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AGA KHAN UNIVERSITY

School of Nursing and Midwifery

***THE KNOWLEDGE AND ATTITUDE REGARDING PUBERTAL CHANGES AMONG
ADOLESCENT MALES IN URBAN KARACHI, PAKISTAN***

By

SABAH MUHAMMAD NAZIM

A thesis submitted in partial fulfilment
of the requirements for the degree of
Master of Science in Nursing

Karachi / Pakistan

15th November, 2023

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Aga Khan University

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Dedication

I would like to dedicate this dissertation to my parents **Mr. Muhammad Nazim** and **Mrs. Jahanzaib**, who has been my rock and biggest supporter. Their unconditional love, support, and encouragement have been my guiding light throughout my academic journey and life. This work is a way of saying thank you for all they have done for me. It's a small token of my appreciation for their unwavering belief in me. I would also dedicate this thesis to my brothers **Mohsin Nazim** and especially **Mubasher Nazim** for his understanding and support throughout. Thank you for standing beside me whenever I needed it.

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Abstract

Background

Adolescence (the period between childhood and adulthood) is characterised by significant changes in bodily functions, along with psychological and cognitive growth. The unanticipated changes in that phase (especially related to sexuality) can cause adolescents embarrassment and distress, thus impacting their well-being and development.

Purpose

The study aimed to evaluate the level of knowledge and attitudes among male adolescents residing in urban Karachi, Pakistan, specifically concerning pubertal changes and health. The primary focus was to gather information about how well these adolescents understand the physical and emotional transformations associated with puberty and their overall awareness and attitude towards pubertal health aspects.

Method

This study follows a quantitative descriptive cross-sectional design. A total of 277 male adolescents were recruited through a stratified random sampling method four study sites, two private secondary schools and two government schools in urban Karachi, Pakistan. Data was collected by using a comprehensive researcher-constructed questionnaire that assessed their knowledge and attitude towards puberty and the source of pubertal information.

Findings

The findings revealed that only 45.4% of students from private and 36% from public schools were acquainted with the knowledge of pubertal changes. Furthermore, a mixed level of awareness

was observed among male adolescents in Karachi about puberty. While there was a basic awareness of the term "puberty," especially among students attending public schools, the depth of knowledge and understanding of the associated changes during puberty was varied.

Conclusion

The research showed that while there is a fundamental awareness of the concept of puberty, there is also a limited understanding of its complexities. Varied levels of comprehension among students from different educational settings emphasise the influence of environmental factors on adolescent awareness and emphasises the need for special educational initiatives to bridge the knowledge gap and prepare adolescents to navigate the complexities of puberty.

List of Abbreviation / Acronyms

CINAHL	Cumulative Index to Nursing and allied health literature
CVI	Content Validation Index
DoE	The Department of Education
ERC	Ethics Review Committee
I-CVI	Item-level Content Validity Index
LMICs	Low- and Middle-Income Countries
PAVHNA	The Pakistan Voluntary Health and Nutrition Association
SPSS	Statistical Package for the Social Sciences
SRH	Sexual and Reproductive Health
SRHR	Sexual and Reproductive Health and Rights
STIs	Sexually Transmitted Infections
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization

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Thank you all

Declaration

I declare that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university and to the best of my knowledge it does not contain any material previously published or written by another person, except where due reference has been made in the text.

The editorial assistance provided to me has in no way added to the substance of my thesis which is the product of my research endeavours.



Sabah Muhammad Nazim

15th November, 2023

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Chapter One: Introduction

This chapter focuses on evaluating the knowledge and attitude regarding pubertal changes among adolescent males in urban Karachi, Pakistan. Chapter one aims to provide an understanding of the background, the significance, the data gap, the problem statement, the research aims, and the research questions related to the topic. The chapter also emphasizes the importance of addressing the knowledge and misconceptions surrounding pubertal health among adolescent males. By exploring the significance, identifying the research gaps, and formulating clear research questions, this study seeks to contribute to the field by reflecting on the level of awareness and attitude among adolescent males towards pubertal changes.

The Background

According to the World Health Organization (2017), adolescence refers to the period between childhood and adulthood, typically ranging from 10 to 19 years, while youth refers to the period between 15 to 24 years of age. Moreover, this period is characterized by significant changes in bodily functions, along with psychological and cognitive growth, which lays the foundation for future health.

Furthermore, adolescence allows physical changes to occur, including developing the ability for sexual reproduction (Yao, Ziapour, Abbas, Toraji, & NeJhaddadgar, 2022). The onset of puberty for boys typically occurs between the ages of 11 to 12, and they reach maturity by the ages of 16 to 17. In contrast, girls' pubertal period can begin between the ages of 10-11 and continue until 15-17 years of age (Valizadeh, 2016). The teenage transition into adulthood in adolescents primarily focuses on reproductive health and the realization of their accompanying human rights. These rights

are crucial for individuality, well-being, and a sense of accomplishment, which can significantly impact their lives in the long term (Kamran et al., 2019).

Moreover, the onset of puberty marks a critical period during adolescence when individuals undergo significant physical, social, and psychological changes. If these changes are unanticipated, especially those related to sexuality, they can cause embarrassment and distress for adolescents, which can have a profound impact on their well-being and development (Ahmadi, Anoosheh, Vaismoradi, & Safdari, 2009).

According to various studies, hormonal fluctuations associated with puberty can lead to cognitive, behavioural, and emotional changes in young people. For instance, Testosterone, a male hormone, is associated with specific behaviours in adolescent boys, such as risk-taking and motivation to achieve higher social status (Shivji, Lymn, Meade, & Watts, 2021). These changes can have a significant impact on an adolescent's overall development, and understanding the relationship between hormonal changes, and behaviour is essential for promoting their well-being during this critical period of their lives. Furthermore, Lotfabadi (2002) highlights that understanding the regularities of physiological, cognitive, spiritual, intellectual, and behavioural changes during puberty is essential for any approach to be efficient and beneficial during this critical phase. Thus, without such knowledge, interventions, and programs promoting adolescent well-being may not be effective.

Adolescents are generally considered healthy individuals, based on standard medical measurements of current health status (Lawrence et al., 2009). However, issues related to the maturation phase and how to navigate them are critical, as they can directly impact how individuals behave in social and sexual situations as adults. Additionally, many illnesses that affect adults have their origins in adolescence, and several adolescent deaths can be attributed to suicide, assault,

pregnancy-related complications, accidents, or different disorders that are treatable or preventable. Despite the importance of the issue, the needs and health of adolescents have received less attention than those of children and adults in recent years, as revealed by the analysis of their health records and requirements (Valizadeh, 2016).

Furthermore, various studies indicate an inadequate understanding and awareness of sexual and reproductive health (SRH) among adolescents in Pakistan. For instance, the United Nations International Children's Emergency Fund (UNICEF) conducted research in 2016, which revealed that young people in Pakistan have limited access to accurate and comprehensive education about sexual and reproductive health, including information about puberty and its changes. The study also found that there are several myths and misconceptions about sexual and reproductive health that prevail among adolescents in Pakistan, such as the belief that masturbation can cause blindness, impotence, or mental illness (UNICEF, 2016).

Similarly, another study conducted in 2019 by the Population Council found that young people in Pakistan lack access to reliable and accurate information about Sexual and Reproductive Health (SRH), and this lack of knowledge puts them at risk of sexually transmitted infections (STIs) and unintended pregnancies (Kamran et al., 2019). One of the major sources of this lack of knowledge includes adolescents not receiving adequate and appropriate SRH information from the media, parents, or the education system. Moreover, since adolescents are less reliant on their parents for reproductive-related knowledge, they acquire the information from their peers or rely on unverified online sources. These sources of information are more likely to be untrustworthy, ambiguous, and exploitative (Huda et al., 2017).

Moreover, students have been involved in the planning of reproductive health education curricula to a limited extent. Decisions or issues regarding the content of reproductive

health education programs typically involve academic professionals and parents or the broader community, while neglecting the input and perspectives of the adolescents themselves. Adolescent problems such as misconceptions and concerns regarding pubertal changes, high-risk pregnancies, STIs, and insufficient sexual knowledge are often disregarded for fear that the information about SRH may boost premarital sexual behaviours among adolescents. As a result of a lack of relevant information sources, adolescents cannot protect their reproductive health (Bashir et al., 2017).

On the other hand, puberty education in schools allows adolescents to comprehend themselves better and deal with the transitions that they are going through, thus, enabling them to improve the self-confidence they require to cope with regular challenges with teachers and colleagues at school, as well as make decisions independently and respond appropriately to pressures from their family, friends, and the community (Yao, Ziapour, Abbas, Toraji, & NeJhaddadgar, 2022).

Several studies investigating the knowledge level of adolescents regarding pubertal changes have revealed that a significant proportion of them lack a basic understanding of the physiological changes occurring during this phase. Adolescent girls, for example, may not fully comprehend the relationship between menstruation and reproduction, while boys often consider nocturnal emissions as a medical condition and may be hesitant to discuss their concerns due to the perceived embarrassment or shame associated with it. This reluctance to express concerns is particularly evident among male adolescents, who may find it challenging to discuss puberty-related issues with their peers or adults, unlike their female counterparts, who are more comfortable talking to their female relatives or friends (Valizadeh et al., 2016).

Moreover, boys are found to have a lower level of knowledge about puberty compared to girls, as they receive less access to sexual and pubertal education in school (Huda et al., 2017).

Moreover, social conventions associated with masculinity and conservative cultural influences discourage boys from discussing sensitive themes related to puberty or seeking knowledge on taboo matters. These gender and sociocultural norms are particularly prevalent in Pakistani society and may be the potential factor behind the lower participation of young men and adolescents in SRH services. Additionally, cultural norms that associate reproductive health care with females further deprive male adolescents of acquiring basic information about puberty, which is considered a sensitive topic (Shivji, Lymn, Meade, & Watts, 2021).

Conclusively, upon reviewing the literature, it becomes apparent that while there are numerous studies concerning female adolescents from diverse cultural backgrounds; however, there is a dearth of research focused on male adolescents' experiences and knowledge during the pubertal phase, both at the national and international levels (Ahmadi, Anoosheh, Vaismoradi, & Safdari, 2009).

The Study's Significance

Puberty, which is marked by rapid physical and sexual development, is a universal experience for all humans. Nonetheless, inadequate knowledge and education regarding this critical stage of life can leave one unprepared for the transformations that come with it. Thus, knowing what to expect during puberty can assist teenagers in anticipating and preparing for the changes beforehand. Additionally, they need to recognize that these changes are a normal part of life that everyone goes through (Ahmadi, Anoosheh, Vaismoradi, & Safdari, 2009).

Moreover, during adolescence, individuals may become more conscious of their physical appearance and experience body dissatisfaction, which can lead to psychological issues. Furthermore, the changes during puberty can contribute to this difficulty, and anxiety during this

time can negatively impact interpersonal relationships. Thus, knowing pubertal health and understanding the reasons behind the changes that occur during this phase can help reduce the likelihood of such issues, ultimately alleviating anxiety and promoting better mental health outcomes for young people (Barkhordari-Sharifabad & Vaziri-Yazdi, 2020).

More importantly, several studies have suggested that improving and adjusting the educational and social settings for teenagers during puberty can help prevent many psychological and physical health consequences associated with this phase (Shivji, Lymn, Meade, & Watts, 2021). In this respect, the WHO emphasizes that adolescents require knowledge of reproductive education, life skills, accessible and effective healthcare, and safe and nurturing settings to mature in good health. In addition, they need opportunities to engage in developing and implementing health improvement and preservation programs actively. Thus, it is vital to enhance these opportunities to address the special needs as well as the rights of adolescents. Multiple studies have suggested that improving and adjusting educational and social settings during puberty can prevent many extended psychological difficulties and physical health consequences (Shivji, Lymn, Meade, & Watts, 2021).

The Data Gap

Despite the critical role of puberty in adolescents' physical, psychological, and social development, research focusing on the knowledge and experiences of male adolescents going through puberty is limited, especially in urban Karachi, Pakistan. Several Pakistani studies have mainly focused on female adolescents and their experiences with puberty, thus, leaving a significant gap in understanding the knowledge and attitudes of male adolescents towards pubertal health and its changes.

This gap in research is problematic since it hinders the development of effective health interventions and education programs that target male adolescents to improve their pubertal health outcomes. Additionally, cultural and gender-related norms in Pakistani society discourage discussions about puberty and reproductive health among male adolescents, thus further exacerbating the knowledge gap. Therefore, this study is necessary to identify the current level of awareness and attitudes towards pubertal health among male adolescents in urban Karachi, Pakistan, to provide insights into developing effective interventions and education programs to promote positive pubertal health outcomes for this population (Huda et al., 2017).

The Problem Statement

Despite the major physical, psychological, and social changes that occur during puberty, adolescents in many societies, including Pakistan, often lack access to comprehensive sexuality education and resources. This lack of knowledge and education can negatively affect adolescents' health, well-being, and relationships. Moreover, while research on female adolescents' experiences and expertise in puberty exists, there is a lack of studies focused on male adolescents in Pakistan. Therefore, there is a need to investigate the knowledge, experiences, and needs of male adolescents going through puberty in Pakistan to promote the development of effective and inclusive interventions and programs.

The Research Purpose

This study aims to evaluate the level of knowledge and attitudes among male adolescents residing in urban Karachi, Pakistan, specifically concerning pubertal changes and health. The primary focus is to gather information about how well these adolescents understand the physical and

emotional transformations associated with puberty and their overall awareness of pubertal health aspects.

The Research Objectives

The following are the objectives of this research;

1. To determine the proportion of male adolescents who know about puberty and its effects on the body by administering a questionnaire that assesses their level of understanding and awareness of the subject matter.
2. To identify the common sources of information that male adolescents use to learn about pubertal health through a questionnaire that asks about their preferred sources of information.
3. To assess and analyse the awareness and attitudes of male adolescents regarding the process of puberty to gain a deeper understanding of their perceptions, knowledge levels, and emotional responses to this significant life transition.

The Research Questions

The study will focus on the following research questions:

- 1) What is the knowledge status of male adolescents about puberty and its effects on the body?
- 2) What are the familiar sources of information regarding pubertal health?
- 3) What is the knowledge and attitude of male adolescents towards puberty?

The Summary

The current understanding and perception of pubertal changes among adolescent males in urban Karachi, Pakistan, is limited, indicating a lack of knowledge and prevalent misconceptions about sexual and reproductive health. Thus, implementing targeted interventions to improve

awareness and knowledge regarding pubertal changes and reproductive health is crucial. These interventions should include comprehensive sexuality and reproductive health education programs in schools, community-based awareness campaigns, and specialized sexual and reproductive health services catering to male adolescents' specific needs. Additionally, healthcare providers should receive specialized training to address the challenges and concerns associated with puberty effectively. Furthermore, the active involvement of parents and collaboration among stakeholders is essential for the success and sustainability of these initiatives. Hence, by addressing these knowledge gaps and implementing evidence-based interventions, we can expect improved understanding and attitudes towards pubertal changes among adolescent males in urban Karachi, leading to better reproductive health outcomes and overall well-being for this population.

Chapter Two: Literature Review

Introduction

This chapter has detailed current studies undertaken across various income settings, including high-income, middle-income, and low-income contexts. This chapter has provided a detailed synthesis of relevant research and an overview of the current understanding of pubertal development and health in male adolescents. A well-defined literature search method was used to guarantee a systematic and rigorous approach, allowing the identification and inclusion of research studies, reports, and other relevant sources. Furthermore, the conceptual definitions of the research variables will be presented in this chapter, creating an explicit knowledge of the fundamental components under examination.

Search Strategy

To achieve in-depth literature support on the topic “Knowledge and attitude regarding pubertal changes among adolescent males in urban Karachi, Pakistan”, search engines including Google Scholar, PubMed, Science Direct, Research Gate, and Cumulative Index to Nursing and allied health literature (CINAHL) were utilized. Keywords used for the Knowledge OR Awareness, Adolescents OR Young Men OR Teenagers OR Male, Puberty OR Adolescence OR Puberty Changes, Reproductive Health OR Pubertal Health or Sexual Health, Attitude OR Experiences AND Urban Karachi. Moreover, filters were applied to refine and narrow the search results according to the topic. These filters included literature from 2012 to 2023 to ensure that up-to-date and current information is accessed, “Full-Text Articles,” to have comprehensive and detailed information on the topic. Lastly, “Humans,” gather evidence and insights relevant to human experiences. After collecting a wide range of literature on the subject, a systematic approach was used to sort and prioritize the articles. From this process, 48 articles were selected as the most relevant for the study. These articles were chosen based

on their alignment with the research objectives, the quality of their research methods, and their contribution to the existing knowledge in the field (Refer to Fig 1).

