DEVELOPMENT OF GUIDELINES FOR ADOLESCENTS AND PARENTS TO INCREASE ADOLESCENT PARTICIPATION IN PHYSICAL ACTIVITY

Colleen Sarah Cozett

(Student Number: 9192285)

A thesis submitted in fulfilment of the requirements for the degree of Doctor Philosophy in the Sport Recreation and Exercise Science

Faculty of Community and Health Sciences, University of the Western Cape

Supervisor:

Professor S. H. Bassett

Co-supervisor:

Professor N. V. Roman

November 2022

ABSTRACT

Physical inactivity in adolescence increases due to numerous influencing factors and this inactivity may continue into adulthood without intervention. Parental involvement provides support for adolescents to increase their participation in physical activity. In South Africa, it is unclear which strategies are available to improve parental involvement in physical activity in adolescence. Thus, this study aimed to develop guidelines for enhancing parental involvement to increase adolescent participation. The objectives of the study included: The phases and stages linked to the research question, study's aim and objectives. Therefore, the research objectives were to do a systematic review stage, a quantitative stage, and a qualitative stage in phase one. In phase two, the concept mapping stage was used to consolidate the findings in stages 1-3 to contribute to the final guideline development. The methodology included a two-phased mixed-method approach in a sequential explanatory design. Phase One consisted of stage 1 (systematic review stage), stage 2 (Quantitative stage) and stage 3 (qualitative stage). In stage 1, a systematic review, using the REAIM features meaning, (Reach, Effectiveness, Adoption, Implementation, Maintenance) to determine the link between parental involvement and adolescent participation was used in stage one. Articles were selected from databases based on inclusion and exclusion criteria from 2010-2020. Data extraction, assessment, and analysis were applied. In stage two, the quantitative inquiry was used to determine the physical activity status of adolescents and parental involvement. The International Physical Activity Questionnaire and Parental Involvement in Sport questionnaires were administered to 15-year-old participants. A final sample of n=773 gave consent, and the data were analysed descriptively. In stage three, the qualitative stage, the contributing factors for increasing adolescents' participation were explored using interviews. A purposive sample of n=35 was selected for three focus groups. Thematic analysis was used to evaluate emerging themes from these data. The link between Phase one and Phase two is that the results of phase one informed

the development of guidelines in phase two. In Phase Two, guidelines were developed in two stages. In stage one, results of phase one, stages 1-3, were consolidated using concept mapping to develop a framework for guidelines. In stage two, a consensus workshop was conducted to agree on the guidelines. Themes were generated using thematic analysis. In Phase Two, a purposive sample of n=65 gave consent for the preliminary workshop. In stage 2, 11 of these members were identified as experts and participated in the final consensus workshop. Workshop recordings were transcribed verbatim and analysed thematically. Results from phase one, stage one, the systematic review with REAIM features, indicated that 28 studies reported on physical activity trends and commonalities that were linked to parental involvement and adolescent participation. The results indicated that South African adolescents preferred walking, but mainly lead sedentary lives. In terms of parental involvement, the results showed that, in general, fathers are more involved in events and mothers help with preparation. Furthermore, parents encourage, support, and direct the behaviour in terms of physical activity in adolescents. In the qualitative stage, eight themes; Theme 1: Parental involvement, Theme 2: Physical activity barriers, Theme 3: Physical Activity preferences, Theme 4: Physical activity parental support, Theme 5: Physical activity facilitators, Theme 6: Physical activity encouragement, Theme 7: Parental Directive behaviour, Theme 8: Increasing physical activity strategies. In phase two, the results generated as themes were consolidated in the concept map and a framework for guidelines. Based on the framework, six guidelines with 52 subcategories evolved as guidelines. The guidelines that were developed in this study may be used as a resource to parents to support adolescents in increasing physical activity participation. The findings and recommendations of this thesis are likely to have an impact on the life and wellbeing of adolescents and their parents in South Africa.

Keywords: Parents; Adolescents; Adolescence; Physical activity; Physical inactivity; RE-AIM framework.

DEFINITION OF TERMS

Adolescence:

Adolescence is a phase of growth and development following the onset of puberty, during which a young person develops from a child into an adult (World Health Organization, 2021).

Adolescents:

The World Health Organization (WHO) (2021) defines an adolescent as any person between the ages of 10 and 24 developing from a child into an adult.

Directive behaviour:

Wuerth et al. (2004) define directive behaviour as the extent to which adolescents feel controlled by their parents. In terms of physical activity, directive behaviour promotes the perception of parental pressure.

Parent:

The term parent should be comprehended as a set of notions such as firstly: the parent's planning and decision to have children; secondly, their care and contribution towards raising their children; and thirdly, the parent's actions and activities towards an overall parental achievement of a priori set goals (Ceka & Murati, 2016).

Parental encouragement:

Parental encouragement refers to the general process undertaken by the parents to initiate and direct the behaviour of the children towards the inspiration or extra-boosting given to the children for being active (Lawrence & Barathi, 2016).

Parental involvement

Parental refers to the amount of participation a parent has when it comes to their children's lives (Ceka & Murati, 2016).

Parental monitoring:

According to Ornelas et al. (2007), parental monitoring refers to parents providing specific household rules and guidelines.

Parental support:

Parents are described as gate-keepers of children's health-related behaviours, through their provision of social support for physical activity and healthy eating. In acknowledgement of the considerable variation in how social support is operationalised in the literature (Pyper et al., 2016).

Physical activity:

Physical activity may be defined as any bodily movement produced by skeletal muscles that require energy expenditure above the resting metabolic rate and is characterised by modality, frequency, intensity, duration, and context of practice (Piggin, 2020).

Physical inactivity:

Physical inactivity or sedentary is when a person does not move their body for long periods. The aforementioned can include sitting or lying on the sofa watching TV, and sitting at a desk or computer (Caspersen et al., 1985).

DECLARATION

I, Colleen Cozett, hereby declare that "**Development of guidelines for adolescents and parents to increase adolescent participation in adolescence**" is my work. All resources that were used or referred to by me during the research study are completely acknowledged through a complete reference or an acknowledgement statement.

Name: Colleen Cozett

Signature: 

Student number: 9192285

Date: November 2022

ACKNOWLEDGEMENTS

I wish to thank all those people who helped me bring this study to fruition: My sincere gratitude goes to my support network who contributed significantly to my journey. The journey was made possible with the support from my husband Marlin Cozett and children, Amber Leigh Hendricks and Erin Cozett. My two supervisors, Professor Susan Bassett and Professor Nicolette Roman, had a major impact on my life and provided me with support and guidance along with Professor Christina Amsterdam, my mother Sarah Adams and my sister, the late Mrs. Veronica Hackley. I sincerely thank you all for the role that you have played in my development. Professor Bassett, thank you for not giving up on me, your encouragement has guided me through my Masters and now the Doctorate studies. Thank you for the financial contributions towards my articles. When I needed it most during the past six years, Professor Roman gave me direction. Thank you, Professor Roman, I am greatly indebted to you for applying for the funding for my study, providing several writing retreats, and paying for the articles in international journals. Thank you all for going the extra mile for me. A special note of thanks to the Research Unit of the WCED and the Ethics committee at UWC for granting the permission to conduct this study in 2017. Thank you to the schools, principals, student participants, officials, and stakeholders who made this vision possible. I acknowledge the support I have received from my colleagues at Northlink College too, thank you. Lastly, my journey could not be complete without the love and support of my family. Thank you very much Marlin, Amber and Erin. You are all my heroes. A special thank you from my heart for the continued encouragement, support, and love, through the years. I thank God for carrying me through all the highs and lows. Marlin, you and I have done something amazing together, we both of us to complete our PhDs in the same year!

