level and preference to a fitting mode had key influence to their patients' CL uptake level.

6.2 Factors promoting uptake of CL in children and teenagers with myopia

The results of this study showed clarity of vision enjoyed while using CL, a reduced self-esteem felt from spectacle wear, as well as bulkiness of spectacles were the important factors found to significantly promote uptake of CL among school-going children and teenagers who participated in this study. However, of the three factors, enhanced clarity of vision, coupled with enhanced social influence and acceptance that comes with CL use were top on the list of factors promoting CL uptake among participants in the user group.

6.3 Barriers to uptake of CL uptake in children and teenagers with myopia

The results of the study indicate that among the children, fear of eye injury from using CL, and felt cost concern to their parents were barriers to the uptake of contact lens among school-going children and teenagers in this study. Even though the results showed a moderate association between individual felt fear of harm and preference/uptake of CL -attributed to awareness and knowledge issues among the user group participants, on the other hand, the association of cost concerns with uptake of CL was weak. In this regard the study thus concludes that important barriers to uptake of CL among the children and teenagers were more due to factors outside their control as a group.

6.4 The influence of parental and eye care practitioners factors on uptake of contact lens among children and teenagers

6.4.1 Parents related factors that promote CL uptake in children

Among the parent participants in the parents' group, the study found that CL affordability (cost issues), previous history or knowledge about CL, improved child's performance in class while using CL, and improved child's performance in sports were the important factors promoting parental preference and approval for CL uptake by the children. Of these, however, the study found that parents who agreed that they found CL to be affordable were highly likely to approve CL uptake in their children. Nonetheless, those with previous negative experience with CL use themselves, were less likely to prefer uptake of same for their children, while on the contrary, parents who either felt improvement in their children's class performance, or reported improved clarity of vision and comfort while using CL had increased likelihood to prefer and approve uptake of the same in their children.

6.4.2 The parent-related factors that hinder uptake of CL in children

Among the parent respondents, the study found that cost issues, fear of harm from CL wear by their child, dearth of professional advice on CL were key factors that presented barriers to their preference or approval of same for their children. Nonetheless, the study showed parents with proper information on benefits of CL to their children were less likely to be concerned about cost and fear of harm, as they were more likely to procure the same, regardless of cost, if they felt their child was old enough to handle/maintain CL.

6.4.3 ECP related factors that promote uptake of CL

For the ECP group, the goal was to elicit factors that would promote their likelihood to either fit or encourage the uptake of CL in children and teenagers. While the existence of trial lenses, and prior conversation around CL were less likely to influence ECPs to fit CL in children and teenagers, the results showed that ECPs were more likely to seek out clients who are motivated and had positive self-image around CL, in consideration of any other factor, when selecting candidates for CL fit.

6.4.4 ECP-related factors that hinder uptake of CL in children and teenagers

. The study found that, while ECPs with limited experience in fitting CLs, reduced confidence on the same, and lacked trial CL kits were less likely to undertake fitting in children and teenagers, they also agreed that parents who were poorly informed about CL and have negative attitude about CL presented a substantial challenge for them to fit CLs in children participants.

6.5 Recommendations

Based on the findings of the study, the following recommendations have been made:

Among other promoting factors, CL affordability and accessibility was important to both users and their parents. Hence, the study recommends to the ECPs, and the ministry of health on the need for cost standardizing, and improved advocacy for regulation and enhance availability of CL products to children and teenagers with myopia.

To address the dearth of useful CL-related information for patients and user which was shown as a major barrier the study recommends eye care institutions engaged in active CL practice should aim to disseminate holistic eye-health information to their clients about the different eye services available to be sought by a patient in the community. ECPs need to initiate CL discussion with clients having significant myopia during a normal consultation session. Additionally, such pre-discussion can be helpful in allaying myths and fears around CL wear. Among the ECPs, limited professional experience and training in CL-related practices posed as a barrier to uptake of CL among users. The study thus recommends to the government and NGOs institutions that support eye health to improved opportunities for ECPs skill upscale as well as advocacy to increase CL-related professional membership for ECPs in Kenya. Finally, as this study is limited in terms of study sample size, further population-controlled study with a much larger sample size is recommended to explore the roles of aesthetic demand, local market influence, funding challenges for CL-related programs, the skills upgrade for ECP, and policy issues around other optical devices for myopia control in children and teenagers with myopia.