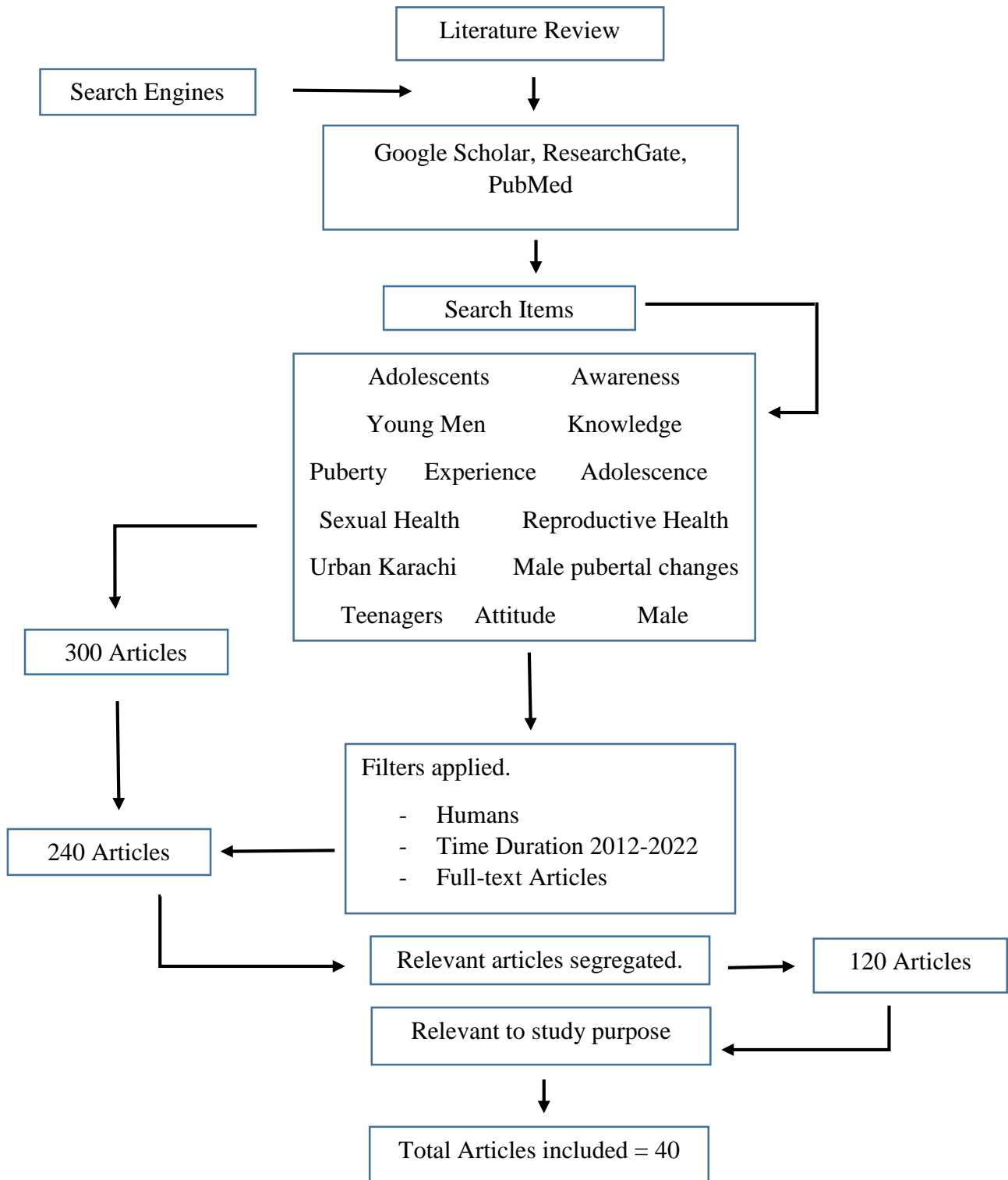


Figure 1. Search Strategy

The Literature Review

World Health Organization (2017) has defined adolescence as the period ranging from childhood to adulthood (10 to 19 years of age) and youth as the period ranging between 15 to 24 years of age. According to the WHO, the region of Southeast Asia has 360 million adolescents, accounting for 20% of the overall population. According to the Sexual and Reproductive Health and Rights (SRHR) Infographic Snapshot compiled by WHO, Pakistan's total population was reported to be 220.9 million in 2021, with children aged 0–14 years accounting for 34.8% and youth aged 15–24, making up for 19.4% of the total population. The image below by WHO summarizes national statistics for Pakistan for 2021 about SRHR across life (WHO, 2021).



Figure 2. Sexual and reproductive health and rights: Infographic snapshot: Pakistan 2021

Puberty Awareness around the globe

According to literature from the United States of America (USA), between 2011 and 2013, more than 80% of teenagers aged 15 to 19 received formal education on reproductive health, sexually transmitted diseases (STI), AIDS, and avoiding sex, while only 60% of young girls and 55% of boys received birth control education. In the United States, parents and teachers were the major sources of knowledge for 59% of girls and 66% of boys about STIs among sexually active adolescents and 55% of females and 43% of males regarding contraception. Only 10% of adolescents with sexual experience named their healthcare providers as a source of information on contraceptive methods, STIs, and HIV (Donaldson et al., 2013). This statistic of the USA is a helpful resource for analysing the level of reproductive health education among adolescents in a high-income nation. While this study focuses on reproductive health knowledge among male adolescents in Pakistan, data from the US context can give significant insights into the prevalence and variability in formal education on reproductive health themes. Moreover, by contextualizing the mentioned statistics within this study framework, meaningful comparisons and contrasts may be established, offering insights particular to the Pakistani setting and contributing to current information on reproductive health education among male adolescents.

A global evaluation of puberty education programs and policies in 2019 has highlighted gaps in existing research about the effectiveness of school-based puberty education in the USA. As puberty education is frequently marketed as a component of larger sexual health education programs, it is seldom analysed individually. On the contrary, other parts of sexual health education programs, particularly those linked to the minimization of unsafe sexual behaviours and adolescent pregnancy, have been studied more extensively (Schmitt et al., 2022). The Department of Education (DoE) conducted an audit in 2022, covering every state in the USA. The audit discovered that out of the 46

states with complete health education standards, 85% had some reference to pubertal health. Meanwhile, the incorporation of menstruation education was comparatively limited. A mere three states (California, Michigan, and New Jersey) explicitly addressed menstrual product concepts, while the remaining three (Utah, Oregon, and Michigan) addressed "menstruation management" in their educational health regulations. (Sebert Kuhlmann et al., 2022)

Several worldwide review studies have thoroughly focused on and examined the understanding of puberty among young female adolescents. For instance, in 2016, 44 published papers on the knowledge of puberty and menstrual cycles in adolescent girls from low- and middle-income countries (LMICs) were gathered from 12 countries using a comprehensive scoping review technique to extensively study adolescent girls' knowledge and preparedness for their menstrual cycles and pubertal changes (Coast et al., 2019). Similarly, another review research examined 81 studies from 25 countries and concluded that female adolescents usually lack understanding about menarche and are not adequately prepared to deal with it (Chandra-Mouli & Patel, 2017). Conversely, similar scoping reviews and studies focusing reproductive health of male adolescents are limited in comparison. Male puberty is frequently portrayed as the start of sexual drive and 'strength' that boys might experience. Wet dreams and Erections, while potentially uncomfortable, are not often integrated with the same shame narrative that girls endure. The shift from adolescence to adulthood is portrayed as joyful, and puberty for males is directly linked to pleasurable sexual impulses. Many puberty education courses have avoided complex discussions of masculinity because they are viewed as unproblematic. This impacts how adolescent boys adapt to puberty education curricula. Teachers claim that male students respond aggressively to sexual content and use language to frighten girls and female teachers. This behaviour allows them to express their perceived masculinity and hence their authority and alleged supremacy (UNESCO, 2014). A thorough analysis of the existing research shows that multiple

studies on female reproductive and menstruation health have been conducted in the USA and other industrialized nations; on the contrary, there is a considerable lack of research investigating male adolescents' pubertal and reproductive health, even in first-world countries.

Puberty Awareness in Lower and Middle-Income Countries

Around 85% of the world's youth reside in LMICs; 45.9% live in countries with low incomes, and 34.1% live in low-middle-income countries. Approximately 20% of the world's youth reside in upper-middle and high-income nations (Yao, Ziapour, Abbas, Toraji, & NeJhaddadgar, 2022). Considering LMICs, research has been done in different states such as Indonesia, India, Kenya, Bangladesh, Uganda, and many others to identify the need for sexual, reproductive, and adolescent education among young adolescents. To determine the level of awareness in adolescents regarding the changes they experience throughout puberty, an Indian-based study was carried out in 2016. Three hundred twenty adolescents in grades 9 through 12 were the subjects of this cross-sectional study. The data was acquired using in-depth interviews. The assessment analysis of the survey revealed that 66.3% of the sample size was aware of some puberty changes, whereas 8.82% of students lacked enough knowledge of typical and natural adolescent changes (Kumar et al., 2013). As indicated by Shrestha & Neupane (2020), a lack of knowledge of these changes can lead to negative perceptions of one's own body, which can lead to confusion about one's sexual orientation, professional choice, and position for the duration of adulthood. They used a standardized questionnaire in their quantitative cross-sectional study in Dhulikhel Municipality, Nepal, to evaluate students in grades 9 and 10. According to the study, girls between 15 and 17 were likelier than boys to know about pubertal transition.

To become a competent generation, adolescents should be able to prevent and deal with their issues, which may be fairly difficult during this transition period. Substance abuse, problems with

sexuality, unexpected pregnancies, abortions, and STD infections are among these issues. Due to a lack of information, one's understanding and perception of the intricacies of sexuality may be inaccurate. According to research, there is a strong link between adolescent sexual behaviour and reproductive health knowledge. Adolescent reproductive health counselling may be the answer to getting teens to respond to unsafe sexual conduct with greater wisdom and caution, hence avoiding numerous sexually transmitted illnesses and implementing healthy lifestyles (Yao, Ziapour, Abbas, Toraji, & NeJhaddadgar, 2022). A recent study published in the Indonesian Community Empowerment Journal investigated how counselling impacts adolescents' overall awareness and response. Thirty teenage students received health counselling via presentations adopting the lecture-based technique. Following that, a question-and-answer period was launched, during which participants asked their queries to the speakers. This study proved that counselling and holding educational sessions significantly impact an adolescent's degree of knowledge as the selected students clarified their concepts regarding sexual and reproductive health during adolescence (Yunita & Silvia Mona, 2022). These findings demonstrate the potential effectiveness of counselling and educational interventions in enhancing adolescents' understanding of natural reproductive health patterns and related issues. By examining the impact of counselling on adolescents' awareness in the context of puberty and reproductive health, this research can contribute valuable insights to the existing knowledge and potentially inform the development of targeted interventions to improve male adolescents' knowledge and attitudes towards pubertal changes in Pakistan.

A recent study was conducted by Yao and his colleagues in Iran, where male adolescents were explicitly targeted. The study aimed to assess the health requirements associated with the onset of puberty in 10-15-year-old adolescent boys. The study used a descriptive cross-sectional method and employed a self-reported questionnaire to collect data. This research indicated that 69.81% of the

adolescents did not have a basic understanding of puberty and its associated health behaviours, and 87% of boys lacked access to educational facilities. In contrast, 82% of boys were reluctant to discuss puberty and basic hygiene practices. The findings also discovered a positive relationship between puberty changes awareness, adolescent health behaviours, and self-confidence. It summarized that adolescents require to receive puberty health education to navigate their health behaviours and develop their self-esteem and to achieve it, their families can exhibit a pivotal role by participating in their education about puberty and its associated factors (Yao, Ziapour, Abbas, Toraji, & NeJhaddadgar, 2022).

Puberty Awareness in Pakistan

Research studies specific to Pakistan have mostly investigated the knowledge, beliefs, and attitudes of female adolescents or both sexes concerning the wider aspect of sexual and reproductive health. However, considerably less research investigates male adolescents' knowledge of puberty (Shivji et al., 2021). One of these studies includes the survey conducted in 2010 by Anjum and her colleagues in Karachi. Their cross-sectional study focused on adolescents aged 17 to 19 and their attitudes and understanding regarding puberty and sexual health. The survey comprised 912 male and female teens from 12 private and public universities. According to the findings of this study, 75% of males and 71% of females had information on puberty sexual and reproductive health, and 81% of male and 91% of female respondents indicated a need for pubertal and reproductive health education. The study's strength was that it covered children from various socioeconomic backgrounds; nevertheless, the sample criteria only included individuals in late adolescence. Because the study included both sexes, it cannot reflect the degree of consciousness of boys, particularly in their early adolescence (Shahid et al., 2012).

Another Pakistan-based study was conducted with male participants aged 13 to 21 years. Participants in this study came from all across the nation, including Gujranwala, Quetta, Sawabi, Karachi, and other rural and peri-urban areas. The study was a pilot survey that included direct interviews with the participants. The study included the participants' parents and guardians. It investigated their perspectives on puberty and its obstacles, teenage behaviours, and strategies to assist the young generation in making a healthy transition into adulthood. The study encompassed a diverse population; the focus was divided into reproductive and adolescent health aspects, such as degrees of physical and sexual abuse. This left little room for discussion on the awareness of adolescence in male participants (Qazi, 2003).

Relatively recent research focusing on boys aged 13-15 was done in 2017 in a secondary school in Karachi. The quasi-experimental study aimed to gauge the effectiveness of pubertal educational sessions. Fifty-eight participants were assessed before an educational session about puberty, and then their level of knowledge was reassessed post-delivering the sessions. According to the study, about half of the individuals did not know their precise pubertal age. 73.33% of adolescents reported feeling ashamed, irritated, and uncomfortable throughout their pubertal era, whereas 53.33% reported occasional puberty talks with their classmates. This study assessed the level of knowledge and educational needs for pubertal health of adolescents in the early stages of puberty; however, it only focused on a small school in a single town. Therefore, this study cannot be representative of a wider population with diverse social origins (Huda et al., 2017).

Understanding Male Adolescents' Puberty Knowledge

According to UN Population Division (2022), about 20.29 percent of Pakistan's population is under 10-19 years old. Adolescents can only gather information through informal routes from a few sources, most of which are insufficient and inaccurate. Several studies show that male teenagers in

Pakistan generally know little about puberty and its impacts on the body. Studies have shown that most boys prefer talking to their friends to adults when seeking information about sexual and reproductive health. Additionally, unrestricted and simple access to electronic media has a grave adverse effect on the youth. This problem emerges because parents and instructors frequently avoid having conversations about pubertal changes, which impacts the kids' physical, mental, and emotional well-being (Ali et al., 2006; Khan et al., 2018; Memon et al., 2017). Most recent studies concluded that teenagers in Pakistan had limited access to health information about puberty and self-care. A lack of information and societal taboos significantly impact adolescents' health and social lives. Insufficient knowledge exists regarding physical changes, sexual development, and reproductive health, according to several research publications (Ali et al., 2006; Khan et al., 2018). Ali et al. (2006) discovered, for instance, that male teenagers in rural Karachi lacked proper knowledge regarding the timing and order of pubertal changes. Studies have also shown that teenage males have worrying beliefs and myths about pubertal changes. For example, one research found that nocturnal emissions are stigmatized among boys and seen as a severe sex-related ailment that causes dread and social isolation. Male adolescents may develop misunderstandings and anxieties due to this ignorance (Khan et al., 2018). In one of the studies conducted by the Aga Khan University titled “Assessment of Sexual Knowledge, Attitudes and Practices in Young Males Presenting to General Practitioners in Karachi”, it was found that around 94 percent of the participants reported having nocturnal emissions, and 15 percent perceived them as a symptom of physical sickness. Forty-five participants linked dark circles under their eyes to the effects of nocturnal discharges and masturbation (Khan, 2000). These findings exclusively indicate the extent of misinformation regarding reproductive health among young males in Karachi.

To create an AIDS awareness campaign for the neighbourhood schools, Aahung (part of the Karachi Reproductive Health Project) conducted a series of focus groups with teenagers in Chanessar Goth, a low-income, multi-ethnic neighbourhood in Karachi. The conversation made it clear that a general lack of confidence, the capacity for assertiveness, and inadequate knowledge of the body were the major causes of poor sexual health among teenagers. Key issues that prevented them from obtaining health care were child sexual abuse, sexual assault, drug use, and body-related shame and guilt. 18% of the 71 boys aged 11 to 19 who participated in in-depth interviews thought it was inappropriate to discuss one's body, and 11.3 percent indicated they wouldn't tell anybody if they were uncomfortable with their genitalia. Most boys thought that masturbating was unhealthy and claimed that it made the penis crooked or droopy (Khan, 2000). Extensive educational initiatives geared toward male teenagers are also required to improve their knowledge and encourage a healthy concept of puberty.