DEDICATION

I dedicate this thesis to my sister Veronica Sophia Hackley who is forever in our hearts. Veronica believed in me from the beginning, and I dedicate this thesis to her memory. The influence she had on my life has been my foundation. She continued to be my rock and we overcame many challenges together. Our happy moments together, laughter, song, and dance have shown me the secret to happiness. Our parents Arthur and Sarah Adams are able to share the moment with me and we will remember the life lessons we all learnt from Veronica. To be surrounded by those who believe in you, those who challenge you, and above all, show kindness to others. I will continue to make a difference by living with a purpose.

Never give up on your dreams! This is but the beginning of another adventure!

PUBLICATIONS AND DISSEMINATION

This thesis is submitted in fulfilment of the requirements for the degree of Doctor Philosophy in Sport Recreation and Exercise Science and the Results Section is presented in article format. In completing the phases and stages of the thesis, five articles were submitted for publication. The selected journals included the Advances in Public Health journal, Health Informatics Journal, the International Journal of Environmental Research and Public Health (IJERPH, Journal), and the African Journal for Physical Activity and Health Sciences (AJPHES) (see Appendices 10-15). The current PhD has provided a broader understanding of the subject matter explored and methodology applied and contributed to the existing body of research knowledge in the field of physical activity, adolescents, parental involvement, adolescence, guideline development, and physical inactivity. Thus, the results presented in this doctoral study may be viewed as important, particularly within the field of physical activity, adolescents, adolescence, guideline development, and physical inactivity and the study contributed to the body of knowledge. The research findings are presented as follows in the articles submitted/accepted for publication:

Published journal articles:

Cozett C. & Roman, N.V. (2022). Recommendations to enhance parental involvement to increase adolescents' physical activity participation. *International Journal for Environmental Research and Public Health, 19*(3), 1333-1355. https://doi.org/10.3390/ijerph19031333

Cozett, C., Roman N.V., & Bassett, S.H. (2022). Exploring adolescents' perceptions of the factors that contribute to increasing physical activity participation. *African Journal of Physical Activity and Health Sciences (AJPHES), 28*(1), 14-30. https://hdl.handle.net/10520/ejc-ajpherd1_v28_n1_a3.

Journal articles under review:

Cozett C., Adebeyiya, B.O, Roman N.V & Bassett, S.H. Increasing physical activity and parental involvement in adolescence: A systematic Review with REAIM features. *Advances in Public Health*. Article submitted March 2022.

Cozett, C., Bassett, S.H., & Roman, N.V. Physical activity status and parental involvement in adolescence. *African Journal of Physical Activity and Health Sciences (AJPHES)*. The article was submitted to the AJPHES in December 2021 and is currently under review.

Cozett, C. & Roman, N.V. (2022). Developing a framework for guidelines for parental involvement to increase physical activity participation: A consensus workshop. *Health Informatics Journal.* The manuscript was submitted to the Health Informatics Journal and is currently under review.

PREFACE

Permission to conduct this research was received from the UWC Senate Higher Degree committee and ethics approval was granted by the University's Humanities and Social Sciences Research Ethics Committee (HSS17/10/16), as presented in Appendix 1. This PhD thesis, in the Department of Sport Recreation and Exercise Science, has been structured and written within a publication format, creating five articles linked to each phase and stage of the study, and is comprised of the following:

Chapter 1: Introduction

Chapter 2: Theoretical Framework

Chapter 3: Methodology

Chapter 4: Article format (Results: a systematic review)

Chapter 5: Article: Results Quantitative study

Chapter 6: Article: Results of the qualitative study

Chapter 7A: Results in article format, concept mapping, and workshopped framework for guidelines developed

Chapter 7B: Consensus workshop, guideline development, and presentation

Chapter 8: Discussion, Findings, and Recommendations

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CHAPTER 1

INTRODUCTION

Background and Rationale

The chapter provides a background, context, and rationale for the study. A discussion focusing on adolescence, parental involvement, physical activity, and inactivity is presented in context. The problem statement, main research question, and subsidiary questions are presented. Lastly, the aim, objectives, significance of the study, methodology, and an outline of the study are provided.

Adolescents make their own decision to participate in physical activity (PA), but that decision is closely tied to an awareness of alternatives and rewards shaped by essential adults in their lives (Coakley et al., 1993). Further to this, adolescent PA behaviour is shaped by the built and social environments, including income disparity and environmental justice. As a result, it is necessary to clarify the terminology related to adolescent health, including PA, that is necessary for inclusion in the study. The World Health Organization uses PA to refer to any bodily movement produced by skeletal muscles that require energy expenditure (WHO, 2017). Although it is known that risk factors for chronic diseases can develop early in life due to leading a sedentary life, there is a decline in PA during adolescence and limited empirical evidence on adolescent health in developing countries (Mokdad et al., 2016). Thus, there is a clear gap in the research and a need for strategies to increase participation among adolescents. Therefore, this study purports to develop guidelines to increase physical activity and parental involvement. Chapter one intends to two,

Understanding adolescent health has become a global concern (Mokdad et al., 2016). Regular physical activity during adolescence has been shown to promote health and wellbeing (Alvareez-Pitti et al., 2020; WHO, 2021). Physically active adolescents have higher levels of

cardiorespiratory fitness and stronger muscles and have lower body fat, stronger bones, and reduced symptoms of anxiety and depression (Dobbins, 2009; Hankonen et al., 2016; Kallio et al., 2018; Poitras et al., 2016; WHO, 2021). Furthermore, regularly active adolescents have a better chance of healthy adulthood. Thus, health benefits can be achieved by doing moderate to vigorous intensity PA for at least 60 minutes (1 hour) or more per day (WHO, 2021). The PA benefits are known and accepted by the scientific community for increasing health benefits and quality of life (QOL), (Carson et al., 2020; Patton et al., 2016). Parents play a role in providing a nurturing environment and support to adolescents to increase PA. Parental involvement and parental influence were found to be predictors of increasing adolescents' PA participation (Cozett et al., 2016). Adolescents emulate the PA behaviour of parents. Thus, parents can influence health behaviours, including physical activity during adolescence, and can influence the PA experiences of adolescents (Farooq et al., 2018). Furthermore, adolescents' PA behaviour is influenced by various factors and barriers that limit PA participation. Several mechanisms exist through which parental involvement may influence and support adolescents to increase PA (Oyeyemi et al., 2016). These mechanisms include high levels of parental monitoring, communication, engagement in activities, and PA support which would lead to increased levels of PA (Oyeyemi et al., 2016). The efforts of parents are often undermined by various factors that limit their participation in their child's PA behaviours.