6.6 Limitation of the study

Despite being a national focused study, nonetheless, a major limitation to this study was the small sample size used, particularly with ECP group who were only 48 participants, to address this limitation, all ECPs were purposively selected into the study. Another limitation was that few facilities were found to be actively involved in CL practice at the time of the study, which also resulted in the few participants included in this study. The study however included all facilities and their practitioners, who also were very positive about the study and actively consent to participating in the study.

6.7 Conclusion

With a low uptake of CL services among school-going children and teenagers, the need to creating awareness of the availability of CL service options and the proper knowledge on their benefits to users and that significant myopia is a burden to any school-going child or teenager would promote uptake. Beyond improving the availability and access of the service, the parental and ECPs knowledge and preference factors play a significant role in modifying the standard of care of school going children with myopia. Efforts put in place to advance the improvement of CL clarity as well as comfort remain a major necessity in enhancing marked positive desired outcomes in children and teenage users.

6.8 Summary

This chapter discussed the closing remarks, together with the relevant recommendations. Sufficient effort towards addressing this issues would ultimately lead to better access and utilization of CL services in Kenya.

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APPENDICES

Appendix I: Map of Kenya Urban Centres Where the Study was Conducted Courtesy; Google Maps:2019



Appendix II: Teenagers Information and Assent Form

Short Study Title: What hinders and/or motivates school going children with short-sightedness of substantial value $\leq -0.50D$ to use or not to use contact lens

Who is responsible of the study?

The study is being undertaken by Gellause Kololi, a graduate student undertaking a Master's degree in Optometry and Vision sciences (contact lens option). He is being supervised *Dr Teclah Sum and Dr Emmanuel Okenwa-Vincent* who will be available in the course of the study to answer any questions; and deal with any problem in case if any arises during the course of the study.

Invitation:

This date _____ this invitation for participation into this research has been given to you because the doctor has found you to have myopia of significant amount and has visited a medical facility to seek care. The following sections in this document explains the study and after reading you can thus decide if you want to participate in this study or not. It is your right to either choose to participate or choose not to participate in this study, no one will get mad at you if you do not want to be part of the study and no one will make you to participate in this study against your desire

Is it a must for me to participate in this study?

It is not a must for you to take part in this study if at all it is against your desire to take part. If you choose to take part, you can stop being in this study anytime and no one will be mad at you. The doctors and staff of this facility will give you just as they have always done in any other day in the past. This will be irrespective of your choice of choosing to participate in this study or choosing not to take part in it.

In the case that you do want to take part in this study, the research assistant will ask you to sign this form while your parent will have to sign a separate permission document to allow you to participate before the researchers enroll you in this study; but even so with your parents' approval, you can still choose not to participate. The researcher will only enroll you if you do agree to take part in this study.

You should take time to read carefully the information provided and talk it over with your family and doctor (if you wish) before you make this decision. Comprehend that If any information provided below is not clear, feel free at any time to talk to assistant researchers, your doctor as well as the CHIEF researcher through address provided. You can decide to take part in this study or may choose not to, further more you are allowed to take more time to make a decision if you want. Even if you do accept to participate in this study, you are allowed to quit if you later on change your mind. At any given time of the study participation, if you have any question during, you can inquire either from the study doctor or the assistant researcher.

Why are we undertaking this study?

We are from Masinde Muliro University and are inviting you to join our research study, Often researches are done so that to learn why people near us act or behave the way they do, furthermore, research can be done just to learn more of how the world works. In this study, our goal is to study and know what encourages or hinders children and teens with myopia of substantial power $\leq -0.50D$ to use or not to use contact lens to correct their short-sightedness also known as myopia which you have and also affects about one out of every six other people globally. Myopia in children and teenagers has disturbing/undesirable effects on their day to day way of life which is as a result of reduced vision that can lead to poor results at school and discomfort due to straining among other things. Contact lens and glasses can be used to correct myopia however many people often use spectacles and only few people use contact lens. This research seeks to know what makes or prevents children and teenagers having substantial myopia power of less or equal to $-0.50 D$ to use or not to use contact lens to correct myopia.

In order for the researchers in this study to be able to better understand what encourages or hinders children and teenagers of age 8 years to 18 years to use or avoid contact lens. Participants will have to answer some questions in the forms provided. Neither the researchers nor the doctors will force or make you in anyway during the study period change from what you are using whether from spectacles to contact lens or from contact lens to spectacles.