Sources of Puberty and Reproductive Health Information

Male adolescents in Pakistan appear to rely largely on unofficial sources for information since there is a lack of parent-child contact in aspects of pubertal health (Balaiah et al., 2017; Saleem et al., 2015). According to Balaiah et al. (2017), family, friends, and peers are the most frequent information sources. This research also points out the difficulty of obtaining correct and trustworthy information from formal sources like schools, hospitals, and the media (Balaiah et al., 2017; Saleem et al., 2015). For instance, Saleem et al. (2015) revealed that teenage boys in rural Karachi received little formal education about reproductive health. Boys and young men appear to be more self-conscious about some aspects of their sexuality despite having more access to the outside world and exposure to a variety of sexual and reproductive information sources. Males are strongly influenced by conventional taboos and the widespread disinformation spread by so-called sex clinics that purport to "cure" men of

undesired sexual behaviours. They are hesitant to share their worries and inquiries with peers regarding their sexuality (Khan, 2000).

The Pakistan Voluntary Health and Nutrition Association (PAVHNA) studied teenagers (ages 13-21) in Pakistan's four provincial cities to examine their sexual and reproductive health needs. It used random sampling to interview 177 females and 133 males. The participants showed rudimentary knowledge of puberty, sex, menstruation, pregnancy, contraception, and knowledge of AIDS. According to the findings, premarital sex is still uncommon in Pakistan. Parents were not seen as dependable or communicative providers of information on puberty and sex, and teachers had inadequate rapport with their pupils to address these sensitive matters. According to research, adolescents reported seeking information from their friends and the media. Thus, it is apparent that the availability and accessibility of trustworthy information sources on pubertal health for male adolescents in Pakistan must be improved through focused interventions to close this knowledge gap.

Challenges Faced by Male Adolescents during Puberty

In Pakistan, male adolescents navigating the transitional phase of puberty encounter a variety of challenges, which are underscored by societal expectations of masculinity, limited access to healthcare services, communication barriers with parents or guardians, and prevailing social and cultural taboos surrounding discussions on reproductive health (Butt et al., 2020; Fatima et al., 2021; Hameed & Imran, 2020). Hameed and Imran (2020) conducted a qualitative research study on male teenagers in metropolitan Lahore, shedding light on the multifaceted difficulties they face during puberty. Body image issues and emotional shifts were among the prominent challenges reported by the young participants. Many of them expressed knowledge gaps, particularly concerning physiological changes, attributing it to the conservative societal norms that discourage open dialogue about puberty. Cultural hurdles further impeded discussions with elders and access to educational

materials on the subject. This lack of awareness and preparation for pubertal changes had adverse psychological impacts on most of the young participants, resulting in negative feelings such as anxiety, dread, bewilderment, melancholy, unease, guilt, loneliness, and despair. Moreover, the participants explicitly articulated how puberty influenced their evolving masculinity, sexual identity, and overall worldview, shaping their identities according to prevailing gendered societal norms. They disclosed the societal expectations of conforming to certain characteristics and behaviours during puberty, which were deemed necessary to align with the prevailing social standards (Hameed and Imran, 2020). By synthesizing the findings of these studies, it becomes evident that male adolescents in Pakistan confront a complex array of challenges during puberty, which encompass emotional, psychological, and socio-cultural dimensions. The research underscores the need for a more comprehensive understanding of the issues faced by male adolescents in this critical phase of development, facilitating the development of targeted interventions and support systems to address their unique needs.

This analysis of the literature showed numerous notable gaps in the existing database of research. While the analysis included a large number of papers on reproductive health concerns, a clear trend appeared, with the majority of the research focusing on female reproductive health, specifically menstruation and cleanliness practices. Despite the emphasis on female reproductive health, there were relatively few studies exploring the knowledge and experiences of male adolescents throughout puberty in Pakistan. Furthermore, the limited amount of research on male reproductive health experiences frequently lacked a focus on adolescent boys. This lack of research limits an in-depth awareness of male adolescents' knowledge and attitudes about pubertal changes and reproductive health education in urban Karachi. The identified gap in the

literature emphasizes the necessity for specific research that tackles the particular difficulties and perspectives of male adolescents at this crucial developmental stage.

The Summary

This overview of the literature highlights the necessity of working on the reproductive health concerns of adolescents, especially puberty awareness. While a substantial amount of research has been available on females' awareness of puberty, there remains an apparent lack of literature explicitly exploring male adolescents and their knowledge and understanding of puberty, particularly in Pakistan. Worldwide studies have indicated an insufficient understanding and awareness of menarche and associated aspects in female adolescents, which makes them unable to cope with the changes they experience; on the contrary, male reproductive and sexual health has been given a positive outlook by mainly associating it to the overall concept of sexuality, creating an imbalance in the educational and literature resources. This gap in literature can be filled by adequately addressing the importance of awareness in male adolescents regarding reproductive health, encouraging open communication, and establishing thorough support networks that can ultimately set a pathway for institutional bodies to intervene and initiate agendas to improve male adolescent reproductive health and experiences.

Chapter Three: Methodology

Introduction

This chapter explored the methodology used in the research addressing various key aspects. It included the study's design, the specific setting in which it was conducted, and the demographics of the study population. Additionally, the criteria for participant selection, both inclusion and exclusion have been discussed, which is followed by the sampling method and the determination of sample size. Furthermore, an extensive overview of the data collection process has been provided, offering detailed insights into the data collection tools utilized. Subsequently, the chapter shifts its focus to the data analysis process. Within this context, the study's rigour and the ethical considerations guiding the research have also been elaborated. Ultimately, the chapter concludes with a summary.

The Study Design

This study follows a quantitative descriptive cross-sectional design. According to Chen (2021), in the fields of community medicine and healthcare, descriptive studies have also been often utilised in the initial stages of a project to examine medical or behavioural issues. While conventional communication typically relies on language to convey problems, quantitative epidemiology utilises descriptive statistical tools and visual techniques for this purpose. Consequently, numerical data is

less influenced by subjectivity and conveys information more succinctly and accurately as compared to verbal descriptions.

Furthermore, this research employed a cross-sectional design in which the exposure of the participants and the outcomes were measured and the association was analysed after a thorough selection of participants based on inclusion and exclusion criteria. Cross-sectional designs are preferred for population-based research and to determine the prevalence which is often affordable and relatively takes less time (Setia, 2016).

The Study Population and Sampling

The study setting for the research was urban Karachi, Pakistan. The participants were recruited from four study sites, two private secondary schools and two government schools. These two sectors were chosen to ensure a broad group of participants in the study, given that the two populations come from various socioeconomic and cultural backgrounds.

Furthermore, a total of 277 male adolescents participated in this research programme. The participants were selected using a stratified random sampling method. On the other hand, the schools were chosen through random sampling. Stratified sampling makes it convenient to target particular population segments. When each stratum comprises comparatively homogeneous units, this design provides flexibility in sampling techniques and improves the accuracy of estimations of target parameters (Qian, 2010). The subjects for the study were male students in grades 8, 9, and 10. The age bracket for the sample was 14 to 17 years, per the inclusion criteria. The rationale for opting for this age category is that puberty changes begin to appear in this phase as defined by WHO.

The Inclusion Criteria

The study's inclusion criteria encompassed a specific group of students meeting precise eligibility requirements. This selected group comprised exclusively male students, aged between 14 and 17 years, who were enrolled in classes 8, 9, and 10 at the time of the study. These students needed to be residents of Karachi, thus demonstrating a geographical specificity for the study. Furthermore, a fundamental prerequisite for inclusion was the voluntary willingness of these students to actively participate in the research initiative. Notably, participants were additionally required to have diligently secured written consent from their respective parents or legal guardians, thus ensuring full compliance with ethical and legal considerations regarding their involvement in the study.

The Exclusion Criteria

To maintain the integrity of the research outcomes, the students with a documented history of cognitive and learning disabilities were excluded from participation in this study. This careful exclusion was undertaken to protect against any potential influence these conditions might exert on the study's results. Furthermore, the students undergoing treatment at that phase in time for cognitive or learning disabilities were also omitted from the study, as their ongoing therapeutic interventions could potentially confound the research findings.

More importantly, for alignment with ethical and legal principles, the male adolescents aged 14 to 17 were only eligible for inclusion if they had obtained written consent from their parents or legal guardians. Therefore, the students not fulfilling this vital requirement were considered ineligible for participation underscoring the study's commitment to ethical research practices and the protection of participants' rights.

The Data Collection Tool

An evaluation tool relates to the specific approach used for gathering data in psychological assessments, which can include methods like questionnaires. The components of an evaluation tool encompass every characteristic of the measurement procedure that can influence the data collected, including elements such as questionnaire content, instructions, and response structures (Yusoff, 2019).

For this study, a comprehensive researcher-constructed questionnaire was used to assess the knowledge and attitude of male adolescent students. This questionnaire served as a valuable resource for gathering critical information about the participants' understanding of puberty, their emotional responses to these changes, and their access to information and support. The study tool comprised three sections which are as follows,

1) ***Section One - Personal Information***

The first section collected basic demographic data to provide context for the responses obtained in the subsequent sections. The participants were asked about their age, grade level, and their parents' educational backgrounds.

2) ***Section Two - Knowledge about Puberty***

The second section evaluated the participants' awareness and knowledge regarding puberty. It employed a combination of open-ended and multiple-choice questions to gauge their understanding of puberty, its onset, and the physical and emotional changes associated with it.

3) ***Section Three- Attitude and Challenges regarding Reproductive Health***

The third and last section of the tool inquires about the participants' emotional responses and attitudes towards pubertal changes. It also explores their openness to

discussing these changes with family members and their comfort level when seeking information or guidance.

The Content Reliability and Study Rigour

Yusoff (2019) emphasises that ensuring content validity is essential to strengthening the validity of assessment tools, such as questionnaires, particularly in research contexts. The significance of a study tool's relevance pertains to the suitability of its components for the intended constructs and assessment purposes. Moreover, the representativeness of a tool is related to the extent to which its components accurately reflect the various aspects of the target construct (Yusoff, 2019). In this study, the tool was first reviewed by the research committee and their suggestions were integrated into the research.

Furthermore, the Content Validation Index (CVI) assessment of the research tool was conducted with a panel of five professionals, comprising four experts in the field of research and one child psychologist. Next, following the guidelines outlined in the 'ABC of Content Validation and Content Validity Index Calculation', the experts were instructed to rate each question in the tool on a Likert scale, with scores of 3 and 4 denoting agreement, and scores of 1 and 2 indicating disagreement. Subsequently, all five experts unanimously assigned scores of either 3 or 4 to every item in the questionnaire, attesting to a high level of agreement regarding the tool's relevance and clarity. Furthermore, the experts provided invaluable insights and suggestions for improvement, which were thoughtfully incorporated into the tool to enhance its quality. As a result, the calculated Item-level Content Validity Index (I-CVI) for the research tool achieved the desirable level of 1, signifying unanimous expert consensus on the tool's appropriateness. Following the CVI calculation, the tool was then shared with the Ethical Review Committee and their approval was obtained. This rigorous validation process highlights the tool's reliability and suitability for this research.

The Data Collection Process

To conduct data collection from the schools, the school management was approached and their permission was sought after providing them with a comprehensive explanation of the study's purpose. Moreover, the questionnaire was administered within a classroom environment where students received assistance in understanding the questions. This support involved reading out and providing explanations for any queries that arose. The questionnaire, originally in English, was explained to the students in Urdu to enhance their comprehension of each question and its context. Moreover, it was made sure that the verbal translation accurately conveyed the content's meaning without altering it. Emphasizing the importance of aligning with the students' level of understanding, each question was thoroughly explained and they were given adequate time to mark their responses.

The entire data collection process, including introducing the study and completing the questionnaires, comprised from 30 minutes to 1 hour. It was a one-time interaction, where the students were informed about the study's purpose and made actively engaged in responding to the questionnaire.

The Data Analysis

After the completion of data collection, data entry was begun. Data analysis in quantitative research typically applies numerical analytical tools, algorithms, and software to extract the key information from the acquired data and to provide answers to queries like how frequently, how many, and how much (Eteng, 2022).

Moreover, in this study, both continuous and categorical variables were analysed. For continuous variables, descriptive analysis and two independent t-test was performed, including calculations of measures such as mean, median, and standard deviations. This allowed for an

understanding of the central tendency and dispersion of continuous data. For categorical variables, such as school type, appropriate categorical data analysis techniques were employed. These methods included frequency tables and the chi-square test. Furthermore, the choice of these methods was based on the nature of the categorical data and the research objectives. To conduct these analyses, the Statistical Package for the Social Sciences (SPSS), version 22.0, was utilized.

The Ethical Considerations

The study's approval was sought from the Ethics Review Committee (ERC) of the Aga Khan University. Since puberty is a sensitive topic, the researcher first developed a rapport with the participants, with a brief introduction to the topic and explained the purpose of the research. Moreover, after assuring them about the confidentiality of their information, the researcher asked the participants to sign an assent form. Likewise, their parents were asked for their consent through a written parental consent form. Parental consent was obtained through a parent-teacher meeting arranged by the school. Furthermore, the meeting included a briefing session by the research team about the study, which was followed by getting the written informed consent form signed. In addition, for schools where male and female students study together, a designated space was provided specifically for male students to complete the questionnaire. The survey was conducted in an enclosed classroom to ensure the privacy of the participants. Similarly, to further ensure their privacy, the students were not required to provide any information related to their identity in the questionnaire. They were instructed verbally by the researcher and assisted in comprehending the questionnaire during the process. Additionally, the participants were assured of their right to withdraw from the study at any point during its progression.

The Confidentiality of the Data

Strict measures were put in place to ensure the confidentiality of the collected data. To fulfil this objective, the data was stored securely within a password-protected network, with exclusive access granted only to the primary investigator and committee members. Moreover, a commitment was made by the researcher to not share this data with anyone external to the research team. Hence, this collective approach safeguarded the privacy and integrity of the gathered information.

The Summary

This chapter provided a thorough insight into the methodology employed in this research. The use of a quantitative descriptive cross-sectional methodology allowed for a thorough assessment of puberty-related social difficulties among a varied population of male adolescents in urban Karachi, Pakistan. Moreover, the rigorous criteria for participant selection, diligent content validation of the data collecting tool, and the ethical standards followed throughout the study all contributed to the reliability and integrity of the research. Moreover, the researcher's commitment to ensuring informed consent and confidentiality further reinforced the ethical foundation of this investigation. Meanwhile, these methodological choices, guided by a commitment to precision, ethics, and comprehensiveness, laid the foundation for the subsequent chapters. Thus, the findings and their analysis in the subsequent chapters provided valuable insights into the knowledge and attitudes of male adolescents toward puberty in this specific context.

Chapter Four: Results

Introduction

This chapter presents the findings of the primary data obtained through a questionnaire to assess the participants' understanding of puberty-related concepts. Utilising statistical analyses, the study specifically explored the association between the type of school attended by the students and their knowledge of puberty. By exploring these analyses, the chapter aimed to uncover the potential correlations and disparities in the understanding of puberty-related topics based on the students' educational background.

The Demographics of the Participants

The total number of participants involved in the study was $n = 277$, meeting specific inclusion criteria where ages ranged between 14 to 17 years. Thus, individuals outside this age range were excluded from the research. Table 1 illustrated that among the participants, 125 students were enrolled in public schools i.e., the Federal Public Government Boys Secondary School (FPGBSS) and the Government Delhi Boys Secondary School (GDBSS), while 152 students attended private

institutions i.e., the Aga Khan School, Garden (AKSG) and Dhaka Secondary Boys and Girls School (DSBGS).

Moreover, there were variations in the distribution of students across age groups between the private and public schools. The public schools had a significant number of students in the age group of 14, while the private schools showed a more distributed pattern across the multiple age groups, notably with larger counts in the 15 and 16 age groups. An independent t-test comparing the ages of students in the private and public schools showed results assuming equal variances and not assuming equal variances between the two groups. Both the tests (assuming and not assuming equal variances) indicate a significant difference in the mean ages of students between the private and public schools. The average age of students in the private schools was approximately 1.68 years higher than the average age of students in the public schools. This difference is statistically significant, and the confidence intervals do not overlap, thus confirming the distinction between the two groups' ages.

Table 1

A Comparison of Student Demographics and Ages in Private and Public Schools

		No. of students	Frequency	Percentage	Mean Age	Std. Deviation	Sig. (2-tailed)
Public Schools	FPGBS	51	125	45.10%	14.19	0.487	<0.0001
	S	74					
Private Schools	AKSG	88	152	54.90%	15.87	0.961	<0.0001
	DSBGS	64					
n = 277							

¹ Note. FPGBS represents the Federal Public Government Boys Secondary School

GDBSS represents the Government Delhi Boys Secondary School

AKSG represents the Aga Khan School Garden

DSBGS represents the Dhaka Secondary Boys and Girls School

Frequency represents the total number of students in private and public schools

Knowledge about Puberty

The study attempted to analyse the participants' knowledge about puberty through the following facets:

Adolescents' Insight into Puberty

Table 2 shows the results related to the question 'Do you know what puberty is?' The subsequent analysis showed that 18.40% of the adolescents from the private schools answered 'YES' as a response to knowing what puberty was, whereas 38% of the adolescents from the public schools responded affirmatively to the same question. The Chi-Square statistical test, with a Pearson Chi-Square value of 12.778 and a p-value of <0.0001, indicates a statistically significant association between the type of school (private vs. public) and the knowledge about puberty among adolescents. The low p-value (<0.0001) suggested that the association between school type and knowledge about puberty was unlikely due to random chance.