Parental involvement includes (1) family cohesion, meaning how many people in the adolescent's life understand them, how much the adolescent and family have fun together, and how much their family pays attention to them; (2) parental monitoring, which refers to parents providing specific household rules (Ornelas et al., 2007) based on the well-being of adolescents and focus on curfews, monitoring friendships, hygiene, limiting screen time, controlling food choices, and setting guidelines for appropriate clothing; (3) parent-adolescent communication is any communication that the adolescent has had with his/her primary caregiver in the last four

weeks (talking with them about dating, a personal problem and schoolwork, and (4) parental engagement is measured as a count of the number of activities that parents participate in with their adolescents, such as attendance at religious or church events, shopping, playing sports, going to movies, plays, or sports events, working on a school project, and eating evening meals together (Ornelas et al., 2007).

Despite the literature indicating global support from parents and the widely known benefits of PA, adolescents engage in far less PA than is recommended (Hankonen et al., 2016). In adolescence, PA tends to decline with age and varies by gender, with boys reporting higher PA levels than girls (Cozett et al., 2016; Gerber et al., 2018). Internationally, adolescents do not meet the health-related guidelines of at least 60 minutes of moderate-to-vigorous physical activity daily (Oyeyemi et al., 2016; Parrish et al., 2020; Sénéchal et al., 2021). Furthermore, globally, there is a drive to reduce physical inactivity by 15%. In describing these health benefits of PA to adolescent health, Oyeyemi et al. (2016) and WHO (2017) highlighted that PA is an essential element in improving the health. Reviews of studies in numerous countries have documented specific PA recommendations for adolescents to improve fitness and health (Bull et al., 2020; WHO, 2019). The WHO's Global Action Plan for PA (GAPPA) was designed to align with the Sustainable development goals (SDG)SDGs for 2018-2030 (WHO, 2018).

In Africa, according to Oyeyemi (2016, p2), adolescents engage in insufficient PA levels or do not accumulate 60 minutes a day. According to Oyeyemi et al. (2016, p2), "In Nigeria, about 72% of school-going adolescents reported engaging in physical activity at least once a month, 59% engaged at moderate levels, and more than 50% engaged in low levels of physical activity". While current PA guidelines focus on youth PA in all domains of life, limited studies in Africa have focused on PA guidelines to increase PA in adolescence and parental involvement (Aubert et al., 2021; Bull et al., 2018). A recent study in South Africa noted that more than 50% of adolescents in rural areas were only involved in PA less than three days per

week (Bull et al., 2018). Various factors exist that influence PA participation behaviour of adolescence in SA. There is notable gap in the literature to utilize from SA active healthy kid's program and the Active Healthy Kids Global Alliance pedagogical PA monitoring program for children and young people. According to HAKSA (2018) gave physical inactivity levels: a Grade C. The reason for the Grade C is the following: physical fitness in South African adolescents is declining; about 40% of adolescents are getting little or no moderate to vigorous activity each week; vulnerable groups such as are girls from disadvantaged communities shows declining levels of PA due to safety concerns. Thus, according to HAKSA (2018), a sports participation culture is clearly lacking amongst adolescents. According to the HAKSA group: ´In fact the most commonly reported leisure time activity is cell phone use. An increase in screen time (television, PC's, console games) adds fuel to the fire. High levels of crime also affect activity levels as the fear for personal safety inhibits the 'walkability' in communities."

Therefore, it is important to understand adolescent health and the factors that influence PA to develop effective strategies to increase PA involvement (Oyeyemi et al., 2016; Sawyer et al., 2018). "One such factor that has been shown to influence adolescent PA behaviour is parental involvement. However, there is limited evidence concerning strategies to more effectively engage parents in supporting their children to increase `PA and to create an "activity-supportive environment" in LMICs and South Africa, specifically", Herrera (2016).

A further gap exists in a lack of effective resources for parents to support adolescents to increase their PA and parental involvement (Herrera, 2016). Involved parents and adolescents need guidelines for increasing PA participation (Pyper et al., 2016). The current study proposed to develop guidelines to improve parental involvement and adolescent PA. Developing the guidelines as a source of information will support parents to assist adolescents effectively to increase PA by being involved and informed. Therefore, guidelines were developed to increase PA participation in adolescence in this study. Guidelines are seen as a resource in the current

study context to increase positive health behaviours and provide information to adolescents and parents.

Problem Statement

Understanding the health and well-being of adolescents has often been overlooked and neglected (Patton et al., 2016). Adolescents health decline has become apparent due to a lack of engagement in physical activity and has become a concern for global health development of physical activity (Mokdad et al., 2016). Coupled with that, PA has been shown to decline during adolescence, and those with lower levels of activity in adolescence show poor health outcomes later in life (Erkelenz et al., 2007). The benefits of PA are widely recognised, but adolescents worldwide engage in substantially less PA than is known and advised (Hankonen et al., 2016). Despite this, PA levels are still insufficient for health benefits in all adolescents. Furthermore, the limitations in empirical evidence in adolescent health present a gap in our understanding (Patton et al., 2016). A critical component to increasing PA is the involvement of parents (Mokdad et al., 2016). Attempting to understand adolescent PA behaviour and parental involvement would allow for the development of strategies to improve health among young people, particularly as it has implications on their health in later life (Mokdad et al., 2016). The strategies to increase PA is vital due to the fact that various environmental and biological constraints and factors have influenced children's PA (Erkelenz et al., 2007). Developing guidelines would breach this gap to provide parents and adolescents with strategies to increase PA behaviour and parental involvement. Therefore, this study aims to develop guidelines to increase adolescent PA participation and parental involvement using a consensus workshop.

Research Questions

The main research question of this study was:

What are the required guidelines to improve parental involvement and adolescent physical activity amongst adolescents?

The following research sub-questions were formulated:

1. What is the prevalence of parental involvement in adolescent physical activity, influence, support, involvement, and encouragement?
2. What is the current physical activity status of adolescents?
3. What are the physical activity preferences to encourage adolescents to participate in physical activity?
4. What are the barriers and facilitators to the physical activity participation of adolescents?
5. How can the results of this study be used to design guidelines to improve parental involvement and increase physical activity in adolescents?
6. What guidelines could be developed to improve parental involvement and increase physical activity in adolescents?

Aims and Objectives of the Study

1.4.1 Aims

This study aimed to develop guidelines to increase parental involvement and physical activity amongst adolescents.

1.4.2 Research Objectives

The phases and stages of the current study are linked to the research question and the study's aim and objectives.

To answer the main question, the following objectives were:

PHASE 1: Problem identification phase

Stage 1: Review stage

1.To conduct a systematic review to determine the best practice models/interventions to inform the guidelines to improve parental involvement and increase physical activity in adolescents.

Stage 2: Quantitative stage

2. To determine the current physical activity status of adolescents.
3. To select current physical activity preferences that would encourage adolescents to participate in physical activity.
4. To determine the level of parental involvement in adolescents' levels of PA and the relationship between adolescent PA levels and parental involvement.

Stage 3: Qualitative stage

5. To explore the barriers and facilitators to adolescent physical activity participation to increase physical activity in adolescents and parental involvement.

PHASE 2: Development of Guidelines phase

Stage 1: Concept mapping and guideline planning

6. To develop and design a framework for guidelines to increase physical activity in adolescents and parental involvement using concept mapping.

Stage 2: Workshops

7. To conduct a workshop to reach a consensus on the final guidelines.

Table 1.1 indicates the study objectives within the phases and stages. Further to this, Table 1.1 provides an overview of the phases and stages in the current study linked to the research question, aims, and objectives.