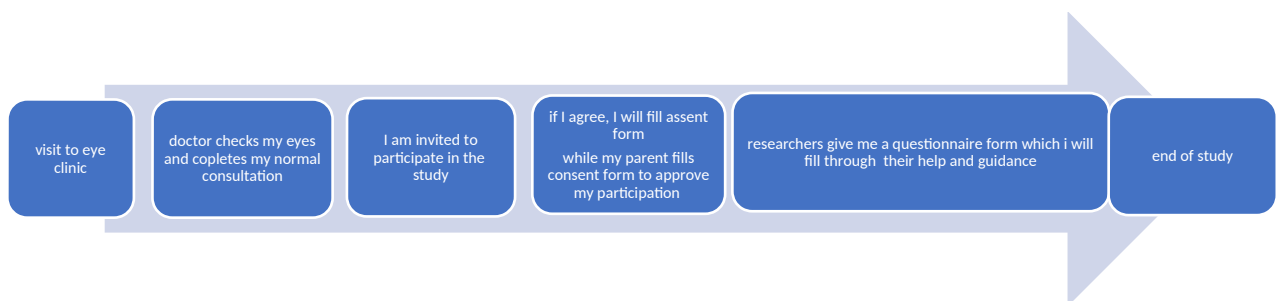
Why am I receiving a request to take part in this study?

You are being invited in this study to give your views because you have short-sightedness of magnitude equal or less than ≤ -0.50 D. Given your experiences in using contact lens or using glasses or not using any of these despite your condition, your views, perceptions and opinions are invaluable as part of this research. You will only take an hour to participate in this study and will use approximately twenty minutes to answer the questions in the forms (questionnaire) that will be given.

What will happen to me in this study?

If you choose to be in this study, after your normal consultation with the doctor at the facility, you will be given an invitation to participate in this study which you have to read carefully and understand. If you agree to participate in this study, your parent will be required to sign a consent form to approve your participation.

In order for the researcher to well get to know the relationship between myopia in children and contact lens your medical history will be taken from the hospital record. You will then be given forms (questionnaires) and will answer the questions in the forms provided why you use or don't use CL. No other medical procedure will be done on you after filling the forms. This study does not need any hospital revisit.



Can anything bad happen?

Nothing bad will happen to you by participating in this study, to our best of our knowledge, the things that you will do in this research have no more risks than you would undergo/experience in everyday life. Besides this there are no direct benefits to you for being a participant in this study. This study however, will hopefully help us learn more about the factors that hinder or influence contact lens to be used by children and teens to improve their lifestyle. After the study you will resume your normal life without any harm.

Are there any other treatments for me?

Participating in this study is up to you. you do not have to be in this study so as to receive any short-sightedness treatment, if you want to learn more about other options for correcting short-sightedness including glasses, contact lens or surgeries you may speak with your eye doctor, parents or the study team if you do prefer.

Who will know that you in this study?

In this study your privacy will be respected. The study team will not tell anybody else that you are or have been a part of this study. The study team nor the doctor will not release any of your information to anybody else that could be used to identify you, unless they are required to do so by law. In order to be able to protect your privacy, the researchers will remove any information that may be used to identify you from any study documents, and in the place of your name appearing on them, you will be identified in only by a specific study code that applies only to you. Only this code number given will be used only on any research-related information collected about you for this particular study, in order that your identity as part of the study will be kept completely private. Only the principal researcher Gellause M. Kololi, the research supervisors will have the ability to link this code number given with your personal information, and the information to be used in linking will be kept in a locked cabinet in Room _____ of the university of Masinde Muliro under the sole supervision and control of the research supervisor and storage will be in compliance with university research ethics compliance for the next five years. In case the information in this research is required for further research the names of any participating charities or individuals will not be identified anywhere.

What will the study cost me?

All the research-related medical diagnosis (consultation) that you will undergo during your participation in this study will be provided to you at no cost. This is in exclusion of all treatment costs as well as costs for diagnosing other eye conditions for example the fee for undergoing ocular imaging at the facility. You will not incur any personal expenses as a result of your participation in this study and any cost incurred by you as a result of your participation such as travel cost, consultation fee at the facility, parking will be reimbursed. Other costs above what is stipulated above including costs for buying vision correction glasses or contact lens at the facility will be at your own cost and will not be reimbursed. The reimbursement will be given to you whether you complete or choose to withdraw before study end. In other words,

reimbursement shall be given to you whether you complete or do not complete this study. Remunerations will be done after one withdraws or finishes the study.