Changes Taking Place during Puberty

In Table 2, the analysis of the question 'Do you know what changes take place during puberty?' revealed that 45.40% of the adolescents from the private schools responded affirmatively ('YES') as a response to knowing the changes that take place during puberty, while 36% of the adolescents from the public schools had similar answers. Moreover, the Chi-Square statistical test

produced a Pearson Chi-Square value of 2.500 and a corresponding p-value of 0.114. The p-value of 0.114 suggested that there wasn't a statistically significant association between the type of school (private vs. public), and the understanding of the changes during puberty among adolescents. The higher p-value indicated that the observed difference in responses between the private and public school students regarding their knowledge of changes during puberty could plausibly be due to random chance.

Puberty Onset - Variations in Adolescents' Ages

In Table 2, the analysis related to the question 'Does puberty begin at the same age in all boys?' showed that 47% of the adolescents from the private schools responded 'YES' as a response to the idea that puberty begins at the same age in all boys, while 74% of the adolescents from public schools answered similarly. The Chi-Square statistical test generated a Pearson Chi-Square value of 20.479, with a corresponding p-value of <0.0001. The low p-value of <0.0001 suggested a statistically significant association between the type of school (private vs. public) and the belief that puberty begins at the same age in all boys among adolescents.

Adolescents' Puberty Onset - Typical Age?

In Table 2, the analysis related to the question 'What Age does puberty usually begin in boys?' showed that The Likelihood Ratio test resulted in a value of 27.790 with a corresponding p-value of <0.0001. The low p-value suggested a statistically significant association between the type of school and the beliefs regarding the usual age at which puberty begins in boys among adolescents. The percentages of responses across different age brackets significantly varied between the two types of schools, thus signifying distinct perceptions about the usual age of puberty onset in boys.

Causes of Puberty

In Table 2, the analysis related to the question ‘Which one of the following causes puberty?’ illustrated the results from the Chi-Square statistical test which revealed a Pearson Chi-Square value of 8.872, alongside a p-value of 0.012. Thus, this finding indicated a significant association between the type of school and the adolescents' beliefs regarding the causes of puberty. Notably, there were marked variations in the percentages of responses associating puberty with age, hormones, and maturity between the two school types, thus indicating different viewpoints on the factors influencing the onset of puberty.

Physiological Changes during Puberty

In Table 2, the analysis related to the question ‘What changes can occur in the male body during Puberty?’ showed that based on the responses from students of private and public schools, the Chi-Square test resulted in various Pearson Chi-Square values associated with the individual categories and a set of p-values. From these results, it can be observed that while most categories did not show a statistically significant difference in responses between the private and public school students, the categories ‘Broadening of chest’, ‘Increased sweating’, ‘Hair growth on armpits and genitals’, and ‘Wet dreams’ demonstrated statistically significant differences in the responses between the two school types.

Puberty and Voice Change in Male Adolescents

In Table 2, the analysis related to the question ‘How does a boy’s voice change during puberty?’ shows that based on the responses from students of the private and public schools, the Chi-Square test generated a Pearson Chi-Square value of 20.015, with a corresponding p-value of

<0.0001. Thus, the low p-value of <0.0001 suggested a statistically significant association between the type of school and the beliefs regarding how a boy's voice changes during puberty among adolescents. Moreover, the percentages of responses about the transformation in a boy's voice significantly differ between the two types of schools, suggesting distinct perceptions regarding the alteration in a boy's voice during puberty.

Wet Dreams

In Table 2, the analysis related to the statement 'A wet dream is not normal,' indicated that 42.10% of the adolescents from the private schools answered 'YES' as a response to the statement signifying that a wet dream is not normal, while 69% of the adolescents from the public schools answered likewise. The Chi-Square test generated a Pearson Chi-Square value of 19.687, with a corresponding p-value of <0.0001. Thus, the low p-value of <0.0001 suggested a statistically significant association between the type of school and the belief that a wet dream is not normal among adolescents.

Ejaculation

In Table 2, the analysis related to the statement 'Ejaculation may occur at night during sleep' shows that 59% of the adolescents from the private schools agreed to the statement, indicating that they believe ejaculation may occur at night during sleep, while 40% of the adolescents from the public schools marked the same response. The Chi-Square test generated a Pearson Chi-Square value of 9.444, with a corresponding p-value of 0.002. Thus, the obtained p-value of 0.002 indicated a statistically significant association between the type of school and the belief about the possibility of ejaculation occurring at night during sleep among adolescents.

Erection

The analysis of the statement ‘Erection is the hardening of the penis’ in Table 2 indicates that 71.10% of the adolescents from the private schools marked ‘YES’ as a response, confirming that an erection is the hardening of the penis, while 64% of the adolescents from public schools also responded positively to the statement. The Chi-Square test yielded a Pearson Chi-Square value of 1.565 and a p-value of 0.211. Thus, the obtained p-value suggested that there was no statistically significant association between the type of school and the understanding of what constitutes an erection among adolescents.

Personal Hygiene during puberty

The analysis of the statement ‘During puberty a person does not have to bath or wash himself thoroughly’ in Table 2 showed that 37% of the adolescents from the private schools marked ‘YES’ as a response," indicating agreement with the statement that during puberty, a person does not need to bathe or wash thoroughly. On the other hand, 22.40% of the adolescents from public schools also marked ‘YES’ as a response to the same statement. The Chi-Square test generated a Pearson Chi-Square value of 6.771, with a corresponding p-value of 0.009. Thus, the obtained p-value suggested a statistically significant association between the type of school and the belief that thorough bathing or washing is not necessary during puberty among adolescents.

Reproduction

The analysis of the statement ‘During puberty a male can reproduce children’ in Table 2 shows that around 41.40% of the adolescents from private schools marked ‘YES’ as a response, indicating agreement with the statement. Meanwhile, 30% of adolescents from the public schools also marked ‘YES’ as a response to the same statement. The Chi-Square test yielded a Pearson Chi-Square value of 0.041, with a corresponding p-value of 0.041. Thus, the obtained p-value suggested a

statistically significant association between the type of school and the belief that males can reproduce children during puberty among adolescents.

Mood Swings during Puberty

The analyses related to the statement ‘Mood swings can be a part of Puberty changes’ in Table 2 indicate that 48% of the adolescents from the private schools showed agreement with the statement that mood swings can be a part of changes during puberty. Meanwhile, 31.20% of the adolescents from the public schools also marked "YES" as a response to the same statement. The Chi-Square test produced a Pearson Chi-Square value of 8.063, with a corresponding p-value of 0.005. Thus, the obtained p-value suggested a statistically significant association between the type of school and the belief that mood swings can be a part of changes during puberty among adolescents.

Puberty Education

The analysis of the question ‘Have you ever received education/information about puberty?’ in Table 2 indicated that 35.50% of the adolescents from private schools confirmed receiving education or information about puberty. Meanwhile, 25% of the adolescents from the public schools were confirmed to have received puberty education. The Chi-Square test generated a Pearson Chi-Square value of 3.710, with a corresponding p-value of 0.054. Thus, the obtained p-value suggested that there was no statistically significant association between the type of school and whether the adolescents have received education or information about puberty.

Source of Pubertal Health Awareness

The analysis of the question ‘Please check all of the places you have had Pubertal health awareness’ in Table 2 indicated multiple Pearson Chi-Square values and additional test statistics for different sources, each associated with a specific p-value. The analyses showed that p-values for Religious Groups, Virtual workshops, and the 'Other' category, which included Family and Friends were less than 0.05, indicating a significant association between the type of school and these sources of education. However, all other sources of awareness had p-values greater than 0.05 respectively, indicating no significant association between the types of schools and receiving information at these locations.

Attitudes/Perceptions Regarding Puberty

The study attempted to analyse the participants’ attitudes and perceptions about puberty through the following facets:

Feelings about Physical Changes during Puberty

In Table 2, the analysis related to the question ‘How did you feel when you experienced puberty changes?’ indicates the results related to the feelings experienced by the students during their puberty changes. The statistical analysis provided multiple Pearson Chi-Square values associated with specific feelings and their respective p-values. For the feeling of ‘I felt normal’, the p-value was 0.094, indicating no significant association between the private and public school students in feeling normal during puberty changes. For ‘I felt embarrassed of my body changes’, the p-value was 0.009, thus suggesting a significant association. The private school students reported feeling more embarrassed about body changes compared to public school students. For ‘I am afraid I might have a disease’, the p-value was 0.049, indicating a significant association. Private school students expressed more fear about potentially having a disease due to the changes than public school students. For ‘I felt anxious’, the p-value was 0.993, thus suggesting no significant association in

feelings of anxiety between the private and public school students during puberty changes. For ‘I have not experienced any change’, the p-value was 0.005, thus signifying a significant association. Furthermore, more public school students reported not experiencing any changes during puberty compared to private school students.

Feelings when Reaching Puberty

In Table 2, the statistical analysis for the question ‘Which of the following feelings did you experience when you reached puberty’ presented multiple Pearson Chi-Square values associated with specific feelings and their respective p-values. The feelings of ‘Embarrassment’, ‘Confidence’, ‘Curiosity’, and ‘I did not feel anything upon reaching puberty’, stated p-values greater than 0.05. However, the p-value (0.050) was borderline for the feeling of ‘Happiness’. Similarly, for ‘Anxiety’, the p-value was 0.060, suggesting a borderline significant association. Overall, there were no significant differences between the private and public school students in feeling embarrassment, curiosity, confidence, or not feeling anything upon reaching puberty. However, a marginal difference was observed in the feeling of anxiety where public school students reported slightly higher levels, though this difference was not statistically significant at a conventional threshold.

Perceptions regarding Physical Changes during Puberty

In Table 2, the statistical analysis for the question ‘How do you view the physical changes that occur during puberty?’ showed multiple Pearson Chi-Square values associated with specific viewpoints and their respective p-values. For the perception of ‘Natural and normal’, the p-value was 0.975, indicating no significant association between private and public school students in considering physical changes as natural and normal during puberty. On the other hand, For ‘Unpleasant & unwanted’, ‘Exciting & positive’, and ‘Embarrassing’, the p-values were 0.087, 0.162, and 0.051 respectively. Among these, only ‘Embarrassing’ had a p-value slightly below the

conventional threshold for statistical significance ($p < 0.05$). This suggests a borderline significant association. Moreover, public school students were more likely to find the physical changes during puberty as embarrassing compared to private school students, but the difference was not highly significant.

Puberty Talk with Family

In Table 2, the statistical analysis for the question ‘Do you think discussing puberty openly with family is important?’ showed a Pearson Chi-Square value of 6.432 and a corresponding p-value of 0.04. The p-value of 0.04 suggested a statistically significant association between the type of school and the perspectives on discussing puberty openly within the family. Specifically, there was a significant difference in viewpoints between the private and public school students regarding whether discussing puberty openly with family was important. The private school students were more inclined to consider discussing puberty as a private matter compared to public school students. Meanwhile, public school students were relatively more open to the idea of discussing puberty openly with family as a means to understand the changes.

Puberty Talk with an Elder

In Table 2, the statistical analysis related to the question ‘How comfortable do you feel talking to an elder about questions related to puberty?’ provided a Likelihood Ratio of 6.005 and a corresponding p-value of 0.111. The p-value of 0.111 suggested no statistically significant association between the type of school and the comfort levels of students when talking to an elder about questions related to puberty. Moreover, both the private and public school students showed similar distributions across comfort levels when discussing puberty-related questions with an elder. However, there was no clear evidence to support a significant difference in the comfort levels between the two groups.

Importance of Puberty Education

In Table 2, the statistical analysis related to the question ‘How important is it to have accurate information about puberty?’ showed a Pearson chi-square value of 28.085 and a corresponding p-value of <0.0001. The p-value of <0.0001 indicated a statistically significant association between the type of school and the perceived importance of having accurate information about puberty.

Moreover, there was a notable difference in the viewpoints between the students from private and public schools regarding the importance of accurate puberty-related information.

Challenges Faced during Puberty

The statistical analysis related to the question ‘What challenges have you faced or are currently facing regarding your changing body during puberty?’ in Table 2 showed a Pearson chi-square value of 15.162 and a corresponding p-value of 0.002, which indicated a statistically significant association between the type of school and the challenges faced or being faced by students regarding their changing bodies during puberty. There were notable differences in the reported challenges between private and public school students. The public school adolescents seem to encounter a higher level of ‘Confusion & uncertainty about changes’ compared to the private school students. Moreover, private school students report a higher percentage of facing challenges related to ‘Unable to cope with mood swings’ in contrast to public school students.

Table 2

Comparison of Student Responses to Questionnaire: Private vs. Public Schools, Percentage Analysis, and Significance (p-values)

Knowledge about Puberty			
S.NO	Items	Percentage of "YES" responses in schools	

		Private school N = 152	Public school N = 125	P value [Asymp. Sig. (2 sided)]
1	Do you know what puberty is?	18.40%	38%	< 0.0001
2	Do you know what changes take place during puberty?	45.40%	36%	0.114
3	Does puberty begin at the same age in all boys?	47%	74%	< 0.0001
4	What Age does puberty usually begin in boys?	0-5yrs: 2%	0-5yrs : 0	< 0.0001*
		5-10yrs: 24.2%	5-10yrs: 10%	
		10-15yrs: 39.5	10-15yrs: 27.2%	
		15-20yrs: 34.2	15-20yrs: 63.2%	
5	Which one of the following causes puberty?	Age: 48%	Age: 52%	0.012
		Hormones: 33%	Hormones: 18.4%	
		Maturity: 19.1%	Maturity: 30%	
6	What changes can occur in the male body during Puberty? (mark all that apply)	Voice start changing: 53%	Voice start changing: 61%	0.173
		Breast development: 27%	Breast development: 22%	0.301
		Penis gets large: 45%	Penis gets large: 38.4%	0.287
		Sperm production: 28.3	Sperm production: 23.2	0.337
		broadening of chest: 8%	broadening of chest: 34%	< 0.0001
		testicular and scrotum growth: 18%	testicular and scrotum growth: 27.2	0.059
		Increased sweating: 20%	Increased sweating: 31.2	0.028
		Hair growth in armpits and genitals: 74%	Hair growth in armpits and genitals: 86.4%	0.009
		Wet dreams: 22.4%	Wet dreams: 13%	0.039
7	How does a boy's voice change during puberty?	It will get deeper: 39.5%	It will get deeper: 36%	< 0.0001
		He will lose his voice: 12%	He will lose his voice: 0%	
		It will get higher: 33%	It will get higher: 36%	
		It will get faster: 16%	It will get faster: 28%	
8	What is mixed with sperm in the testicles?	Smegma: 44.1%	Smegma: 47.2%	0.626
		Semen: 34.2%	Semen: 29%	
		Blood: 21.7%	Blood: 24%	

9	Sometimes a boy's body will release seminal fluid through the penis during the night when he's asleep. This is called:	Wetting the bed: 25%	Wetting the bed: 58%	<0.0001
		A wet dream: 39%	A wet dream: 28%	
		An erection: 28%	An erection: 14.4%	
		Masturbation: 9%	Masturbation: 0%	
10	A wet dream is not normal.	42.10%	69%	<0.0001
11	Ejaculation may occur at night during sleep	59%	40%	0.002
12	Erection is the hardening of the penis.	71.10%	64%	0.211
13	During puberty, a person does not have to bath or wash himself thoroughly	37%	22.40%	0.009
14	During puberty, a male can reproduce children.	41.40%	30%	0.041
15	Mood swings (mood changes) can be a part of Puberty changes.	48%	31.20%	0.005
16	Have you ever received education/information about puberty?	35.50%	25%	0.054
17	Please check all of the places you have had Pubertal health awareness	Primary School: 28.3%	Primary School: 33%	0.416
		Middle school: 15.1%	Middle school: 16%	0.843
		Secondary school: 5.3%	Secondary school: 4.8	0.861
		Religious Group: 16%	Religious Group: 0%	<0.0001
		Online Social media: 59%	Online Social media: 61%	0.704
		Virtual workshops: 5.3%	Virtual workshops: 0%	0.009 *
		Other (family): 1.3%	Other (family: 4%, Friends: 5%)	0.003 **
Attitudes/Perceptions Regarding Puberty				
18	Which of the following feelings did you experience when	Embarrassment: 25%	Embarrassment: 16%	0.067
		Curiosity: 43%	Curiosity: 38%	0.384
		Confidence: 16.4%	Confidence: 19.2%	0.55

	you reached puberty? (Mark all that apply)	Anxiety: 32.2%	Anxiety: 43.2%	0.06
		Happiness: 6.6%	Happiness: 13.6	0.05
		I did not feel anything upon reaching puberty: 20.4	I did not feel anything upon reaching puberty: 30%	0.076
19	How do you view the physical changes that occur during puberty? (mark all that apply)	Natural & Normal: 36.2	Natural & Normal: 36%	0.975
		Unpleasant & unwanted: 29%	Unpleasant & unwanted: 20%	0.087
		Exciting & positive: 26.3%	Exciting & positive: 19.2%	0.162
		Embarrassing: 30%	Embarrassing: 41%	0.051
20	Do you think discussing puberty openly with family is important?	Yes, it helps to understand what's happening: 9.2	Yes, it helps to understand what's happening: 11.2%	0.04
		No, it's a private matter: 52%	No, it's a private matter: 37%	
		Not sure: 39%	Not sure: 52%	
21	How comfortable do you feel talking to an elder about questions related to puberty?	Not comfortable at all: 39%	Not comfortable at all: 51.2%	0.111 **
		Not very comfortable: 33%	Not very comfortable: 30.4%	
		Somewhat Comfortable: 26.3%	Somewhat Comfortable: 16%	
		Very comfortable: 2%	Very comfortable: 2.4%	
22	How important is it to have accurate information about puberty?	Not very Important: 39%	Not very Important: 60%	<0.0001
		Somewhat Important: 28.3%	Somewhat Important: 33%	
		Very Important: 33%	Very Important: 7.2%	
Challenges Faced During Puberty				
23	What challenges have you faced or are currently facing regarding your changing body during puberty? (mark all that apply)	None: 10%	None: 20%	0.002
		Decreased self-confidence: 19.1%	Decreased self-confidence: 16%	
		Confusion & uncertainty about changes: 31%	Confusion & uncertainty about changes: 42.4	
		Unable to cope with mood swings: 40.1	Unable to cope with mood swings: 22% ²	

Note. The table displays a comparative analysis of student responses to a questionnaire, segmented by the school type (private and public), presenting the percentage distribution of responses for each

question, alongside the associated p-values indicating the significance of differences between the school types.