Table 1.1

Study Objectives Linked to Study Phases and Stages

Phases and stages	Research questions	Research objectives
Phase 1, Stage 1: Systematic review **(Problem identification stage)**	What are the required guidelines to improve parental involvement and adolescent physical activity amongst adolescents? (Overarching research question) 1. The study aimed to develop guidelines to increase parental involvement and physical activity amongst adolescents.	1. To conduct a systematic review to determine the best practice models/interventions/ to inform the guidelines to improve parental involvement and increase PA in adolescents. ***Phase 1 Stage 1.*** Thus, the systematic review determines the relationship/link between adolescent PA levels and level of parental involvement and its relevance in Africa and internationally. ***Phase 1 Stage 1***
Phase 1, Stage 2: Quantitative inquiry	2. What is the current prevalence of parental involvement in adolescent PA (influence, support, involvement, encouragement)? ***Phase 1 Stage 2*** 3. What is the current PA status of adolescents? ***Phase 1 Stage 2***	2 To determine the level of parental involvement in adolescent PA and the relationship between adolescent PA and parental involvement. Phase 1 ***Stages 2 & 3.*** 3. To determine the current PA status of adolescents. ***Phase 1 Stage 2***
Phase 1, Stage 3: Qualitative exploration	4. What are the physical activity preferences to encourage adolescents to participate in PA? ***Phase 1 Stage 3*** 5. What was the level of parental involvement in adolescent PA and the relationship between adolescent PA and parental involvement? ***Phase 1 Stage 3*** 6. What are the barriers and facilitators to PA participation for adolescents? ***Phase 1 Stage 3***	4. To select activity preferences that would encourage adolescents to participate in PA. ***Phase 1 Stage 3*** 5. To determine parental involvement in adolescent PA and the relationship between adolescent PA and parental involvement. ***Phase 1 Stages 1 & 3*** 6. To explore the barriers and facilitators to adolescent PA participation. ***Phase 1 Stage 3***
Phase 2, Stage 1: Guideline development stage	7. How can the results of this study be used to develop and design guidelines to increase PA in adolescents and parental involvement? ***Phase 2 Stage 1***	7. To develop and design guidelines to increase PA in adolescents and parental involvement using concept mapping to conduct a workshop and develop a framework for guideline development. ***Phase 2 Stage 1***
Phase 2, Stage 2 **(Guideline presentation stage)**	8. What are the guidelines to be included in the workshop format to increase adolescent PA participation and parental involvement? ***Phase 2 Stage 2***	8. To conduct a workshop to reach a consensus on the final guidelines. ***Phase 2 Stage 2***

Research Methodology

This study followed a mixed-methods approach with a sequential explanatory design using a two-phased approach. The research methodology is discussed in more detail in Chapter 3. A methodological framework presented in chapter 3, guided the study in the different phases and stages as it provided practical and useful solutions to developing the proposed guidelines. The framework refers to a table developed to fluidly showcase the phases and stages to contribute to the golden thread in the current study. Using quantitative research designs within the mixed-method approach allowed the researcher to describe, and measure variables. The use of the qualitative research designs within the mixed method approach allowed for insight to be gained, collect data, and evaluate information to gain knowledge and understanding (Carey, 2012). Lastly, the pragmatic worldview is described, central to the mixed methods approach. The stages and phases in the current study contribute to guidelines developed to increase adolescents' PA participation and parental involvement.

Significance of the Study

Given the paucity of research on increasing PA participation in adolescents to improve health outcomes in South Africa, the current study has the potential to contribute in the following ways: 1) providing information related to increasing PA participation among adolescents and parents; 2) resources to policymakers and educators and; 3) developed guidelines may be used as a resource to increase PA in adolescence and parental involvement. Guidelines developed in the current study was developed with the purpose to become a resource for parents to support adolescents to increase PA participation. Information gained by this study was designed to contribute to the knowledge base and to provide PA information to parents to support their adolescents. The study results will facilitate the understanding and provide insight into the domain of parental involvement to increase PA. The information for parents is formulated in user-friendly parent resources.

1) In promoting the study, the information contained in the results and findings will be shared with officials, stakeholders, and educators to increase the body of knowledge on increasing PA in adolescence. The phases and stages in the study contributed to the guidelines developed. The study makes noteworthy contributions regarding strategies to increase parental involvement and PA in adolescents, using the developed guidelines as a resource to provide information.
2) In the course of developing the thesis guidelines were developed to provide strategies for parents to increase adolescents PA participation and parental involvement. Thus, the study explored the items that needed to be included in the final guidelines to increase PA through parental involvement. It was highlighted that adolescents are exposed to environmental influences and that inactivity may track into adulthood. Therefore, the study further contributed to the body of knowledge related to developing guidelines in a South African context aligned to the research questions and objectives of the current study.

Chapter Outline of the Thesis

In the course of completing the thesis, five articles were submitted for publication, of which two articles were published, two articles was accepted and published, and three articles are currently under review. The study has been divided into eight chapters as follows:

Chapter 1: Orients the reader to the research topic and the key elements investigated such as the following: introduction, background, and provides the research question and objectives of the current study.

Chapter 2: Presents the conceptual framework. This study is located within the health promotion theory and the ecological systems theory. The chapter examines the theoretical assumptions and propositions, as well as the main constructs of theories. It further expounds

on the application of the theory to the current study providing a short description of its location within the ecological systems theory and the health promotion theory. A literature review is provided, summarizing previous research done on the current topic.

Chapter 3: Outlines the research methodology used in the study. The specific techniques adopted to collect, analyse, and evaluate the data of the current study are described, along with the tools used to gather the data. The chapter also describes and provides illustrations of how the mixed methods approach with a sequential explanatory design using a two-phased approach was implemented. It further clarifies the research paradigm and presents the trustworthiness of the study. Finally, the ethical considerations and conclusion are presented.

Chapter 4: Comprises Stage 1 of Phase 1 of this study, a systematic review with REAIM features explored previous literature on determining the best practice models/interventions/ to inform the guidelines interventions. This chapter was done in article format. The results and findings are discussed in chapter 4. The article was submitted to Advances in Public Health, an international journal and is currently under review.

Cozett, C., Adebeyiya, B.O., Roman N.V., & Bassett, S.H. (2022). Increasing physical activity and parental involvement in adolescence: A systematic Review with REAIM features. Article submitted to *Advances in Public Health* in March 2022.

Chapter 5: Provides results for Stage 2 of Phase 1, which determined the PA status of adolescents and the level of parental involvement. This chapter was structured in article format and submitted to an international journal. The manuscript was reviewed, corrected, and resubmitted to the journal for the final editorial decision.

Cozett, C., Bassett, S.H., & Roman, N.V. (2021). Increasing physical activity status and parental involvement in adolescents. ***African Journal of Physical Activity and Health Sciences (AJPHES)*****. Under review.**

Chapter 6: This chapter reports on Stage 3 of Phase 1, the qualitative stage in which the perceptions of adolescents were explored about the factors that contribute to PA and the barriers to PA. This chapter was done in an approved article. The approved article was published in March 2022.

Cozett, C., Roman, N.V., Bassett, S.H. (2022). Exploring adolescents' perceptions of the factors that contribute to increasing physical activity participation. ***African Journal of Physical Activity and Health Sciences (AJPHES)*****,** ***28*****(1), 14-30.**

Chapter 7: Consists of two sections (7A and 7B).