Who do I contact if I have questions about the study during my participation?

If you have any questions or desire further clarification information about this study before during the process of your participation. You can contact your doctor or the researcher Gellaus Kololi through +254706032072 or through email: kgellaus@gmail.com.

Who do I contact if I have any questions or concerns about my rights as a participant?

If you do have any concerns or complaints about your individual rights as a research participant and/or your individual experiences while participating in this study, you are allowed to contact the Research Participant Complaint Line in the Masinde Muliro University's Directorate of Research Extension and Linkages (REL) by e-mail at rel@mmust.ac.ke

What will happen to the results of the research study?

The results from this study will be used for the purpose of the Master's degree dissertation in Optometry and vision science. However, they might additionally be disseminated at different conferences or published in peer-reviewed publications. Furthermore, a report with the results will be sent to the participating contact lens clinics. If you are interested in receiving a copy of the final report, please contact the researcher on kgellaus@mmust.ac.ke or kgellaus@gmail.com also you can make a call on 0706032072 and it will be sent to you.

Future studies

If there is a chance that in the course of this study if the researchers will find other questions that will need answers that may require future studies to be conducted. If you are willing to hear about such future studies you will mark in the "yes" box. Note that by accepting to be informed about future studies, doesn't mean that you will have to take part in a new study. If you do not want to be contacted about any future study you will mark in the "no" box below.

Are you willing to be contacted by the researchers for future studies?

YES ☐

NO ☐

Assent to Participate

Study: Factors influencing contact lenses uptake amongst school going persons with myopia attending contact lens clinics in Kenya Participant Assent

Before I sign on this assent form, I do understand that my signature on this assent form will mean that: I have read and understood well this adolescent information and assent form, I have had enough time to go through and consider the information provided and also to ask for advice from my doctor, my parents or relatives if necessary.

It also means that I have had the opportunity to ask questions to study team and have had acceptable answers to all my questions and that that I can always continue to ask any questions, regarding my participation in the study.

I do understand that all of the information collected in this study will be kept confidential and that the results will only be used for scientific objectives.

I do understand that my participation in this study is fully voluntary and that I am completely free to refuse to either participate or to withdraw from this study at any time without changing the quality of care that I receive at this facility.

Finally, I do understand that if I put my name at the end of this assent form, it means that I agree to be a participant in this study and I will receive a signed copy of the same for my own records.

I agree to participate in this study.

Participant's name/Signature

name

Date

Contact for further information or for clarification about this research:

Researcher:

Gellause Mrefu Kololi MSc Optometry and Vision science (Contact lens option), Masinde Muliro University, Department of Optometry and vision sciences, email: kgellaus@mmust.ac.ke or kgellaus@gmail.com call +254706032072.

Principal research supervisor:

Dr. TSum Psusma, Masinde Muliro University, Faculty of Health Sciences, Department of Paramedical Sciences/Emergency Medicine,

Email: tsum@mmust.ac.ke

Contact for complaints and questions about the conduct of this research:

Research Participant Complaint Line, Masinde Muliro University's Directorate of Research Extension and Linkages (REL) e-mail rel@mmust.ac.ke

Parental Permission Form for Child's Research Participation

Study Title: Barriers and Factors Influencing the Uptake of Contact Lens Among School Going Children and Youth with Significant Myopia.

Principal Investigator: Gellause Mrefu Kololi

Your child is being asked to take part in a research study. This form has important information about the reason for doing this study, what we will ask your child to do, and the way we would like to use information about your child if you choose to allow your child to be in the study.

Why are you doing this study?

Your child is being asked to participate in a research study about the barriers and factors influencing the uptake of contact lens among school going children and teenagers with significant myopia

In this study, in other words we want to learn more about what encourages or hinders children and teens with myopia of substantial power $\leq -0.50D$ to use or not to use contact lens to correct their short-sightedness also known as myopia which your child has and also affects about one out of every six other people globally.

What will my child be asked to do if my child is in this study?