* Fishers Test

** Likelihood Ratio

Note: Bolded p-values in the table denote statistical significance.

The Summary

To summarise, the study targeted participants aged 14 to 17 from different public and private schools. Differences in age distributions between these school types were observed. The private schools showed a more distributed age pattern, while the public schools had more students at age 14. Moreover, an independent samples t-test revealed a significant difference in mean ages, with the private school average being 1.68 years higher. In terms of puberty awareness, the students from public schools seemed more informed about puberty compared to private school students, thus displaying higher percentages in understanding puberty, its changes, and the typical puberty onset age in boys. There were differing beliefs regarding the causes of puberty and changes during puberty. While the majority of physical changes during puberty were perceived similarly, opinions diverged on voice changes, wet dreams, a curved penis being normal, and the normalcy of a wet dream. Furthermore, the belief that thorough hygiene isn't essential during puberty was more prevalent among private school students. The study results depicted significant differences in understanding puberty-related matters among students from public and private schools, thus signalling diverse awareness and perceptions about these topics.

Moreover, there were distinctions in attitudes towards puberty as well. The private school students expressed more embarrassment and concern about potential diseases due to body changes than their public school counterparts. They were also less likely to feel no changes during puberty. Moreover, while the public school students were more open to discussing puberty within the family,

the private school students leaned towards considering it a private matter. However, no significant differences were detected between the groups in feeling comfortable discussing puberty-related queries with an elder. Notably, the students from private and public schools varied in their perceived importance of accurate information about puberty. Lastly, regarding challenges faced during puberty, the public school students exhibited more confusion about changes, while the private school students reported difficulty in coping with mood swings, thus, indicating different challenges experienced by these student groups.

Chapter Five: Discussion

Introduction

This chapter discusses the findings of the study conducted to explore the basic knowledge and understanding of male adolescent students of Karachi, Pakistan, towards puberty and its associated changes supported by evidence-based literature. Moreover, the study's findings would be incorporated with the existing research to foster a deeper understanding of male adolescent perspectives on puberty and its transformations within the local context. This deeper understanding, in turn, aims to bridge gaps in knowledge and illuminate areas for future exploration. Additionally, this study's insight have informed the strengths and limitations of the study followed by recommendations for future practices across educational, research, policy, and practical domains. Lastly, the chapter concludes with a comprehensive summary of the discussed points.

The Discussion

The discussion of the study's findings encompassed the following dimensions:

General Awareness about Puberty among Adolescents

The findings reveal a mixed level of awareness among male adolescents in Karachi about puberty. While there's a basic awareness of the term "puberty," especially among public schools students, the depth of knowledge and understanding of the associated changes during puberty is varied. Some aspects show a higher level of awareness, whereas others depict lower levels of understanding. For instance, understanding the term "puberty" might be known to a higher percentage of public school students than private schools students. However, the specific changes taking place during puberty, the age at which it starts, the causes of puberty, and the physiological, emotional, and reproductive aspects seem to vary significantly among these students. Hence, the findings suggest that while awareness of puberty as a concept might be present among male adolescents, the comprehensive understanding of its intricacies appears to be relatively low across the board. This finding is supported by a Turkish descriptive study conducted to understand the awareness and perceptions of young adolescents regarding pubertal changes. The study observed that while the highest percentages of correct answers signified a certain level of awareness among adolescents, the responses to other aspects of puberty were remarkably lower. Moreover, this disparity further suggests a variable depth of understanding concerning different aspects of puberty among adolescents. It also found statistically significant differences between genders and age groups for particular statements, suggesting that both gender and age influenced the adolescents' knowledge about pubertal changes (Unalan et al., 2007). On comparing this research to this current study, both the studies demonstrated that certain aspects show a higher level of awareness, while others indicate a lower level of understanding among adolescents. However, this research did not compare the

association between age and the level of understanding of the adolescents. Still, it showcased statistically significant associations between different types of schools (public vs. private) and the awareness levels concerning various puberty-related aspects, which were in line with the Turkish study. Furthermore, these associations imply the influence of educational backgrounds on the depth of understanding of puberty among adolescents in the both studies.

Moreover, Iranian research indicated that 69.8% of adolescent males possessed inadequate and fragmented understanding regarding puberty changes. An evaluation of the responses concerning awareness of initial puberty indicators revealed that changes in reproductive organs and their onset, wet dreams, maintaining a healthy diet in puberty, and behavioural responses to puberty changes received the lowest points (Yao, Ziapour, Abbas, Toraji, & NeJhaddadgar, 2022). Thus, these findings were consistent with the present research which showed that only 45.4% of students from private and 36% from public schools were acquainted with the knowledge of pubertal changes.

Similar consistency was observed in Indian descriptive research as well that indicated inadequate knowledge among 74% of boys and an average level of knowledge in 24% of boys (Rani et al., 2016). A contradiction was observed in a recent study conducted at Marsudisiwi SDK, Malang to investigate the correlation between knowledge of adolescent reproductive health and self-adjustment during puberty among male adolescents, which showed that the majority of participants possessed satisfactory knowledge, comprising 37 children (52.8%), while a small percentage, specifically three children (4.3%), exhibited insufficient knowledge. Thus, a possible reason for this discrepancy can be a significant difference in the sample size of both the researches. Moreover, this study indicated educational institutes as an inadequate source of knowledge for pubertal health awareness (Keswara & Sulistyah, 2021). This specific finding can be related to the present study which showed no statistical significance between the school types and receiving information.

Another inconsistency regarding the proportion of inadequacy in pubertal health information among male adolescents was observed in a different study in India which revealed that out of the 196 respondents, around 62.2% (122) participants demonstrated good puberty health knowledge, whereas 37.85 % (74) of the students displayed inadequate knowledge (Anilkumar et al., 2022).

Likewise, a massive difference in the findings with this study was seen in another recent study (Pelu & Halil, 2022) which was done in Tidore Island involving 45 participants. This research indicated that a staggering 73.3% (33) of the adolescents didn't acquire pubertal education, whereas only 12 (26.7%) participants displayed puberty-related awareness.

Furthermore, this study's findings were more consistent with the research (Shrestha & Neupane, 2020) conducted in Dhulikhel Municipality, Nepal, that revealed a substantial correlation between the type of school and the understanding of pubertal changes. The study observed that students in government schools exhibited a higher level of knowledge and a more positive attitude toward pubertal changes than their private school counterparts. Thus, these findings are parallel to the finding of our study where the public school adolescents also had more insight into puberty.

Meanwhile, considering the Pakistani context, the research findings from the study conducted in Peshawar District reveal insights into adolescent health awareness among 429 students aged 11-19 years from both public and private educational institutions. The study identified that a considerable percentage i.e., 51.98%, displayed moderate awareness, while 47.09% exhibited good awareness, and a small fraction, 0.93%, had excellent awareness about adolescent health. Moreover, the study suggested that students in public sector schools scored significantly higher at 53.34% compared to 46.29% in private sector schools regarding awareness, which was statistically significant (Iftikhar et al., 2016). This specific finding is in line with the current study's analyses that also indicates that the students (38%) from public schools in Karachi demonstrated more awareness about puberty

compared to private school students (18.40%), displaying higher percentages in understanding puberty, its changes, and the typical puberty onset age in boys.

The lack of pubertal health knowledge nationally and internationally can be attributed to various factors. These may include cultural taboos and societal norms that inhibit open discussions about puberty and reproductive health. In some regions, limited access to comprehensive, standardized, and age-appropriate puberty education may contribute to inadequate knowledge. Additionally, socioeconomic disparities, including unequal access to healthcare and information, may further exacerbate the knowledge gap among male children. Hence, addressing these multifaceted challenges requires a holistic approach involving education, community engagement, and policy initiatives.

Attitude and Feelings Regarding Pubertal Changes

The transitional period of puberty brings its share of varying psychological and emotional alterations in an individual other than the physiological changes. Thus, these alterations can cause an adolescent to have different feelings and perceptions and portray attitudes differently than in the pre-pubertal phase. In this study, varying emotional responses and viewpoints among public and private school students were also observed. Moreover, when asked about their feelings during puberty changes, the statistical analysis showed significant differences in feelings of embarrassment and fear of having a disease, with private school students reporting higher levels of embarrassment and fear compared to public school students. However, no significant associations were found for feelings of anxiety or not experiencing any changes.

Similarly, regarding feelings upon reaching puberty, while there were no significant differences in feelings of embarrassment, curiosity, or confidence between private and public school

students. A marginal difference was observed in the anxiety levels, though not statistically significant. Moreover, regarding the perceptions of physical changes during puberty, there were no significant differences in considering these changes as natural and normal. However, a borderline association was noted in the perception of puberty changes as embarrassing, with public school students more likely to perceive these changes as embarrassing compared to their private school counterparts. Still, this difference was not highly significant.

Moreover, unlike the present study, a cross-sectional study conducted in eastern Nepal, targeting 146 adolescents from three schools, showed a considerable percentage (37%) of adolescents agreeing that pubertal changes are normal, further emphasizing the importance of essential sex education. Additionally, there was acceptance and agreement (48.6%) regarding the normalcy of significant reproductive changes and the appropriateness (58.2%) of discussing it openly. The findings also revealed concerns about anxiety among adolescents during puberty, emphasizing the importance of not feeling ashamed of these changes, while indicating a strong disagreement about pubertal changes being solely physical, thus highlighting a holistic perspective beyond physical alterations (Prajapati et al., 2023). Therefore, this variance in the studies can be a result of differences in the sociocultural dynamics of the two countries.

A similar cross-sectional study (Rajawat et al., 2018) conducted in Rohtak, India, investigated the perceptions of male adolescents in government and private schools regarding different aspects of puberty. For instance, among the 600 participants, 12.3% of government school students considered wet dreams as abnormal, whereas 3.4% of the students in private schools reported wet dreams to be abnormal. This analysis shows a vast difference from this researcher's study considering that around 42.10% and 69% of adolescents attributed wet dreams as abnormal in private and public schools, respectively.

Furthermore, a qualitative study in Kenya analysed through focused group discussions that a considerable amount of male adolescents belonging to either urban or rural schools reported having confusion as they began transitioning during puberty. Some of the students expressed the feeling of guilt regarding their bodily changes, whereas many students reported being afraid of wet dreams considering it a disease (Carney et al., 2022). A similar finding was reported in the present research, where 28% of adolescents in private and 18% of adolescents in public schools mentioned the feelings of fear after experiencing wet dreams assuming that they had an illness. The results of this study were again similar to the study by Shrestha & Neupane (2020) which also manifested an association between the type of school attended by the respondents and the attitude toward pubertal changes, and a significant correlation was identified between the two variables. Nevertheless, no associations were observed with other variables.

Furthermore, a Pakistan-based qualitative study revealed that certain emotions articulated by the participants in response to the psychological impact of puberty included confusion, guilt, anxiety, uncertainty, and despair (Shivji et al., 2021). Similar emotions were also observed in this study's analyses where the feelings of anxiety (34%), embarrassment (22.3%), and Confusion and uncertainty (36.7%) were profound.

The Source of Pubertal Health Information

The analyses in this research revealed that students (11.2%) from public schools were more willing to engage in conversations about puberty within their families, whereas students (52%) from private schools regarded it as a private subject. Nevertheless, no prominent variations were found between the two groups regarding their comfort levels when discussing puberty-related questions with an elder. Moreover, the analyses indicated social media to be a common source of information

regarding puberty among the adolescents of both the schools (private & public) with a percentage of 59% and 61% respectively. However, the sources of the religious group, virtual workshops, and the family and friends showed a statistical significance with the type of schools.

In comparison, a study (Methun et al., 2021) in Bangladesh revealed that Community-level variables such as interaction with peers, and educational sites were found to have a prominent impact on adolescents' awareness of pubertal changes. Additionally, the study highlighted the significant influence of religion on the understanding of pubertal changes.

On the other hand, the research of Prajapati et al. (2023) showed that a majority (63.7%) of adolescents found it convenient and appropriate to have conversations with their parents about pubertal changes. Likewise, 56.2% of the students believed that well-educated parents are a valuable source for insights into these sensitive topics, while, 67.1% agreed that peer influence plays a role in handling pubertal changes. On the other hand, 37% disagreed with the idea of schools providing educational programs about pubertal changes. Likewise, half of the participants agreed that elders are a reliable source of information on this topic. Conversely, nearly a quarter strongly disagreed that sociological factors significantly impact how adolescents cope with these changes (Prajapati et al., 2023). Thus, these findings are completely conflicting with the analyses of the present research which shows social media as the major source of information as compared to family, friends, or educational platforms.

On the other hand, the research of Shivji et al. (2021) fairly relates to the results of this study, as it indicates that adolescents find it difficult to discuss puberty with any elder. Instead, they are more inclined towards the internet as a source of information. A similar trend was seen in the study of Rajawat et al. (2018) where a substantial amount of participants expressed feeling embarrassed

while opening up to an elder, while 16% of the respondents reported resorting to the use of the Internet.

However, contrary to the findings in the current research, a study by Shrestha & Neupane (2020) showed a substantial percentage of adolescents acquiring information from the teachers (74%), followed by turning to textbooks (48.4) and referring to friends (46.5%). However, the students receiving knowledge from social media were a small proportion accounting for 24.4% only.

In a conservative society like Pakistan, religious and moral values may shape attitudes toward puberty and sex education. Discussions about reproductive health and sexuality may be viewed through a moral or religious lens, impacting the content and delivery of pubertal health and sex education. The lack of effective communication channels between parents, teachers, and adolescents hinders the transfer of knowledge profoundly. Similarly, a study by Meherali et al. (2022) in Gilgit, Pakistan witnessed that the obstacles keeping the adolescents away from availing basic health services regarding sexual and reproductive health commonly included their perception of being too young (18%), concerns about being judged (13.6%), and societal approach towards sex (11.23%). The study further revealed that the most common sources of information among adolescents residing in Northern Pakistan were youth groups and peers constituting about 25.4% and 21.3 respectively. However, the proportion of parents or family as a source of information constituted 13.5% only indicating a lack of communication between the adolescents and their folks. These results are contrary to the present study where the proportions of peers and school as the source of information were relatively low.

The Study's Strengths

The following are the strengths of this research study:

- The study has included participants from both public and private schools in Karachi, Pakistan, providing a diverse sample for analysis.
- The study is comprehensive, exploring various aspects of knowledge and attitudes regarding puberty among male adolescents in Karachi. Moreover, it covers a wide range of questions related to puberty and provides detailed statistical results.
- This research has potentially provided insights for educational, health, and social interventions.
- The study is contextualized within the specific environment of Karachi, thus recognizing the potential influence of cultural and regional variations on attitudes toward puberty. This also ensures that the findings are relevant to the local context.