In **Section 7A**, a consensus workshop was conducted. It presented and described the data consolidation of the stages and phases of the study to present in the form of a concept map. The framework and the guidelines were designed in two rounds: Round one was conducted with a panel of experts and round two was carried out with a panel of stakeholders in PA and parental involvement. Thus, the findings of the previous stages and phases of the study were collated in a concept map to develop a framework for developing guidelines in chapter 7A.

Cozett, C. & Roman, N.V. (2022). Developing a framework for guidelines for parental involvement to increase physical activity participation: A consensus workshop. Health Informatics Journal - Decision on Manuscript ID HIJ-22-0170. The manuscript was submitted to the journal in April 2022.

Section 7B: Provides the guidelines of the study. Guidelines were developed using the round two consensus workshop with expert input. The guidelines to increase parental involvement

and PA in adolescents are presented. It is envisaged that with the formulation and the guidelines developed in the domain of PA and parental involvement, the strategies to increase PA in adolescence and parental involvement to increase PA in adolescence are strengthened. The manuscript was reviewed by three international reviewers, corrected, and resubmitted for the final editorial decision and was accepted published January 2022.

Cozett, C. & Roman, N.V. (2021). Recommendations to enhance parental involvement to increase physical activity participation: A consensus workshop. ***International Journal for Environmental Research and Physical Health, 19*****(3), 1333-1355.**

Chapter 8: The final chapter concludes the study by discussing the findings linked to the study's objectives. Also presented are the implications, future recommendations, and conclusions of the overall research study.

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CHAPTER TWO

CONCEPTUAL AND THEORETHICAL FRAMEWORK

2.1 Introduction

The chapter aims to describe the conceptual framework that guided the study. Thus, the chapter begins with the conceptual framework and the two theories, Health Promotion Theory and the Ecological Systems Theory. Furthermore, this chapter explores the literature on parental involvement, the phase of adolescent period in the life cycle, and the impact of the immediate environment on the adolescent, PA, physical inactivity and the benefits of PA. It further explores the impact of physical inactivity and the health status of adolescents.

2.1.1 Health Promotion Theory

The health promotion theory presented by Nutbeam (1998, p.30) provides the framework for defining health outcomes associated with health promotion activities. It is rooted in ideas and concepts as a foundation, but a theory is a broader concept that interprets or represents reality from a discipline-specific perspective (Earp & Ennett, 1991). Theories are "usually concerned with classes of behaviour and do not deal directly, as conceptual models do, with specific types of behaviour in specific contexts" (Earp & Ennett, 1991, p.166). In attempting to differentiate between the two terms, these authors indicated that:

> *A model is often used to mean the visual representation of the elements of a theory and is informed by more than one theory for the inclusion of processes and characteristics not grounded in formal theory but empirical findings or derived from practicing professionals. (Earp & Ennett, 1991, p.164)*

The health promotion framework identifies the different levels contributing to the development of effective PA guidelines in the form of health actions or outcomes. The action framework consists of the health and social outcomes stream, the intermediate health action stream, the

health promotion outcomes stream, and the health promotion actions stream (Nutbeam, 1998). Health promotion actions are based on the various outcomes including immediate health outcomes (health promotion impact measures), intermediate health outcomes (measures to increase participation), and long-term health outcomes such as reduced morbidity and increased quality of life. This framework is used in the current study to define the health actions needed to develop guidelines. “No single theory dominates health promotion practice, and nor could it, given the range of health problems and their determinants, the diversity of populations and settings, and differences in available resources and skills among practitioners.” (Nutbeam & Harris, 1999, p.15).

The health promotion action theory is one of the two theories suitable for use and application in the current study. The intermediate health promotion outcomes stream was applied in the current study, with the overarching health outcome being, to develop guidelines to increase adolescent PA participation. Figure 2.1 illustrates various levels in the health promotion actions framework that apply to the current study. Specifically, the intermediate health outcomes on level 3 apply to the current study.

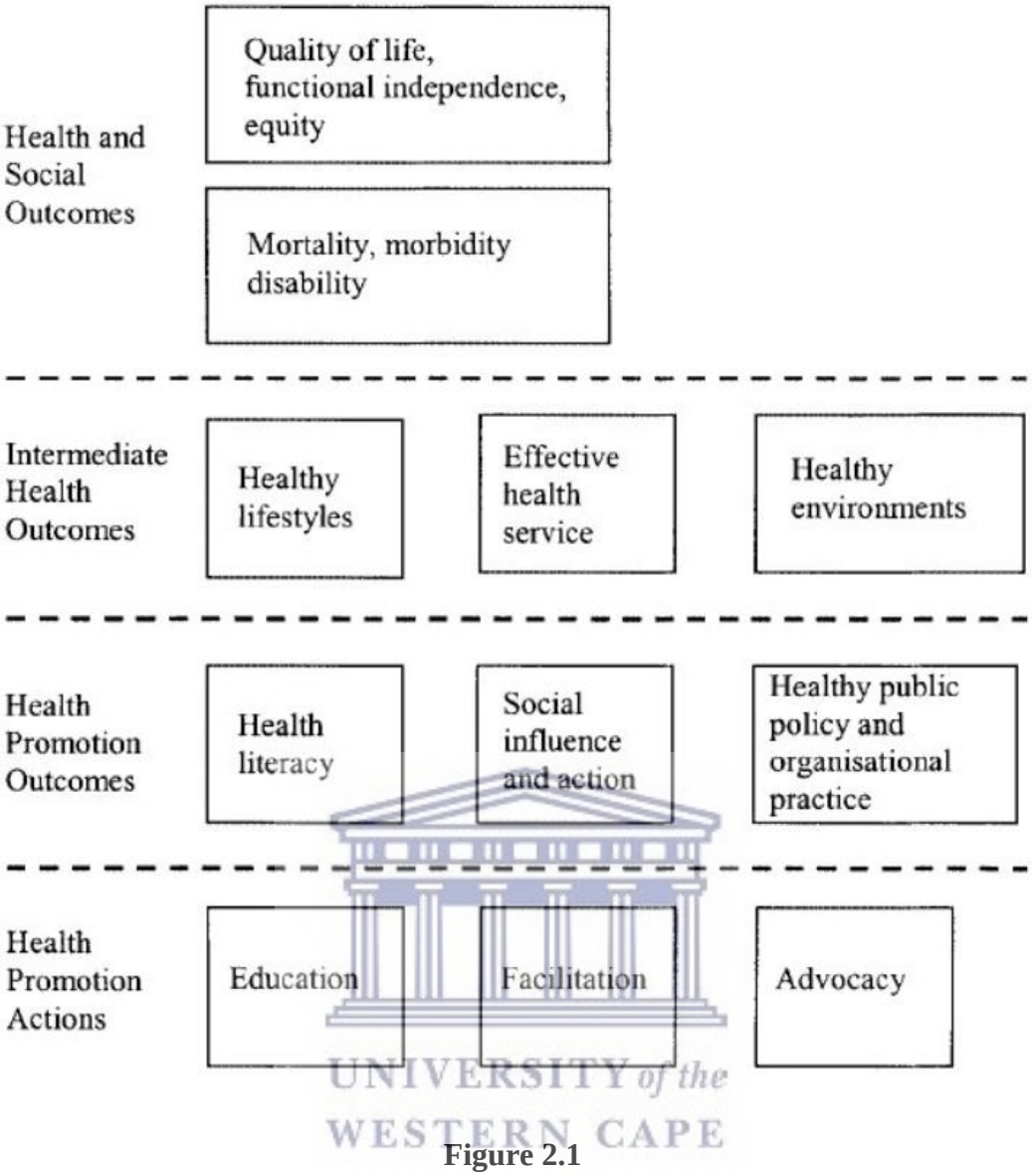


Figure 2.1

Health Promotion Outcomes (Nutbeam & Harris, 1999)

2.1.2 Intermediate Health Outcomes

The health promotion theory focuses on healthy lifestyle choices, lifestyle changes and living condition self-management (Nutbeam & Harris, 1999; WHO, 2021). Intermediate health outcomes are changes in the determinants of health, notably which can have a positive or negative effect on an adolescent's health such as individually-set personal health goals based on realistic personal outcomes to be reached and are attributable to developing guidelines, setting interventions, promoting health, and preventing disease long-term. The following

outcomes are associated with the current study: Healthy lifestyle choices, health promotion, and healthy environments.