If your child chooses to be a participant in this study and you permit him or her to, after his/her normal consultation with the doctor at the facility who would have diagnosed him/her with myopia.

In order for the researcher to well get to know the relationship between the factors that hinder and/or influence uptake contact among children and teenagers with myopia part of his/her medical history records will be examined to check the doctor's diagnosis only.

He/she will answer questionnaires which take around 30 minutes to fill. No other medical procedure will be done after filling the forms. This study does not need any hospital revisit.

What are the possible risks or discomforts to my child?

To the best of our knowledge, during this study the things your child would be doing have no more risk of harm than the risks of everyday life. However, your child may get tired during the filling of questionnaire and can take break at a time and can any time tell the interviewer if she/he does wants to take a break at any time or to stop the interview. Besides this they are free to skip any questions that they will find uncomfortable.

What are the possible benefits for my child or others?

Your child is not likely to have any direct benefit from choosing to participate in this research study. However, this study is designed to learn more about the barriers and factors influencing the uptake of contact lens among school going children and teenagers with significant myopia. This study results may be used to help other people in the future.

How will you protect the information you collect about my child, and how will that information be shared?

In this study your child privacy will be respected. The study team will not tell anybody else that he/she are or have been a part of this study. The study team nor the doctor will not release any of his/her information to anybody else that could be used for identification, unless if we are required to do so by law.

In order to be able to protect your privacy, the researchers will remove any information that may be used to identify the child from any study documents, and in the place of your sons'/daughters' name appearing on them, they will be identified by a specific study code that applies only to them individually. This code number given will be used only on the research-related information collected about the child/teenager for this particular study, this will help their identity as participants of the study to be kept completely private. Only the researcher Gellause M. Kololi and the research supervisors will have the ability to link this code number given with your child personal information, and the information to be used in linking will be kept in a locked cabinet in Room _____ of the university of Masinde Muliro under the sole supervision and control of Dr. Tsuma Psuma who is the research supervisor and storage will be in compliance with university research ethics compliance for the next five years. In case the information in this research is required for further research the names of any participating charities or individuals will not be identified anywhere.

Financial Information

Participation in this study will involve no cost to you or your child. Your child will not be paid for participating in this study.

What will the study cost me and my child?

All the research-related medical diagnosis (consultation) that your child will undergo during his/her participation in this study will be provided to them at no cost. This is in exclusion of all treatment costs as well as costs for diagnosing other eye conditions for example the fee for undergoing ocular imaging at the facility.

You will not incur any personal expenses as a result of your participation in this study and any cost incurred by you as a result of your participation such as travel cost, consultation fee charged at the facility, and parking will be reimbursed. Other costs above what is stipulated above including costs for buying vision correction glasses or contact lens at the facility will be at your own cost and will not be reimbursed.

The reimbursement will be given to you whether you complete or choose to withdraw before study end. In other words, reimbursement shall be given to you whether you complete or do not complete this study.

Remunerations will be done after one withdraws or finishes the study.

What are my child's rights as a research participant?

Participation in this study is voluntary. Your child may withdraw from this study at any time. Besides this, there will be no penalization to you and your child in any way or losing of any sort of benefits for deciding to stop participation in this study. If you and your child choose not to be in this study, understand that your decision will not in whatsoever way affect the relationship that you and your child have with the medical facility or the staff in any way.

If your child chooses to withdraw from the study before its completion the researchers will if the information already collected from your child can be used.

Who can I contact if I have questions or concerns about this research study?

if you have any questions or desire further clarification information about this study before during the process of your participation, you can contact your doctor or the principal researcher Gellause Kololi through +254706032072 or through email: kgellaus@gmail.com. Or the principal supervisor for this research

If you do have any concerns or complaints about your individual rights as a research participant and/or your child's while participating in this study, you are allowed to contact the Research Participant Complaint Line in the University of Masinde Muliro Office of Directorate of Research Extension and Linkages (REL) by e-mail at rel@mmust.ac.ke

What will happen to the results of the research study?

The results from this study will be used for the purpose of the Master's degree dissertation in Optometry and vision science. However, they might additionally be disseminated at different conferences or published in peer-reviewed publications. Furthermore, a report with the results will be sent to the participating contact lens clinics. If you are interested in receiving a copy of the final report, please contact the researcher on kgellaus@mmust.ac.ke or kgellaus@gmail.com also you can make a call on 0706032072 and it will be sent to you.