The Study's Limitations

The Limitations of the study are as follows:

- The findings are specific to the context of Karachi. Thus, they might not be generalizable to other regions or countries due to cultural and regional variations in attitudes toward puberty.
- Being a cross-sectional study, the findings might not provide a longitudinal view of how attitudes and awareness change over adolescence, thus limiting the understanding of changes in knowledge and attitudes.
- The study's reliance on questionnaires might limit the depth of understanding and context, as questionnaires might not capture subtle opinions or reasons behind the responses.

The Recommendations

The study also generated a few recommendations:

At Educational Level

The educational level recommendations are as follows:

- Integrating detailed and age-appropriate puberty education into school curriculum ensure a comprehensive understanding of the changes that occur during puberty. Moreover, engaging interactive teaching methods and materials can greatly enhance the effectiveness of this curriculum integration.
- There is a need to develop life skills programmes within schools that emphasise emotional and physical changes during puberty, mental health, and interpersonal relationships. These programmes empower adolescents to navigate the challenges presented by these changes, thus contributing to their overall well-being and development.
- There is a need to develop and implement customized educational programmes that go beyond generic puberty education and focus on the subtle aspects that were found to be less understood by male adolescents in Karachi.
- The integration of emotional support components into educational initiatives is needed. There is also the need to acknowledge and address the emotional responses observed among students, such as embarrassment and fear, to create a more inclusive and supportive learning environment.
- There is a need to establish peer support programmes within schools where older students can mentor younger ones. Thus, this can create a supportive peer environment, allowing adolescents to discuss and navigate puberty changes with their peers.

At Research Level

The research-level recommendations are as follows:

- There is a need to conduct longitudinal studies that monitor changes in knowledge and attitudes about puberty among male adolescents over time, thus providing a comprehensive understanding of the evolution of awareness during this crucial developmental phase.
- There is also the need to broaden the research scope to include diverse socio-economic backgrounds, cultural groups, and regions within Karachi or Pakistan. It would eventually enhance the depth of understanding of puberty perceptions among male adolescents.

This inclusive approach will offer insights into how these perceptions vary across different societal contexts, contributing to a more subtle and comprehensive understanding of adolescent experiences during puberty.

At Policy Level

The policy-level recommendations are as follows:

- National policies, strategies, and plans must acknowledge the significance of adolescent reproductive health and integrate it into various sectors. The policy-level recommendations for enhancing the awareness of puberty and reproductive health in male adolescents encompass several key strategies.
- National guidelines or standards should be developed and implemented for puberty education, thus ensuring consistency and evidence-based practices.

- Advocacy for age-appropriate and comprehensive puberty education in the national school curriculum is emphasized, with an equity-based approach considering diverse backgrounds.
- Policies should be formulated based on ongoing research findings while remaining adaptable to emerging trends.
- Culturally sensitive educational materials and mandatory teacher training programmes could be implemented for effective education. This can enhance the quality of education provided to male adolescents.
- Collaboration between educational authorities and healthcare professionals is encouraged to provide accurate information.
- Regular evaluations of puberty education programs are recommended to ensure ongoing effectiveness and address evolving needs.

At Practice levels

The practice-level recommendations are as follows:

- There is a need to initiate community-based programmes in collaboration with schools to engage parents, guardians, and local communities in conversations about puberty. Thus, offering guidance and resources can create a more inclusive environment for discussing and addressing puberty-related concerns.

- There is a need to establish or expand adolescent health services within schools or community centres that would ensure accessibility to essential guidance and support services, thus promoting a more holistic approach to adolescents' development and well-being.

A Summary of the Chapter

The chapter provided a comprehensive analysis of the study exploring the awareness and understanding of male adolescent students in Karachi regarding puberty and its changes. The study demonstrated a varied level of awareness among male adolescents in Karachi about puberty, thus exhibiting that while the concept of puberty is known, the comprehensive understanding of its complexities is relatively low. Moreover, comparative analyses with prior studies underline similar differences in awareness among adolescents. Furthermore, it examines the findings and discusses both the strengths and limitations of the research. Lastly, the chapter concludes with recommendations for educational, research, policy, and practical applications

A Conclusion of the Study

In conclusion, this comprehensive study explored the awareness and attitudes of male adolescents in Karachi regarding puberty. The research showed that while there is a fundamental awareness of puberty, there is also a limited understanding of its complexities. Varied levels of comprehension among students from different educational settings emphasise the influence of environmental factors on adolescent awareness. Thus, this study underscores the need for special educational initiatives, spanning curriculum integration and life skills programmes, to bridge the knowledge gap and prepare adolescents to navigate the complexities of puberty. Lastly, it highlights the importance of community involvement, emphasising the need for supportive resources to support adolescents in coping effectively with the changes during this critical developmental phase.

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Table 3:*Literature Synthesis*

S N O	Author	Purpose of the study	Study Design	Finding
1	Shahid et al. (2012)	Assessing adolescents in Karachi to gauge their current knowledge, attitude, and behaviour towards reproductive and sexual health, and gathering their views on reproductive health education.	Cross-sectional study Sample size: 912	About 75% of males and 71% of females were familiar with reproductive health. The majority of participants reported discussing reproductive health matters with friends. Moreover, 81% of males and 91% of females expressed the need for improved reproductive health education and awareness.
2	Qazi, Y. S. (2003)	Investigating knowledge, attitudes, and information sources regarding sexual and reproductive health among unmarried adolescents. Additionally, assessing levels of physical and sexual abuse.	A pilot survey Sample size: 310	1. Study results reveal a common lack of knowledge about sexuality and reproduction among both male and female adolescents in Pakistan, leaving them unprepared for the physical and emotional changes during this life stage.

3	Mustasam et al. (2018)	To assess women's present knowledge, attitudes, and practices concerning reproductive health services.	Descriptive cross-sectional study Sample size: 384	Findings showed that 64% of females didn't seek gynaecological care advice. 80% never received information on sexually transmitted infections whereas 74% of participants didn't discuss family planning with a healthcare professional. However, they value antenatal and postnatal care for women's health and showed interest to receive awareness on these topics.
4	Bashir et al. (2017)	Examining the knowledge of urban adolescent females regarding sexual and reproductive health issues.	An interpretive qualitative study Sample size: 24	The study revealed a lack of knowledge about crucial sexual and reproductive health issues among adolescent females. Due to social taboos and stigma surrounding sex education in Pakistan, parents and teachers often struggle to effectively raise awareness among adolescents. Consequently, adolescents resort to other sources like peers, media, and the internet, which may be unreliable and exploitative. This study underscores the necessity for comprehensive sexual and reproductive health information among adolescents.
5	Tasleem et al. (2020)	Examining pubertal experiences in adolescent girls in Pakistan and assessing their impact.	Cross-sectional Descriptive study Sample size: 194	The study's findings align with existing literature, indicating that pubertal timing plays a crucial role in the development of emotional reactivity and self-regulation, leading to pro-social behaviour in adolescents. The analysis also supports the validity of using PCES (Pubertal Changes Experiences Scale) as an effective assessment tool for measuring pubertal experiences in school girls.
6	Shivji et al. (2021)	The study focused on investigating the puberty experiences of young males in Pakistan.	Qualitative thematic analysis with an inductive approach. Sample size: 22	Findings highlight the significance of culturally appropriate puberty education and various facilitating factors that may improve the puberty experiences for future young men
7	Huda et al. (2017)	The study aimed to explore perceptions and practices of adolescent boys regarding puberty and evaluate the effectiveness of academic sessions on their knowledge about puberty at a secondary school in F.B. Area, Karachi.	Time series pre and post-quasi-experimental design. Sample size: 58	Approximately half of the participants were unaware of their pubertal age. 73.33% of the adolescents reported that they felt shame and hypersensitive over the physical changes they experience in the pubertal age group. Interestingly, 53.33% of the adolescents reported that they talk about these changes with their parents
8	Coast et al. (2019)	This research aims to conduct a scoping review that explores available evidence concerning the understanding and encounters of puberty and menstruation among females aged 10-14 years in low- and middle-income countries.	A systematic scoping review. Sample size: 44	A majority (40/44) of studies used school-based samples, and fifteen studies reported on interventions. Girls had inadequate knowledge about menstruation; menarche as a trigger for girls learning about menstruation was common. Adolescents struggled with menstrual hygiene. Negative emotions were associated with menarche

				and menstrual management. A minority of studies dealt explicitly with puberty.
9	Sultan & Rehman (2011)	The objective of this study is to evaluate the involvement of community stakeholders in ensuring the Sexual Reproductive Health Rights of early adolescent girls, as it directly impacts their future and the future of their nations.	Cross-sectional quantitative study Sample size: 384	The study indicates that 60% of adolescents rely on their family as a source of information regarding adolescent issues. However, access to health services for menstruation-related problems and complications is only 2%. Merely 40% of girls receive assistance from the community apart from their family, and only 11% know pubertal changes during adolescence. The level of awareness concerning Sexual and Reproductive Health was found to be significantly low in the study.
10	Ali et al. (2006)	To determine the percentage of female adolescents utilizing available facilities and to evaluate the extent of comprehension concerning puberty and related health issues among female adolescents.	Cross-sectional study Sample size: 150	The study's findings indicated a deficiency in knowledge related to puberty and associated health issues among female adolescents. Sixty-six percent (66%) of the participants were aware of the names of reproductive organs. The majority of them received information about sexuality from their mothers. Additionally, sixty-seven percent (67%) of the participants were unfamiliar with the self-breast examination.
11	Barreck & Malik (2019)	To assess the level and scope of reproductive health knowledge among college youth in Balochistan.	Quantitative Sample size: 400	The study findings indicated a low level of awareness among adolescents concerning their physical and mental health. They lack knowledge of how to handle emergencies. Additionally, they possess minimal information and awareness regarding sexual and sexually transmitted diseases.

12	Valizadeh (2016)	To examine the influence of puberty health education, using the Health Belief Model, on health behaviours and preventive measures among male students in the first secondary school in Marivan City in 2015.	A quantitative and pragmatic approach Sample size: 360	The study's results highlight and demonstrate the effectiveness of an educational intervention based on the Health Belief Model in promoting preventive and controlling behaviours related to aspects of reproductive health during puberty.
13	Mamdani et al. (2009)	To investigate the knowledge and attitude of female adolescents aged 15-19 years regarding their reproductive health in Lower Hunza, Northern Areas of Pakistan.	Quantitative methodology Sample size: 135	The study findings indicate that the knowledge of late female adolescents in Lower Hunza is not satisfactory. There are gaps in their understanding of certain aspects of reproductive health, and some of their knowledge is based on misconceptions. The majority of the respondents lack knowledge about puberty, reproductive age in women, and contraceptive use.
14	Mansoor et al. (2021)	To determine the socio-demographic factors associated with knowledge about puberty and menstruation among females of reproductive age attending a public healthcare institute.	Cross-sectional survey. Sample size: 288	The analysis, both descriptive and inferential, involved 288 female participants in the study. Among them, 48.6% demonstrated adequate knowledge concerning puberty and menstruation.
15	Dhakal (2019)	The objective of the study was to assess the knowledge and attitude regarding pubertal health among adolescent girls.	Descriptive cross-sectional study. Sample size: 183	The study findings showed that 61.4% of the students belonged to the early adolescence age group. The majority (80.3%) had a moderate level of knowledge, and approximately half (48.6%) exhibited a positive attitude. The level of knowledge and attitude differed based on the respondent's level of education, relationship with siblings, and the source of information from elder sisters and teachers/school.
16	Shrestha & Neupane (2020)	To evaluate the knowledge and attitude regarding pubertal changes among secondary-level students in a selected school of Dhulikhel Municipality.	A quantitative, descriptive cross-sectional study Sample size: 254	Knowledge about pubertal changes was notably higher among the age group of 15-17 years. Females exhibited greater knowledge compared to males. Moreover, the attitude towards pubertal changes was significantly more positive in respondents studying in government schools.
17	İşgüven et al. (2015)	The study's objective was to assess the level of knowledge and identify the sources of information about normal puberty and menstrual patterns among Turkish schoolgirls in Istanbul.	Cross-sectional study Sample size: 922	Around half (50.7%) of the students were not aware of the period between the onset of puberty and menarche. The girls who had experienced menarche demonstrated higher knowledge about puberty, primarily through their personal experiences.

18	Yao et al. (2022)	This study investigated the puberty-related health needs of 10—5-year-old boys in Iran.	Cross-sectional descriptive Sample size: 452	There was a notable correlation between the educational levels of both mothers and fathers and the awareness of puberty changes among adolescent boys. The study found that 69.81% of teenage boys lacked awareness of puberty and health behaviours, and 87% had limited access to desired educational resources. Additionally, 82% of the boys' families did not discuss puberty changes and hygiene practices with them.
19	Ziapour et al. (2020)	The purpose of this study was to explore the educational requirements of 10-14-year-old girls concerning adolescent puberty health in Ardabil City, Iran.	Cross-sectional descriptive-correlational study Sample size: 452	The study findings revealed that 73.8% of girls were aware of puberty and menstruation problems. However, approximately 74.3% of girls had low self-efficacy. Moreover, 77% of the female students lacked access to essential educational resources and classes, which significantly influence behaviour development. Additionally, 88% of families did not discuss hygiene practices related to their children.
20	Ahmadi et al. (2009)	The study aimed to explore adolescents' and parents' experiences regarding puberty within the cultural context of Iran.	Qualitative research Sample size: 16	Transcript analysis revealed four main themes: shame and embarrassment, anxiety, transition, and puberty orientation and management. Most boys in the sample expressed anxiety and fear about the physical and mental changes during puberty, experiencing these emotions directly and indirectly.
21	Farid et al. (2019)	To evaluate the knowledge, attitude, and coping strategies employed by female secondary school students in Karaj, Iran, in dealing with puberty-related challenges.	Cross-sectional study. Sample size: 570	About 85.1% of the participants had high knowledge about puberty and 66.7% had a good attitude toward it. Nearly, 54.2% of the girls used the avoidance-oriented coping strategy. There was no significant relationship between knowledge and attitude regarding selective strategies to cope with stressful situations in puberty.
22	Saghi et al. (2015)	The study aims to determine the knowledge and attitude of adolescents regarding pubertal health, along with identifying the socio-demographic factors that may influence them.	Cross-sectional study Sample size:1017	The findings of this study show that the knowledge and attitude of adolescents about pubertal health are moderate.
23	Afsari et al. (2017)	The study seeks to identify the factors that predict the knowledge and practice of female students about puberty health in Tabriz High Schools.	Cross-sectional study Sample size:364	Adequacy of information, the kind of family, and the preferred source of information were practice predictors about puberty health

24	Bobhate & Shrivastava (2011)	The study's objectives are twofold: first, to investigate the knowledge about reproductive health among female adolescents, and second, to assess their treatment-seeking behaviour concerning reproductive health issues in an urban slum of Mumbai.	Cross-sectional descriptive study. Sample size:241	32.8% had unsatisfactory menstrual hygiene practices. 88% were aware of ANC services. 66% knew HIV transmission modes, but only 18.7% knew safe sexual practices. Education status and early adolescence (10-14 years) were significantly associated with knowledge of menstruation.
25	Gaferi et al. (2018)	The study aimed to evaluate the knowledge, hygiene practices during menses, and attitudes of female adolescents in Riyadh female secondary schools regarding reproductive health aspects.	A quantitative descriptive cross-sectional design Sample size:350	The findings revealed that 66.3% of the participants had inaccurate knowledge, whereas approximately one-third (33.7%) possessed correct knowledge regarding reproductive health (RH).
26	AlQuaiz et al. (2013)	This study aimed to assess the sexual health knowledge level of adolescents and examine its correlation with the roles of parents, friends, and the school environment among adolescent girls in Riyadh, Saudi Arabia.	Cross-sectional study Sample size:419	54% of ≤15years and 70.7% of >15 years had poor sexual health knowledge.
27	Keswara & Sulistiyah (2021)	The study aimed to explore the connection between adolescent reproductive health knowledge and self-adjustment in puberty among boys at the Marsudisiwi SDK in Malang.	Analytical research method with a cross-sectional approach. Sample size: 70	The study's results indicated no significant relationship between adolescent reproductive health knowledge and self-adjustment in puberty among boys at Marsudisiwi SDK in Malang. However, it was observed that some respondents exhibited a lack of adolescent reproductive health knowledge, which could potentially influence their ability to cope with the challenges of puberty.
28	Ahmed et al. (2009)	The study investigated adolescent male opinions on reproductive health education at the onset of puberty and aimed to understand their perceptions and attitudes toward it.	Quantitative cross-sectional study Sample size: 800	Approximately half of the university students (48%) lacked a clear understanding of puberty and remained confused. A significant number of adolescents felt shy (26%), scared (7%), least bothered (14%), and completely unaware (5%) about the onset of puberty.
29	Priya et al. (2022)	The objective is to assess and enhance the current awareness levels of reproductive health among adolescent girls in South India.	Descriptive interventional study Sample size: 800	All students demonstrated noteworthy progress in knowledge levels after the educational intervention. During the pre-test, 414 students had average knowledge, and 71 had good knowledge, while in the post-test, the numbers improved to 75 with average knowledge and 723 with good knowledge.
30	Jain et al. (2013)	The objective of this study was to evaluate the level of awareness about adolescent changes and problems among school-going adolescents.	Cross-sectional study Sample size: 320	Among the 320 study adolescents, 212 (66.3%) were aware of at least one adolescent change. However, 24 (8.82%) adolescents either did not consider these changes as normal or were uncertain whether the changes were normal or abnormal.