2.1.3 Healthy Lifestyles Choices and living conditions

The healthy lifestyle choices adolescents make are important to improve and protect their health and are based on adolescents' health behaviour and behaviour change. The adolescent's own PA choices have either a positive or negative influence on their health. The healthy PA behaviour that adolescents engage in is influenced by their PA knowledge, beliefs, and attitudes about health. Moreover, PA's perceived barriers and benefits for improving adolescent health play a factor in the adolescent's choices. The factors that play a role are those factors that influence behaviour change (or influence an individual's intention to act) both at an individual level and in interaction with the environment (Prochaska & DiClemente, 1992).

The last component of the health outcomes stream refers to the impact of the healthy environment. 'Healthy environments' in this current study refers to the immediate environment, the indirect environment, and the adolescent's shared environment. Therefore, these environments were explored further in the second phase of theory construction, which examined Bronfenbrenner's (1990) ecological systems theory of how the shared environment influences the individual.

2.1.4 Effective Health Action

Nutbeam (1998) suggests that the most appropriate outcomes are those concerned with behaviour change and action. Health promotion activities that are long-term, easily predicted, controlled, and measured by conventional means, are the most effective. Changes occur due to the actions taken and are attributable to a planned intervention or series of interventions actions. Actions may include guidelines developed, interventions, health services, and health promotion programs. Yet, limitations exist based on the understanding and complexity of health

promotion action. The characteristics of effective health action are that it should have a mixed strategy that employs the following: “The use of theory and pilot testing, an emphasis on skill-building, delivery by a health professional, and the use of the simplified text” (Nutbeam, 1998, p. 31). The current study linked up with community partners, individuals, and community groups, who contributed to developing the guidelines. This was achieved through continuous interactions, i.e. the workshop sessions, as a part of the data collection process in the various phases and stages. Community members were allowed to contribute to the action taken on behalf of adolescents.

2.2 Ecological Systems Theory

Ecological systems theory focuses on an adolescent’s development in a system of specific relationships in the immediate environment (Bronfenbrenner, 1999). The current research was based on the ecological systems theory and was founded on the work of Bronfenbrenner (1990). This links with the current study in that the adolescent’s PA development is part of a system of parents’ influence and the environment, at the macro, micro, and meso level, that contribute to increasing or limiting PA activity.

2.2.1 Ecological Systems Theory in Context

The Ecological Systems theory, according to Bronfenbrenner (1999), defines the system of relationships that form “layers" within the environment, with each layer affecting an adolescent’s development. The theory emphasises adolescents' biology as a primary environment fuelling their development. The ecological systems theory consists of the following systems: The child as the central focus (microsystem), the relationship level (mesosystem), the community level (exo-system), and the societal level (macro-system). The chronosystem is linked to the specific phase of adolescence that plays a role in the individual’s development. Hence actions in one system have a ripple effect on what happens in another sphere. Various influences exist as, in the context of the current study, micro and macro spheres

of influence (Bronfenbrenner, 1999). All spheres and layers are interlinked, and changes or conflicts in any one layer will affect other layers. The various terms in the ecological system's theory are illustrated in Figure 2.2 which depicts the ecological systems theory and how each level flows into the next. The adolescent is the first level, located in the centre, followed by the microsystem, mesosystem, exo-system, Macro system. In the current study, the layers within the environment were explored extensively as part of the theoretical framework. Figure 2.2 illustrates the Ecological systems theory.

In the microsystem, the adolescent's PA development is influenced by existing relationships with significant others within the given environment. The adolescent's immediate environment stems from the family, and is interconnected with the larger environment. Family life can be unpredictable and can be a building or destructive force in the life of an adolescent.

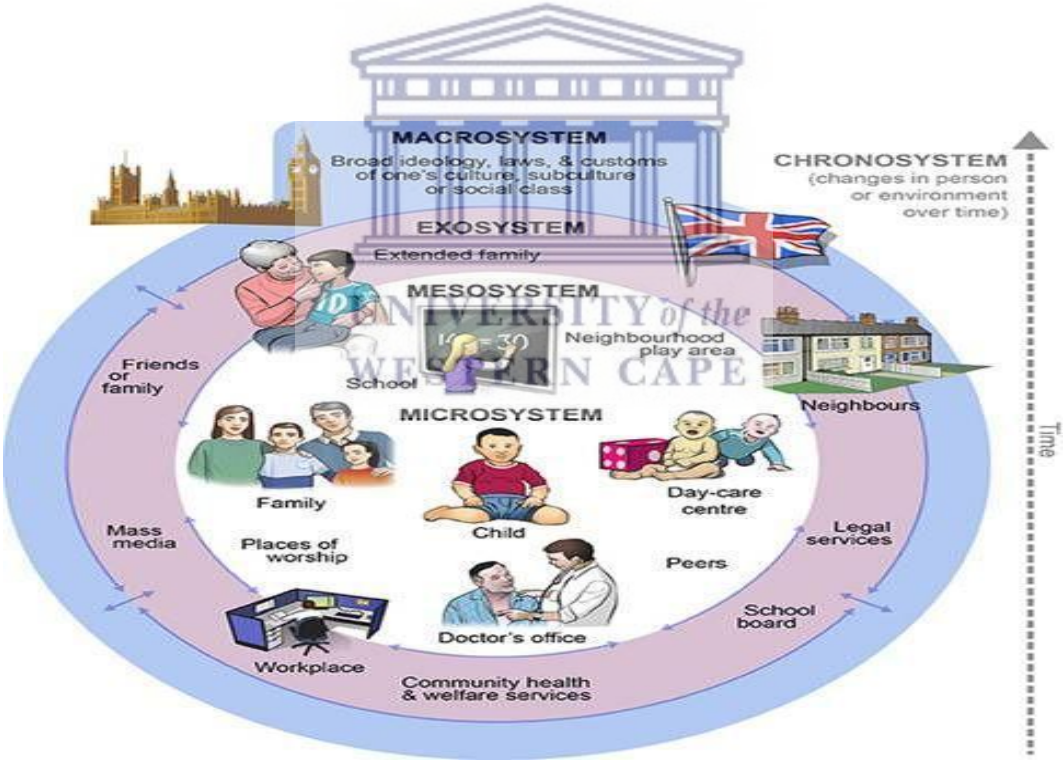


Figure 2.2

Ecological System Theory (Lippard et al., 2017)

2.2.2 Microsystem

The micro-system refers to those connections in the environment closest to the adolescent. An example of the micro-system is the influence of the family, the school, and the local neighbourhood. The connections within the mesosystem in the current study context refer to the adolescent, parent, and school. Furthermore, the exco-system refers to the larger society in which the adolescent indirectly affects adolescents in the microsystem. An example of the exco-system is the parents' work routine and community resources (Bronfenbrenner, 1999). The macro-system refers to the outermost layer that includes the adolescent's value system, culture, and community influences. The macro-system has a multilevel influence on the other environmental layers. For example, low socioeconomic circumstances within the broader community affect the community, the family, the parent, and thus the adolescent. Figure 2.3 illustrates an overview of the systems contained in theory. Figure 2.3 provides an overview of the ecological systems.