Parental Permission for Child's Participation in Research

This form must be completed and returned to the research team for the named young person to be included in this study. a stamped addressed envelope has been provided.

I have read this form and the research study has been explained to me. I have been given the opportunity to ask questions and my questions have been answered. If I have additional questions, I have been told whom to contact. I give permission for my child to participate in the

research study described above and will receive a copy of this Parental Permission form after I sign it.

Further information about the study is contained in the enclosed letters and information leaflets for young people and parents/guardians

I have read and understood the accompanying letter and information leaflet and give permission for the child (named above) to be included.

Name _____

Relationship to child _____

Signature _____

Contact for further information or for clarification about this research:

Researcher: Gellause Mrefu Kololi

MSc Optometry and Vision science (Contact lens option), Masinde Muliro University, Department of Optometry and vision sciences, email: kgellaus@mmust.ac.ke or kgellaus@gmail.com call +254706032072.

Principal research supervisor:

Dr. TSum Psusma, Masinde Muliro University, Faculty of Health Sciences, Department of Paramedical Sciences/Emergency Medicine,

Email: tsum@mmust.ac.ke

Contact for complaints and questions about the conduct of this research:

Research Participant Complaint Line, University of Masinde Muliro Office of Directorate of Research Extension and Linkages (REL) e-mail rel@mmust.ac.ke

Appendix III: Questionnaire for children and teenagers

Part One: General Questions about contact lens using

1. What is your age _____
2. I am a _____
 - a. Boy 1
 - b. Girl 2
3. Hospital visited _____
4. What do you primarily use to correct eye sight (choose the appropriate answer)?
 - b. Glasses
 - c. Contact lens
 - d. None
5. Do you know about contact lens?
 - a. Yes
 - b. No

(If your answer is no skip question 6 – 8 go to question 9)

6. How did you come to know about contact lens?
 - a. My eye doctor told me about it
 - b. My friends told me about it
 - c. My parent told me about it
 - d. I saw it on media (internet, TV or newspaper)
8. Do you use contact lens to correct your eye sight currently?
 - a. Yes
 - b. No
 - c. I once used contact lens but stopped
9. Does your parent use/wear contact lens?
 - a. Yes
 - b. No
10. Which statement is true about why you stopped using contact lens?
 - a. Cost of contact lens and its solution is expensive
 - b. My eyes hurt when I use contact lens
 - c. contact lens professional doctors are not easily available
 - d. Clinics where to buy contact lens are not easily available.

Part Two: Barriers questions

Below are several statements that describe why some children don't wear contact lenses. Read each of the statements below. Tick whether you strongly disagree, disagree, neither agree nor disagree, agree, or strongly agree.

Section A: Please tick as appropriate to you

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I have not ever known about contact lenses					
I fear if I use contact lenses, they will harm my eyes					
Contact lens price is expensive					
Contact lens is not easily available					
My parent wouldn't approve of me to use contact lens					
Contact lens professional doctors are not easily available anywhere close to where I live					
When I wear my contact lenses my eyes hurt. My eyes itch, burn, or feel dry and general uncomfortable.					
My contact lenses fall out of my eyes.					

Section B: Besides the above in section A, give other reason that you know that may prevent you from using contact lens to correct your eyesight.

Part Three: Promoting factors' questions

Below are several statements that describe what could make some children and teenagers **opt or prefer to use contact lens instead of glasses**. Read each of the statements below. Tick whether you strongly disagree, disagree, neither agree nor disagree, agree, or strongly agree.

Section A: Please tick as appropriate to you

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
My glasses are bulky.					
I don't like how I look with glasses.					
I am bothered by my glasses when I play sports or do other physical activities.					
It is easy to clean and take care of my contact lenses					
When I wear my contact lenses, I usually see better					
When I wear my contact lenses I like how I look.					
When I wear my contact lenses my friends want to wear contact lenses too.					
When I wear my contact lenses my eyes feel good.					

Section B: Besides the above in section A, give other reason that you know that may make you or have made you happier to prefer contact lens instead of glasses to correct your eyesight.