31	Sharma & Sharma (2019)	To identify the specific medical and reproductive health needs of adolescent girls.	A cross-sectional analytical study Sample size: 1127	Only 57.8% of the participants were aware of the available contraceptive methods. Merely 14% (164) of the girls were aware of reproductive tract infections and sexually transmitted diseases. However, 61% (687) of the girls were informed about HIV/AIDS in particular.
32	Bunoti et al. (2022)	The objective of this study was to assess the awareness of pubertal body changes, challenges, and opportunities among primary school children aged 10-14 years in eastern Uganda.	Qualitative study design Sample size: 152	Girls in rural schools exhibited higher awareness of their body changes compared to those from urban schools. Conversely, boys in urban schools demonstrated better knowledge of pubertal body changes than their counterparts in rural schools.
33	Telebak et al. (2013)	The study aimed to investigate the level of knowledge among adolescents in the Republic of Srpska regarding reproductive health and explore their attitudes toward it.	Cross-sectional study Sample size: 683	Approximately one in four 12-year-olds and one in eight 15-year-olds received information on reproductive health from their parents. A majority of young people (54.9%) preferred to seek advice from their parents when dealing with sexual life issues, while only 2.8% would approach their teachers. One in four adolescents would seek advice from their peers on sexual life issues. Moreover, 79.1% of all surveyed adolescents believed that having Sexual Education as a school subject would be beneficial.
34	Anilkumar et al.(2022)	To determine the knowledge, attitudes, and perceptions of school-going adolescents in Central Kerala, India, concerning sex education.	Cross-sectional study Sample size: 196	Out of all the participants, 122 (62.2%) demonstrated good knowledge of sex education, while 74 (37.85%) had limited knowledge. In terms of attitude, 110 (56.1%) had a favourable attitude, and the remaining 86 had an unfavourable attitude. Additionally, 134 (68.9%) had a positive perception of sex education, while 61 (31.1%) had a negative perception.
35	Poojary et al. (2015)	The study aimed to evaluate the knowledge of school-aged girls about pubertal changes. Additionally, it sought to identify the associated demographic factors related to their knowledge about these changes.	Descriptive survey design Sample size: 100	Out of the girls studied, 41% had inadequate knowledge, 58% had moderate knowledge, and only 1% had adequate knowledge regarding pubertal changes. The knowledge level was significantly associated with age, religion, and those who had received prior information about pubertal changes.
36	Prasad et al. (2020)	The objectives of this study were to evaluate the knowledge level of adolescent girls regarding menarche and puberty and to determine the association between this knowledge level and selected variables such as age, educational status, occupation, and income status.	Descriptive research design Sample size: 50	Among the adolescent girls, 11% had adequate knowledge, 33% had moderately adequate knowledge, and 6% had inadequate knowledge about menarche and puberty.

37	Rani et al. (2020)	The study aims to evaluate the knowledge and attitude regarding puberty and reproductive health among pre-adolescents.	Descriptive study design Sample size: 204	The majority of pre-adolescent girls and boys (75% and 74% respectively) had limited knowledge regarding pubertal changes.
38	Schmitt et al. (2022)	To gain insights from adolescent girls and the adults in their lives regarding the challenges associated with providing menstruation and puberty education in urban U.S.A. schools.	Qualitative study Sample size:73	The study revealed that a considerable number of girls expressed a desire for more education on menstruation and puberty topics in schools, with a particular emphasis on practical guidance.
39	Schmitt et al. (2022)	The objective was to address a gap in the existing literature and guidance on menstrual hygiene management (MHM), specifically concerning menstrual disposal and the laundering of reusable menstrual materials in emergencies.	Qualitative assessment Sample size:81	The study found variations in the availability of menstrual materials and supplies, including items required for the proper cleaning of reusable menstrual products. Additionally, many respondents emphasized the insufficient access to menstruation-friendly toilets, which included a lack of disposal options and poor lighting.
40	Carney et al. (2022)	This study aims to provide valuable insights into boys' transitions through puberty in sub-Saharan Africa, contributing to the limited existing evidence on this topic.	A comparative case study using qualitative methodologies Sample size 130	Although the rural and urban sites differed in cultural, religious, and economic aspects, adolescent boys in both locations reported experiencing feelings of guilt, shame, and confusion as their bodies went through changes during puberty.
41	Yunita & Mona (2022)	To figure out the adolescent's level of knowledge regarding reproductive health.	Qualitative study including counselling or direct socialization with adolescents Sample size 30	The results indicated that reproductive health counselling for adolescents is being conducted effectively and with clear objectives. Adolescents showed a high level of enthusiasm for counselling, and it was found to be highly beneficial for both adolescents and society as a whole.
42	Damayanti et al. (2022)	The study aims to investigate the relationship between the knowledge and attitudes of adolescent girls regarding the physical changes of puberty and their self-confidence.	Observational with a cross-sectional approach Sample size 71	The study found a significant relationship between the knowledge and attitude of young women regarding the physical changes of puberty and their self-confidence.
43	Korri et al. (2021)	The study aims to explore the perceptions and experiences related to sexual and reproductive health (SRH) among refugee adolescent girls residing in Bourj Hammoud, an urban setting in Lebanon.	Qualitative design Sample size 40	During the focus group discussions, most participants expressed that they lacked awareness about menstruation when they experienced it for the first time. They also highlighted the presence of social stigma associated with menstruation.

44	Pelu & Halil (2022)	To investigate the impact of health education on knowledge of physical changes in early adolescents at MTs Al-Ikhwan Tidore Islands.	Quasi Experimental design. Sample size: 45	The study's conclusion indicated that health education on puberty had a positive effect on early adolescents' knowledge of physical changes during this stage of development.
45	Chandra-Mouli & Patel (2017)	The primary objective of this review is to assess the knowledge of menstruation among adolescent girls in low- and middle-income countries, explore their sources of information, evaluate the response of adults to their information needs, identify the negative health and social effects they experience, and examine their coping strategies and practices in response to these effects.	structured search strategy, Sample size:81	The study's results show that adolescent girls in LMIC are often unprepared and uninformed about menarche. They rely on information from female family members, leading to misconceptions and unhygienic practices. Instead of seeking medical consultation, girls tend to miss school, self-medicate, and avoid social interactions.

Note. The above table is for research based literature.

Appendix A

Questionnaire

Date: _____

Participant ID: _____

Section One: Personal Information

1. How old are you? ____
2. What grade are you in?
A. Grade 8 B. Grade 9 C. Grade 10
3. What level of education have your parents/caregivers completed?

My mother has completed:

- A. Primary School B. Middle School C. Secondary School
D. College E. University F. Religious Education/Madrassa

My father has completed:

- B. Primary School B. Middle School C. Secondary School
D. College E. University F. Religious Education/Madrassa
-

Section Two: Knowledge about Puberty

Mark "1" if your answer is Yes and "0" if your answer is No.

1. Do you know what puberty is?
2. Do you know what changes takes place during puberty?
3. Does puberty begin at the same age in all boys?

1	0
1	0
1	0

Choose the best answer:

4. What Age does puberty usually begin in boys?

- 0-5yrs
- 5-10yrs
- 10-15yrs
- 15-20yrs

5. Which one of the following causes puberty?

- Age
- Hormones
- Maturity

6. What changes can occur in male body during Puberty? (mark all that apply)

- Voice start changing Yes No
- Breast Development Yes No
- Penis gets large Yes No
- Sperm production Yes No
- Broadening of chest Yes No
- Testicular and scrotum growth Yes No
- Increased sweating Yes No
- Hair growth specially in armpits and around genitals Yes No
- Wet dreams Yes No

7. How does a boy's voice change during puberty?

- It will get deeper.
- He will lose his voice.
- It will get higher.
- It will get faster.

8. What is mixed with sperm in the testicles?

- Smegma (thick secretion around your genitals)
- Semen
- Blood

9. Sometimes a boy's body will release seminal fluid through the penis during the night when he's asleep. This is called:

- Wetting the bed
- A wet dream
- An erection

- Masturbation

10. What happens as a result of a wet dream?

- The person urinate during sleep
- The person ejaculate semen
- The person urinate in midnight

11. A wet dream is not normal.

- Yes
- No

12. Is it normal for a male to have a curved penis?

- Yes
- No

13. Ejaculation may occur at night during sleep

- Yes
- No

14. Erection is the hardening of the penis.

- Yes
- No

15. During puberty a person does not have to bath or wash himself thoroughly.

- Yes
- No

16. During puberty a male is able to reproduce children.

- Yes
- No

17. Mood swings (changes of mood) can be a part of Puberty changes.

- Yes
- No

Section Three: Attitude and Perception regarding Reproductive Health

18. How did you feel when you experienced puberty changes? (mark all that apply)

- I felt normal
- I felt embarrassed of my body changes
- I am afraid I might have a disease
- I felt anxious
- I have not experienced any change.

19. Which of following feelings did you experience when you reached to puberty? (Mark all that apply)

- Embarrassment
- Curiosity

- Confidence
- Anxiety
- Happiness

20. How do you view the physical changes that occur during puberty? (mark all that apply)

- Natural and normal
- Unpleasant and unwanted
- Exciting and positive
- Embarrassing

21. Do you think discussing puberty openly with family is important?

- Yes, it helps to understand what's happening
- No, it's a private matter
- Not sure

22. How comfortable do you feel talking to an elder about questions related to puberty?

- Very comfortable
- Somewhat comfortable
- Not very comfortable
- Not comfortable at all

23. How important is it to have accurate information about puberty?

- Very important, so I can understand my body
- Somewhat important, but not a top priority
- Not very important, I'll figure it out on my own

24. Have you ever received education/information about puberty?

- Yes
- No

25. Please check all of the places you have had Pubertal health awareness.

- Primary school
- Middle school
- Secondary school
- Religious group (i.e., mosque)
- Online (social media, websites)
- Virtual workshops
- Other (_____)

26. What challenges have you faced or are currently facing regarding your changing body during puberty? (mark all that apply)

- Decreased self-confidence
- Confusion and uncertainty about changes
- Unable to cope with mood swings
- Other. (_____)

Appendix B-1

Informed Consent (English)

PARENTAL CONSENT FORM FOR CHILDREN 0 <18YEARS

Project Information	
Project Title: Knowledge & attitude regarding pubertal changes among adolescent males in urban Karachi, Pakistan.	Date: May 9, 2023
ERC Project No: 2023-8302-24757	Sponsor:
Principal Investigator: Dr. Saleema Gulzar	Organization: Aga Khan University
Location: Karachi	Phone: 03332356678
Other Investigators: Sabah Muhammad Nazim Dr. Zohra Lassi Hussain Maqbool	Organization: Aga Khan University
Location: Karachi	Phone Numbers: Saleema Gulzar 0333-2356678 Sabah M. Nazim 0332-7963848 Hussain Maqbool +1 825 440-1825

Introduction

The purpose of this form is to provide you (as the parent of a prospective research study participant) information that may affect your decision as to whether or not to let your child participate in this research study. The person performing the research will describe the study to you and answer all your questions. Read the information below and ask any questions you might have before deciding whether or not to give your permission for your child to take part. If you decide to let your child participate in this study, this form will be used to record your permission.

Purpose of the Study

If you agree, your child will be asked to participate in a research study about finding the level of knowledge regarding puberty in young male students in Karachi and the sources of their information.

What is my child going to be asked to do?

If you allow your child to participate in this study, s/he will be asked to fill out a questionnaire. This study will take **30minutes to 1 hour** and there will be **270** of other people in this study.

What are the risks involved in this study?

There are no foreseeable risks to participating in this study.

What are the possible benefits of this study?

Your child will receive no direct benefit from participating in this study; however it will help in highlighting the lack of puberty awareness if there would be any, and will give a goal to the relative institutions to address this need and take steps to remove the knowledge gaps in young male students which will promote the physical and mental health of the younger generation of the society.

Does my child have to participate?

No, your child's participation in this study is voluntary. Your child may decline to participate or to withdraw from participation at any time. Withdrawal or refusing to participate will not affect their treatment/procedure or relationship with Aga Khan University in anyway. You can agree to allow your child to be in the study now and change your mind later without any penalty.

What if my child does not want to participate?

In addition to your permission, your child must agree to participate in the study. If your child does not want to participate they will not be included in the study and there will be no penalty. If your child initially agrees to be in the study s/he can change their mind later without any penalty. Your child have the right to refuse to answer any question(s) that they do not wish to

answer. Their decision to refuse to answer any question(s) will not affect their participation in the study in any way.

Will there be any compensation?

Neither you nor your child will receive any type of payment participating in this study.

How will your child’s privacy and confidentiality be protected if s/he participates in this research study?

Your child’s privacy and the confidentiality of his/her data will be protected by keeping it under secured network with password access. Only primary investigator and the committee members will be able to access the data. Your child’s research records will not be released without your consent unless required by law or a court order. If it becomes necessary for the Ethics Review Committee to review the study records, information that can be linked to your child will be protected to the extent permitted by law. The data resulting from your child’s participation may be made available to other researchers in the future for research purposes without identification. In these cases, the data will contain no identifying information that could associate it with your child, or with your child’s participation in any study.

Whom to contact with questions about the study?

Prior, during or after your participation you can contact the researcher **Sabah Muhammad Nazim** at **03327963848** or send an email to **sabah.muhammad@scholar.aku.edu** for any questions or if you feel that you have been harmed. This study has been reviewed and approved by AKU Ethics Review Committee.

Signature

You are making a decision about allowing your child to participate in this study. Your signature below indicates that you have read the information provided above and have decided to allow them to participate in the study. If you later decide that you wish to withdraw your permission for your child to participate in the study you may discontinue his or her participation at any time. You will be given a copy of this document.

Child’s Printed Name: _____

Printed Name of Parent(s) or Legal Guardian: _____

Signature of Parent(s) or Legal Guardian _____

Date: _____

Printed Name of Person Obtaining Consent: _____

Signature of Person Obtaining Consent: _____

Date: _____

For Participants unable to read

Witness:

I have witnessed the accurate reading of the consent form to the potential participants, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Witness Name: _____ Participant's Thumb Print: _____

Signature: _____

Date: _____

Appendix B-2

Informed Consent (Urdu)

18 سال سے کم عمر کے بچوں کے لیے والدین کی رضامندی کے فارم کا نمونہ

پروجیکٹ کی معلومات	
ورژن : 3 تاریخ: 9 مئی, 2023	پروجیکٹ کا عنوان: شہر کراچی میں نوجوان نوعمر لڑکوں میں بلوغت کی تبدیلیوں کے بارے میں علم اور رویہ
معاونت کار	ERC پروجیکٹ نمبر-2023-8302-24757
ادارہ: آغا خان یونیورسٹی ہسپتال	مرکزی تحقیق کار: ڈاکٹر سلیمہ گلزار
فون : 03332356678	مقام: کراچی
ادارہ: آغا خان یونیورسٹی ہسپتال	دیگر تحقیق کار: صبا محمد ناظم ڈاکٹر زہرہ لاسی حسین مقبول

فون:	
Saleema Gulzar 0333-2356678	
Sabah M. Nazim 0332-7963848	مقام: کراچی
Hussain Maqbool +1 825 440-1825	
Dr Zohra Lassi +61 405 332 094	

تعارف

اس فارم کا مقصد آپ کو (ممکنہ تحقیقی مطالعہ کے شرکاء کے والدین کی حیثیت سے) ایسی معلومات فراہم کرنا ہے جو آپ کے فیصلے پر اثر انداز ہو سکتی ہے کہ آپ کے بچے کو اس تحقیقی مطالعے میں حصہ لینے دیا جائے یا نہیں۔ تحقیق کار آپ کو مطالعہ کی وضاحت کرے گا اور آپ کے تمام سوالات کے جواب دے گا۔ اپنے بچے کو حصہ لینے کی اجازت دینے یا نہ دینے کا فیصلہ کرنے سے پہلے نیچے دی گئی معلومات کو پڑھیں اور کوئی بھی سوال پوچھیں۔ اگر آپ اپنے بچے کو اس مطالعے میں حصہ دلانے کا فیصلہ کرتے ہیں تو یہ فارم آپ کی اجازت کو ریکارڈ کرنے کے لیے استعمال کیا جائے گا۔