2.2.3 The mesosystem

The mesosystem refers to the connection between structures within the adolescent's environment (Berk, 2003). For example, there are connections all around adolescents, connections with parents, family, teachers, friends, places of worship, and their neighbourhood. Thus, mesosystems are organisational or institutional factors that shape the structure of one's environment through connections. Institutional factors shaping one's environment are policies, etiquette, and norms that shape the individual at this level. Educational institutions where adolescents engage with teams, classmates, and interest groups are examples of meso-systems structures (Bronfenbrenner, 1979).

2.2.4 Exo-system

The exo-environment defines the social system which affects adolescents indirectly. The social settings and persons in the adolescent's environment form an integral part of adolescent development (Berk, 2003). The schedule or working hours of the parent, the resources, and family income impact the adolescent. The adolescent may not be directly involved but does feel the connections, whether positive or negative and their impact. Exo- systems are community-level influences that include social media, politics, unrest, and community issues or cultural issues that impact adolescents. It fosters belonging in the social setting or community (Bronfenbrenner, 1979).

2.2.5 The macrosystem

The macrosystem is the outermost layer environment. The layer consisted of the following, culture, values, customs, and laws (Berk, 2003). For example, if the culture believes that parents should be solely responsible for raising their children, that culture is less likely to provide resources to help parents. This, in turn, affects the structures in which the parent functions. The parents' ability or inability to carry out that responsibility toward their child within the child's microsystem is likewise affected.

2.2.6 The Chronosystem

The chronosystem refers to the dimension of time as it links to the environment. Elements within this system can be either external or internal. External elements refer to examples such as the time of death in the family, a special occasion, the first day of high school, or specific phases in life. As adolescents get older, they may react differently to environmental changes and may be able to predict how that change will influence them. For this study, the chronosystem refers to the phase of adolescence, which is a specific time in the life cycle of a person (Bronfenbrenner, 1999). The connection to the current study is that the specific age

group in this study is the specific phase of adolescence that the sample was selected from and the age group of 15 years old.

2.2.7 Advantages of using the Ecological Systems Theory

The following advantages are part of the ecological systems theory (Stokols, 1996, p. 288):

1) The aim is to provide the capacity to benefit a large number of people, not just one individual.
2) Moreover, intervention may include passive interventions that do not require sustained effort on the part of an individual.
3) It targets the individual behaviour to change and emphasizes active interventions that require voluntary and sustained effort to accomplish behavioural goals.
4) Multiple methods to intervene can be used which are cost-effective.
5) It is conducive to use samples in environments with poor infrastructure, and geographic mobility when designing health promotion programs based on ecological systems theory.
6) It is also important to include multiple physical, social, and cultural factors that influence health outcomes, including such factors as developmental maturation, genetic heritage, psychological dispositions, behavioural patterns, emotional well-being, and social cohesion (Stokols, 1996).

   The levels and linkages were explained in figures 2.2 and figure 2.3 which referred to the systems.

2.2.8 Levels of Influences within the Ecological Systems Theory

The conceptual framework was also based on the ecological systems theory which provides the theoretical foundation on which the current guidelines were formulated. The ecological systems theory was put into action as the following paragraphs indicate by putting the guideline development into practice. The various levels linked to the ecological system theory are

illustrated below: Is the next diagram a combination of concepts. The first is the Individual, Relationship, Community, and Societal levels (Bronfenbrenner, 1999) and the second is the mesosystem (Berk, 2003). Figure 2.4 illustrates the levels of influence on adolescents, and the ripple effect felt at one level spills over to the next.

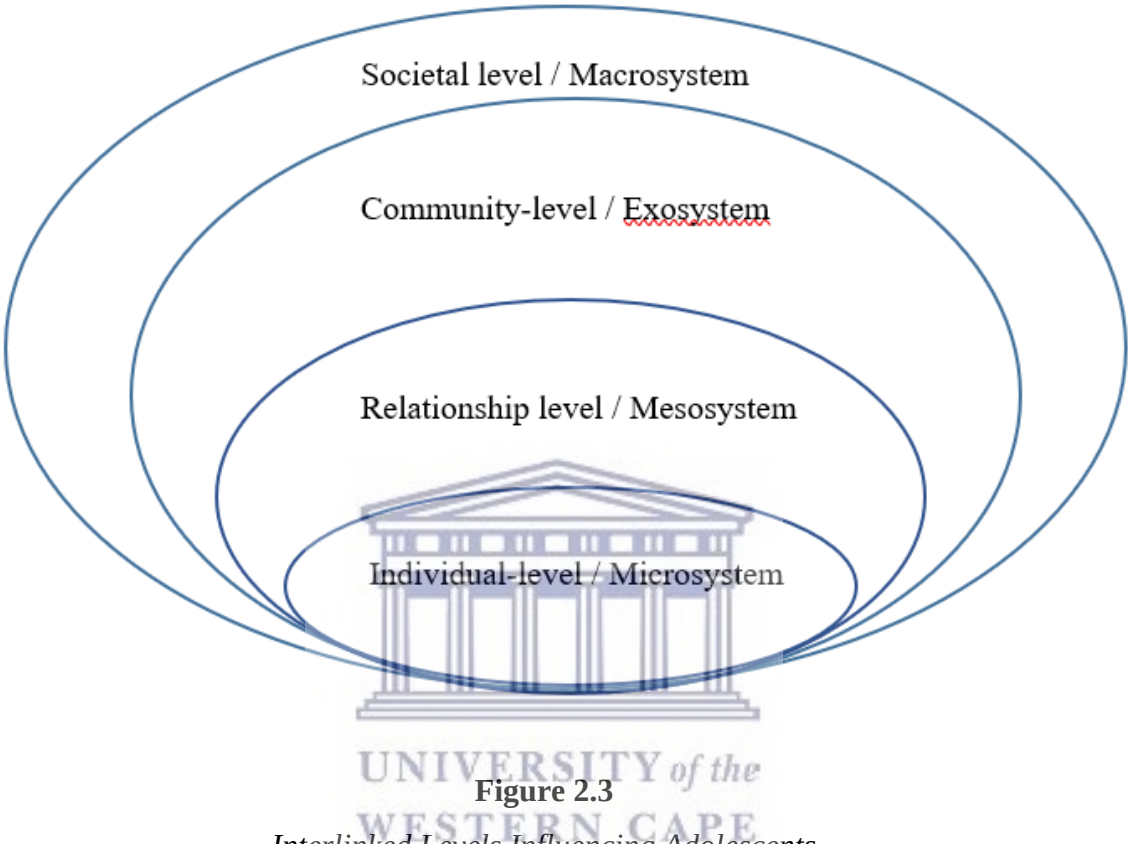


Figure 2.3

Interlinked Levels Influencing Adolescents

a) The individual level

The individual level is based on the adolescent who is also known as the adolescent in this context. It refers to the adolescent's gender, age, temperament, and lifestyle choices made to set personal goals. The immediate environment of the individual is based on the microsystem in the Ecological model. The adolescent is affected by the layer or those aspects of the environment with which direct contact is made. Therefore, it refers to the relationships and

interactions an adolescent has with their immediate surroundings (Berk, 2003). The adolescent's characteristics increase the likelihood of making positive lifestyle choices.