Appendix IV: Parent Survey Questionnaire

Study title: Factors influencing contact lenses uptake amongst school going persons with myopia attending contact lens clinics in Kenya

Dear parent,

You and your child have been invited to participate in this study because we do understand your views are important. We are conducting a survey to understand the potential barriers, motivating factors that may hinder or influence the usage of contact lenses (CL) in children and teenagers with substantial myopia. We would appreciate if you could complete the attached brief survey. The completion of the survey is expected to take you about 10 minutes. The questions are quite general. There are no known risks to participation in this study besides this, the participation in this project is voluntary and anonymous. Further, all information you provide will be kept confidential. If you wish to participate in this survey, kindly sign the consent.

Consent of Participant

By signing this study consent form, you are not in any way waiving your legal rights or releasing the investigator of this study (Gellause Kololi) or the involved institution (Masinde Muliro university) from their legal and professional responsibilities. I have read carefully the information presented in the information letter about a study on the barriers and factors influencing CL uptake in children and teenagers with myopia, which is being conducted by Gellause Kololi. I have had the opportunity to ask any questions to the researcher which are related to this study, and any additional details I wanted to be aware of. I am much aware that I may withdraw from this study without consequence at any time by advising the researchers of this decision. With a full knowledge of all foregoing, I do agree, of my own free will, to participate in this study.

I agree to participate in this study.

Participant's Signature

name

Date

Part One: General Questions

1. Child's age: __ __
2. Child's gender: Boy 1 Girl 2
3. Mode of vision correction;
 - a. Contact lens
 - b. Glasses
 - c. Refractive surgeries
 - d. None
4. Have you ever used contact lens?
 - a. Yes
 - b. No
5. Would you prefer your child to wear contact lens?
 - a. Yes
 - b. No
 - c. Not certain

Part Two: Barrier factors' questions (parental perspective)

Please tick each box that appropriately describe reasons that would make you not to **LIKELY** prefer to glasses to contact lenses for your child.

Section A: If your answer was no, why wouldn't you prefer contact lens over glasses for your child?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
My child is too young to handle contact lens					
My child is not careful enough to handle contact lens					
Contact lens can cause some harm if worn by my child					
Contact lens is expensive					
Contact lens is not easily available					

Lack of contact lens professional/expert advice					
I once tried it myself and my personal experience of contact lens was not good					

Section B: Besides the above in section A, give other reason that you know that may make you not to prefer contact lens instead of glasses to correct your child's eyesight.

Part Three: Promoting factors' questions (parental perspective)

Please tick appropriately your extent of agreement to the statements in the table below as related to potential reasons why you would prefer CL for your child to use CL.

Section A: If your answer was yes, why would you prefer contact lens over glasses for your child?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Contact lens gives a clearer vision for my child					
My child has better comfort/feels better when using contact lens					
My child has improved self-esteem when using contact lenses than glasses					
My child feels discomfort while using glasses					
Contact lens is affordable					
My child can put in and remove					

contact with ease					
My child has better performance in class when using contact lens than in glasses					
My child has better performance in sports when in contact lens than in glasses					
My child generally feels good about his/her vision correction					
I have used contact lens myself and I feel it's a better option for my child					

Section B: Besides the above in section A, give other reason that you know that may make you or have made you happier to prefer contact lens instead of glasses to correct your child's eyesight.

Appendix V: Practitioners Questionnaire

Study title: Factors influencing contact lenses uptake amongst school going persons with myopia attending contact lens clinics in Kenya

Dear Eye Care Practitioner,

You have been invited to participate in this study because we do understand your views are important. We are conducting a survey to understand the potential barriers, motivating factors and enablers to prescribe contact lenses (CL) to pediatrics with significant myopia. We would appreciate if you could complete the attached brief survey. The completion of the survey is expected to take you about 10 minutes. The questions are quite general. There are no known risks to participation in this study besides the participation in this project is voluntary and anonymous. Further, all information you provide will be kept confidential. If you wish to participate in this survey, kindly sign the consent.

Consent of Participant

By signing this study consent form, you are not in any way waiving your legal rights or releasing the investigator of this study or the involved institution from their legal and professional responsibilities. I have read carefully the information presented in the information letter about a study on the barriers and factors influencing CL uptake in children and teenagers with myopia, which is being conducted by Gellause Kololi. I have had the opportunity to ask any questions to the researcher which are related to this study, and any additional details I wanted to be aware of. I am much aware that I may withdraw from this study without consequence at any time by advising the researchers of this decision. With a full knowledge of all foregoing, I do agree, of my own free will, to participate in this study.