مطالعہ کا مقصد۔

اگر آپ رضامند ہیں تو، آپ کے بچے سے کہا جائے گا کہ وہ کراچی کے نوجوان طلباء میں بلوغت کے بارے میں علم کی سطح اور ان کی معلومات کے ذرائع کے بارے میں تحقیقی مطالعہ میں حصہ لے۔ اس مطالعے کا مقصد یہ معلوم کرنا ہے کہ بلوغت کے بارے میں مرد نوعمر طلباء میں علم کی سطح کیا ہے اور بلوغت کی تبدیلیوں کے آغاز پر انہوں نے کیا ردعمل ظاہر کیا۔

میرے بچے سے کیا پوچھا جائے گا؟

اگر آپ اپنے بچے کو اس مطالعے میں حصہ لینے کی اجازت دیتے ہیں تو ان سے ایک سوالنامہ پُر کرنے کو کہا جائے گا۔ اس مطالعہ میں تقریباً 30 منٹ سے 1 گھنٹہ لگے گا اور اس مطالعہ میں 270 دیگر طلباء بھی شامل ہوں گے۔

اس مطالعے میں شامل خطرات کیا ہیں؟

اس مطالعے میں حصہ لینے کے لیے کوئی متوقع خطرات نہیں ہیں۔

اس مطالعے کے ممکنہ فوائد کیا ہیں؟

آپ کے بچے کو اس مطالعے میں حصہ لینے سے کوئی براہ راست فائدہ نہیں ملے گا۔ تاہم اس سے معاشرے میں

بلوغت کے بارے میں آگاہی کی کمی کو اجاگر کرنے میں مدد ملے گی، اور متعلقہ اداروں کو اس ضرورت کو پورا کرنے اور نوجوان طلباء میں علم کی کمی کو دور کرنے کے لیے اقدامات کرنے کا ہدف ملے گا جس سے معاشرے کی نوجوان نسل کی جسمانی اور ذہنی صحت کو فروغ ملے گا۔

کیا میرے بچے کو حصہ لینا چاہئے؟

نہیں، اس مطالعے میں آپ کے بچے کی شرکت رضاکارانہ ہے۔ آپ کا بچہ شرکت کرنے سے منع کر سکتا ہے یا کسی بھی وقت شرکت سے دستبردار ہوسکتا ہے۔ دستبرداری یا حصہ لینے سے انکار ان کے علاج/طریقہ کار یا کسی بھی طرح آغا خان یونیورسٹی کے ساتھ تعلقات کو متاثر نہیں کرے گا۔ آپ اپنے بچے کو ابھی مطالعے میں آنے کی اجازت دینے پر راضی ہو سکتے ہیں اور بغیر کسی جرمانے کے اپنا خیال بعد میں تبدیل کر سکتے ہیں۔

اگر میرا بچہ حصہ نہیں لینا چاہتا تو کیا ہوگا؟

آپ کی اجازت کے علاوہ، آپ کے بچے کو مطالعے میں حصہ لینے کے لیے رضامند ہونا چاہیے۔ اگر آپ کا بچہ حصہ نہیں لینا چاہتا تو وہ مطالعے میں شامل نہیں ہوگا اور نہ ہی کوئی جرمانہ ہوگا۔ اگر آپ کا بچہ ابتدائی طور پر مطالعے میں شامل ہونے سے اتفاق کرتا ہے تو وہ بغیر کسی جرمانے کے بعد میں اپنا خیال بدل سکتا ہے۔ آپ کے بچے کو کسی بھی سوال کا جواب دینے سے انکار کرنے کا حق ہے جس کا وہ جواب نہیں دینا چاہتے۔ کسی بھی سوال کا جواب دینے سے انکار کرنے کا ان کا فیصلہ مطالعہ میں ان کی شرکت کو کسی بھی طرح متاثر نہیں کرے گا۔

کیا کوئی معاوضہ ملے گا؟

نہ تو آپ اور نہ ہی آپ کا بچہ اس مطالعے میں حصہ لینے کے لیے کسی بھی قسم کی ادائیگی وصول کرے گا۔

آپ کے بچے کی نجی زندگی اور رازداری کیسے محفوظ رہے گی اگر وہ اس تحقیقی مطالعہ میں حصہ لیتا/لیتی ہے؟

آپ کے بچے کی نجی زندگی اور اس کے ڈیٹا کی رازداری محفوظ رہے گی۔ اس ڈیٹا کی رازداری کو پاس ورڈ تک رسائی کے ساتھ محفوظ نیٹ ورک کے تحت رکھ کر محفوظ کیا جائے گا۔ صرف بنیادی تفتیش کار اور کمیٹی کے ارکان ڈیٹا تک رسائی حاصل کر سکیں گے۔ آپ کے بچے کے تحقیقی ریکارڈ آپ کی رضامندی کے بغیر جاری نہیں کیے جائیں گے جب تک کہ قانون یا عدالتی حکم کی ضرورت نہ ہو۔ اگر یہ ضروری ہو جاتا ہے کہ اخلاقیات کی جائزہ لینے والی کمیٹی مطالعاتی ریکارڈز کا جائزہ لے، تو وہ معلومات جو آپ کے بچے سے منسلک ہو سکتی ہیں قانون کی اجازت کی حد تک محفوظ رہیں گی۔ آپ کے بچے کی شرکت سے حاصل ہونے والا ڈیٹا مستقبل میں دیگر محققین کے لیے بغیر شناخت کے تحقیقی مقاصد کے لیے دستیاب کیا جا سکتا ہے۔ ان

معاملات میں ، ڈیٹا میں کوئی شناختی معلومات نہیں ہوگی جو اسے آپ کے بیجے کے ساتھ ، یا آپ کے بیجے کی کسی مطالعے میں شرکت کے ساتھ جوڑ سکتی ہے۔

مطالعہ کے بارے میں سوالات کے لیے کس سے رابطہ کریں؟

پہلے، اپنی شرکت کے دوران یا بعد میں آپ تحقیق کار سے اس نمبر پر رابطہ کر سکتے ہیں [صبا محمد ناظم 03327963848 یا کسی بھی سوال کے لیے [sabah.muhammad@scholar.aku.edu] پر ای میل بھیجیں اگر آپ کو لگتا ہے کہ آپ کو نقصان پہنچا ہے۔ اس مطالعے کا جائزہ اور منظوری اے کے یو کی اخلاقیات جائزہ کمیٹی نے دی ہے۔

دستخط

آپ اپنے بیجے کو اس مطالعے میں حصہ لینے کی اجازت دینے کے بارے میں فیصلہ کر رہے ہیں۔ ذیل میں آپ کے دستخط سے ظاہر ہوتا ہے کہ آپ نے اوپر دی گئی معلومات کو پڑھ لیا ہے اور فیصلہ کیا ہے کہ انہیں مطالعے میں حصہ لینے کی اجازت دی جائے۔ اگر آپ نے بعد میں فیصلہ کیا کہ آپ اپنے بیجے کو مطالعے میں شرکت سے دستبردار کرانا چاہتے ہیں تو آپ کسی بھی وقت اس کی شرکت ختم کر سکتے ہیں۔ آپ کو اس دستاویز کی ایک کاپی دی جائے گی۔

بیجے کا چھپا ہوا نام:

والدین یا قانونی سرپرست کا چھپا ہوا نام:

والدین کے یا قانونی سرپرست کے دستخط _____

تاریخ: _____

رضامندی حاصل کرنے والے شخص کا چھپا ہوا نام:

رضامندی حاصل کرنے والے شخص کے دستخط:

تاریخ: _____

شرکاء کے لیے جو پڑھنے سے قاصر ہیں۔

گواہ:

میں نے ممکنہ شرکاء کو رضامندی کے فارم کے درست طور پر پڑھنے کا مشاہدہ کیا ہے ، اور فرد کو سوالات پوچھنے کا موقع ملا ہے۔ میں تصدیق کرتا ہوں کہ فرد نے آزادانہ طور پر رضامندی دی ہے

گواہ کا نام: _____ شرکاء کے انگوٹھے کا نشان _____:

دستخط _____

تاریخ: _____

Appendix B-3

Assent Form

ADOLESCENT ASSENT TO PARTICIPATE IN RESEARCH (Age from 13 to <18)

Project Information	
Project Title: Knowledge & attitude regarding pubertal changes among adolescent males in urban Karachi, Pakistan.	Version: 3 Date: May 9 th , 2023
ERC Project No: 2023-8302-24757	Sponsor:
Principal Investigator: Dr. Saleema Gulzar	Organization: Aga Khan University
Location: Karachi	Phone: 03332356678
Other Investigators: Sabah Muhammad Nazim Dr. Zohra Lassi Hussain Maqbool	Organization: Aga Khan University
Location: Karachi	Phone Numbers: Saleema Gulzar 0333-2356678 Sabah M. Nazim 0332-7963848 Hussain Maqbool +1 825 440-1825 Dr Zohra Lassi +61 405 332 094

You are being asked to participate in a research study conducted by *Sabah M. Nazim*, a student supervised by *Dr. Saleema Gulzar* from the School of Nursing & Midwifery at The Aga Khan University. You were selected as a possible participant in this study because you are an eligible candidate according to the inclusion criteria. Your participation in the research study is voluntary.

Why is this study being done?

The study will investigate about the level of knowledge regarding puberty in male students of 15-19 years of age residing in urban Karachi.

What will happen if I take part in this research study?

Please talk this over with your parents before you decide whether or not to participate. We will also ask your parents to give their permission for you to take part in this study. Even if your parents say “yes” you can still decide not participate.

If you volunteer to be in this study, you may leave the study at any time without consequences of any kind. You are not waiving any of your legal rights if you choose to be in this research study. You may refuse to answer any questions that you do not want to answer and still remain in the study.

If you volunteer to participate in this study, the researcher will ask you to do the following:

You will be required to fill out a questionnaire that will assess your knowledge regarding male puberty.

How long will I be in the research study?

30minutes to 1 hour.

Are there any potential risks or discomforts that I can expect from this study?

There are no potential risks or discomfort.

Are there any potential benefits if I participate?

You will not directly benefit from participating in this study.

Will I receive any payment if I participate in this study?

You will receive no payment for participation in this study.

Will information about me and my participation be kept confidential?

Any information that is obtained in connection with this study and that can identify you will remain confidential. It will be disclosed only with your permission or as required by law. The gathered data will be strictly kept confidential. To achieve this purpose, data will be kept under secured network with password access. Only primary investigator and the committee members will be able to access the data.

Who can answer questions I might have about this study?

If you have any questions, comments or concerns about this study, you can talk to one of the researchers. Please contact Sabah Nazim at sabah.muhammad@scholar.aku.edu

This study has been reviewed and approved by AKU Ethics Review Committee.

SIGNATURE OF STUDY PARTICIPANT:

I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

Name of Participant: _____

Signature of Participant: _____ Date: _____

Name and Signature of Person Obtaining Consent: _____

Date: _____

For Participants unable to read

Witness:

I have witnessed the accurate reading of the consent form to the potential participants, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Witness Name: _____ Participant's Thumb Print: _____

Signature:

Date:

Appendix C-1

ERC Approval Letter



آغا خان یونیورسٹی
THE AGA KHAN UNIVERSITY

22-May-2023

Dr. Saleema Gulzar
Department of School of Nursing and Midwifery
Aga Khan University
Karachi

Dear Dr. Saleema Gulzar,

2023-8302-24997, Saleema Gulzar: Knowledge and attitude regarding pubertal changes among adolescent males in urban Karachi, Pakistan.

Thank you for submitting your application for ethical approval regarding the above mentioned study.

Your study was reviewed and discussed in ERC meeting. There were no major ethical issues. The study was given an approval for a period of one year with effect from 22-May-2023. For further extension a request must be submitted along with the annual report.

List of document(s) approved with this submission.

Submission Document Name	Submission Document Date	Submission Document Version
GCP-certificate-eg	03-Mar-2017	5
ERC CIIT CERTIFICATE	31-May-2021	
13_Lassi Uganda_Ethics Certificate_LASSI	28-Jun-2019	
CIIT Hussain COI	29-Mar-2021	
Study Tool	08-Mar-2023	1
AK school Garden	09-Mar-2023	1
Permission letter Delhi school	09-Mar-2023	1
Permission Letter Dhaka School	09-Mar-2023	1
Permission letter Federal School	09-Mar-2023	1
Affidavit for Translation	14-Apr-2023	1
Thesis Protocol	09-May-2023	2
Assent Form Template (13 to less than 18 years)	09-May-2023	3
Parental consent form (1)	09-May-2023	3
URDU - Parental consent form (1)	09-May-2023	3
ERC RESPONSE sheet	09-May-2023	1

Any changes in the protocol or extension in the period of study should be notified to the Committee for prior approval. All informed consents should be retained for future reference.

Please ensure that all the national and institutional requirements are met.

Thank you.

Sincerely,

Dr Afia Zafar

Appendix C-2
ERC Approval Letter for Amendment



آغا خان یونیورسٹی
THE AGA KHAN UNIVERSITY

06-Oct-2023

Dr. Saleema Gulzar
Department of School of Nursing and Midwifery
The Aga Khan University
Karachi

Dear Dr. Saleema Gulzar,

Re: 2023-S302-26587, Saleema Gulzar: Knowledge and attitude regarding pubertal changes among adolescent males in urban Karachi, Pakistan.

Thank you for your submission.

The proposed amendments have been reviewed and approved. Please note that this only constitutes an approval to your requested amendment(s) till the current validity period of your ERC approval. If any further extension is required, then kindly apply for an extension separately by creating a subform.

List of amended document(s) approved with this submission.

Submission Document Name	Submission Document Date	Submission Document Version
Study Tool Version 2.0	20-Sep-2023	3

Any changes in the protocol or extension in the period of study should be notified to the committee for prior approval. All informed consents should be retained for future reference.

Thank you.

Sincerely,

Dr. Afia Zafar

Chairperson

Ethics Review Committee

Appendix D-1
Permission Letter

**Knowledge and attitude regarding pubertal changes among adolescent males in urban
Karachi, Pakistan**

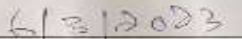
Primary Investigator: Sabah Muhammad Nazim
MScN Student,
Aga Khan University School of Nursing,
Karachi.

Thesis Supervisor: Dr. Saleema Gulzar
Associate Professor
Aga Khan University School of Nursing,
Karachi.

I, Sufia Fatima, Principal, Federal Public Government Boys Secondary School, accepts to access participants' data and collect required information after seeking their informed consent in the above study.



Signature



Date

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Appendix D-2
Permission Letter

**Knowledge and attitude regarding pubertal changes among adolescent males in urban
Karachi, Pakistan**

Primary Investigator: Sabah Muhammad Nazim
MScN Student,
Aga Khan University School of Nursing,
Karachi.

Thesis Supervisor: Dr. Saleema Gulzar
Associate Professor
Aga Khan University School of Nursing,
Karachi.

I, Musharraf Ali, District Education Officer, Secondary and Higher Secondary Schools Karachi, accepts to access participants' data and collect required information after seeking their informed consent in the above study.



Signature

Date

مُشَرَّفُ عَلِي
Deputy District Education Officer (Admin),
IE/S&H/SI BS-18, Central Karachi


Appendix D-3
Permission Letter

**Knowledge and attitude regarding pubertal changes among adolescent males in urban
Karachi, Pakistan**

Primary Investigator: Sabah Muhammad Nazim
MScN Student,
Aga Khan University School of Nursing,
Karachi.

Thesis Supervisor: Dr. Saleema Gulzar
Associate Professor
Aga Khan University School of Nursing,
Karachi.

I, Tasneem Amina, Principal, Aga Khan School Garden, accepts to access participants' data and collect required information after seeking their informed consent in the above study.

Tasneem Amina


Signature

4-3-2023

Date

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Appendix D-4


Permission Letter

Knowledge and attitude regarding pubertal changes among adolescent males in urban Karachi, Pakistan

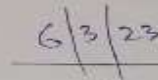
Primary Investigator: Sabah Muhammad Nazim
MScN Student,
Aga Khan University School of Nursing,
Karachi.

Thesis Supervisor: Dr. Saleema Gulzar
Associate Professor
Aga Khan University School of Nursing,
Karachi.

I, Hasnain Rizvi, Owner, Dhaka Secondary Boys and Girls School, accepts to access participants' data and collect required information after seeking their informed consent in the above study.



Signature



Date

Scanned with CamScanner

Affidavit for Translation

I am Sabah Muhammad Nazim, fluent in English and Urdu language

I confirm that I have reviewed the translated document(s) to ensure that the language used will be understandable by the research subjects, and that the translation does not include infrequently used phrases unlikely to be understood by the research subjects Urdu.

Name of Original Document in English	Version
Written Consent Form	2
Parental Consent Form	2

Name of Translated Document in Urdu	Version
تحریری رضامندی کا فارم	2
والدین کی رضامندی کا فارم	2

Sabah Muhammad Nazim

Printed name of Translator

sabah.muhammad@scholar.aku.edu

Email address of Translator



Signature of Translator

Dr. Saleema Gulzar

23-02-2023

Date

23-02-2023



Printed name of Principal Investigator

Signature of Principal Investigator

Date