I agree to participate in this study.

Participant's Signature

name

Date _____

Part One: General information:

1. Name (optional): _____
2. Gender: Male ☐ Female ☐

3. What is your primary place of practice?
 - a. Practice owner
 - b. Franchisee (one or multiple practices affiliated with a regional/national optical company)
 - c. Standalone practice - Employed by an optometric practice (not affiliated with a regional/national optical company)
 - d. Hospital based clinic/other multidisciplinary
 - e. Educational institution
4. Educational Qualification _____
5. How many years have you been practicing contact lenses? _____
6. Location of practice _____ (county) _____ (town)
7. IACLE member / FICLLE / NA (circle appropriate response)
8. Date of completing this survey: _____
9. Which statement best describes your level practice?
 - a. We fit contact lens to people over age of 18 years only
 - b. We fit contact lens to people from age between 8 and above
 - c. We fit contact lens to people under age of 18
10. Indicate in the table below at what age /age-group do you feel it is best appropriate to introduce a child to;
 - a. Soft contact lenses?
 - b. Rigid gas permeable contact lenses?

Recommended age for introduction in CL						
CONTACT LENS MODALITY	Under age of 8 years	8 to 9 years	10-12 years	13-14 years	15-17 years	Not appropriate to age $\leq$ 18 years
soft contact lenses						
gas permeable contact lenses						

11. In your daily practice what is your routine approach to vision correction of myopia in children below 18 years (tick where necessary)

Children age groups					
Recommended approach to vision correction	Under age of 8 years	8 to 9 years	10-12 years	13-14 years	15-17 years
Recommend spectacles correction only					
Recommend spectacles but may also prescribe contact lenses as secondary correction in our practice					
Recommend contact lenses as the primary form of vision correction with spectacles as a secondary correction					

12. Which contact lens option do you prescribe in relation to children and myopia?

	Under age of 8 years	8 to 9 years	10-12 years	13-14 years	15-17 years	Not appropriate to age ≤ 18 years
Daily disposable						
Two weeks replacement						
Monthly replacement						
Planned replacement (quarterly/6 monthly)						
Gas permeable						
Corneal reshaping (CRT)/ORTHO						
Conventional						

13. On average how many children and teenagers with myopia (age 7 to 19 years) do you fit with contact lenses in a month?

- One or Less please complete survey A
- 2 or more please complete survey B.

SURVEY “A”: For ECPs who fit One or Less child in a month

Section One: Please read the following **potential barriers** in prescribing and fitting CL in children and teenagers and mark your level of agreement

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Trial lenses are not readily available.					
I feel there is lack of knowledge in fitting CL specifically for controlling myopia in children and teenagers					
Parental inhibition					
Less CL awareness among users					
A communication barrier when it comes to convincing new CL users					
Not confident enough in fitting CL					

Section Two: What other reasons as related to prescribing and fitting CL in children and teenagers presents potential barriers or challenges to you?

Section Three: Please tick appropriately your extent of agreement to the statements in the table below as related to potential barriers to CL use from a contact lens wearer’s perspective

	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Lens wearers are not motivated for wearing CL					
There is less awareness about CL among consumers/patients					
Patients feel contact lenses are					

expensive					
Most often parents do not want their children to wear CL					
Good communication makes it easy for motivating and convincing patient to use CL					
Ability to choose right patients for fit usually gives desired outcomes					
Trial lens availability helps in increasing my confidence in fitting these lenses					
Marketing has spread good awareness among consumers about CL					

Section Four: What other reasons are related to barriers to uptake of CL in children and teenagers from a wearer perspective?

Thank you very much for your valuable inputs and time.

SURVEY “B”: *For ECPs who fit Two or more children in a month*

Section One: Please read the following ***potential influencing factors*** in prescribing and fitting CL in children and teenagers and mark your level of agreement

	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Trial lens availability helps in increasing my confidence in fitting CL					
Child motivation to wear CL					
fitting improves children self-esteem					

Market opportunity in fitting children with myopia					
Beginning conversations with patient about CL leads to more conversions.					
Ability to choose right patients for CL fit usually gives a desired outcome					

Section Two: What other reasons as related to prescribing and fitting CL in children and teenagers presents potential influence and motivation to you in desiring to fit CL on children and teenagers?

Thank you very much for your valuable inputs and time.

Address as appropriate