b) Relationship level

The relationship level provides the connection between the structures of the adolescent's close connections in the microsystem and close relationships in the meso-system (Berk, 2003). Examples of the relationship level are the connection between the adolescent's teacher, parents, family, and the neighbourhood are vital. On the relationship level, close interactions with family influence the possibility of the adolescent engaging in PA. The bi-directional influences on various levels influence the adolescent's choices made about their health.

c) Community level

The community level looks at the social context in which the social relationships are embedded. The exo-system is linked to the community level as it refers to the larger social system in which the adolescent does not function directly. The structures in this layer impact the adolescent's development by interacting with some structure in his or her microsystem (Berk, 2003). Exo-systems are community-level influences that include norms, standards, social networks, and the media. An individual does not have to be an active member in an exo-system for it to influence adolescents.

d) Societal level

At the societal level, it is important to note that it is linked to the macro-system and may be considered the outermost layer in the adolescent's environment. The societal climate may influence the possibility for adolescents to participate in PA. Berk (2003) suggests the macro-system has a cascading influence throughout the interactions of all other layers. Societal beliefs and culture play a role. Societal frustrations, violence, and social conflict influence the

individual's choices. The adolescent's perceived support from parents or the parent's ability or inability to carry out responsibilities toward their child affects PA behaviour.

2.2.9 Rationale for Developing Guidelines to increase physical activity

The rationale for the development of PA guidelines and the central aim of the current study was based on the conceptual foundation established by the health promotion theory and the ecological systems theory. The two theories provided a foundation to support the synthesis of the guidelines developed in the current study. Firstly, the health promotion action framework was put into action by using the theory to put the guideline development into practice. The aim is to use a lifelong health promotion approach in developing guidelines. To achieve this, the background of guideline development was determined below, to map the way forward.

In 2012, the Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM) published PA recommendations for public health. The report stated that adolescents should accumulate at least 60 minutes a day of moderate-intensity PA on most, preferably all, days per week. In 1996, Physical Activity and Health: "A Report of the Surgeon General supported this same recommendation. The Physical Activity Guidelines for Americans affirms that it is acceptable to follow the CDC/ACSM recommendation and similar recommendations" (Oyeyemi et al., 2016; Parrish et al., 2020; Sénéchal et al., 2021). However, according to the Advisory Committee report, the CDC/ACSM guideline was too specific. As a result, the new Guidelines allow a person to accumulate 150 minutes a week in various ways. United States Department of Health and Human Services (2020) supported the same recommendations for the inclusion of the following guidelines.

Adolescents should engage in regular PA to reduce the risk factors and health problems. The PA choices of adolescents influence their lifestyle, participation in PA, risk behaviour, smoking, and alcohol use. The primary audiences for PA guidelines in the current study are adolescents, parents, and community stakeholders. Guidelines should be designed as a resource

to provide information on physical activity, guidance, and benefits (Bull et al., 2020). The guideline information generated may be useful to parents and adolescents as a resource to provide strategies for increasing PA. Guideline development is necessary because of the importance of PA to the health of South Africans, whose current inactivity puts them at unnecessary risk. Physical inactivity among South African adolescents remains relatively high (WHO, 2018). The current study based the development of PA guidelines for adolescents and parents on the health promotion conceptual framework. The various phases and stages in this study informed the guidelines developed. The main elements for inclusion when developing PA guidelines are included in the following sections.

Physical activity (PA) has been defined as any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above a basal level (Piggin, 2020). Bodily movement can be divided into two categories: 1) Baseline activity refers to the light-intensity activities of daily life, such as standing, walking slowly, and lifting lightweight objects. Adolescents vary in how much PA participates. Adolescents who do only baseline activity are inactive. Short bouts of activity count toward meeting the recommended PA guidelines. The second category of health-enhancing PA is an activity that, when added to baseline activity, produces health benefits. In this document, the term "physical activity" generally refers to health-enhancing PA with examples such as brisk walking, jumping rope, dancing, lifting weights, climbing, cycling, and doing yoga are all examples of PA (Piggin, 2020). Normal lifestyle activities that encourage the increase of PA are sensible for several reasons (U.S. Department of Health and Human Services, 2018):

- Increasing PA helps to maintain a healthy body weight.
- PA promotes bone health.
- Bouts of short PA sessions accumulate to the recommended number of minutes for adolescents.

- Short bouts of PA are appropriate for inactive adolescents to gradually increase their level of activity.
- Encouraging PA helps build an active nation.

Therefore, adolescents must be allowed to make healthy lifestyle choices by selecting alternative options. An example of decisions taken is when an adolescent has the option of taking the stairs instead of using an elevator. Physical activity gives adolescents a chance to have fun, be with friends and family, enjoy the outdoors, improve their appearance, and improve their PA participation so that they can engage in more intensive PA. Previous guidelines have generally explained the amounts and types of PA needed for health benefits. Thus, individuals have many choices about appropriate types and amounts of activity. To make these choices, adolescents must set personal goals for PA, which involves questions like, "How physically active do I want to be?". Adolescents can meet the guidelines with support and continued parental involvement. The proposed guidelines must be understandable in practice.

2.3 Parental Involvement

Parental involvement shapes and influences health behaviours, including PA during adolescence (Sawyer et al., 2018). Thus, the conceptual framework linked to the health promotion theory and the ecological systems theory poses that PA is a lifelong endeavour. A healthy lifestyle leads to health outcomes that can be beneficial until adolescents reach adulthood. Moreover, the role of the parent in the PA experience of adolescents must be acknowledged. Despite significant research on the broader aspects, parent involvement, parent support, influence, and engagement, the link with parent involvement remains understudied (Cozett et al., 2016). Several mechanisms through which parents can be involved in PA have been proposed (Oyeyemi et al., 2016; van Hout et al., 2013). More specifically, the parent's involvement in the adolescent's PA behaviour is vital. According to Ornelas et al. (2007) characteristics of parental involvement include (1) family cohesion, meaning how many people

in the adolescent's life understand them, how much the adolescent and family have fun together, and how much their family pays attention to them; (2) Parental monitoring; (3) Parental directive behaviour related to family rules and boundaries and parental encouragement.

2.3.1 The role of Parents

The family is the smallest functional unit that instils values in a community. The most recent White Paper on Families in South Africa (Department of Social Development, 2021) defines families as the "societal groups that are related by blood (kinship), marriage, adoption, or affiliation with close emotional attachments to each other that endure over time and go beyond a particular physical residence" (p. 10).

The communities within which families exist, share characteristics such as social cohesion. Social cohesion is defined as "the result of building shared values and enabling people to have a sense of engagement in a common enterprise-facing shared challenge" (DSD, 2013, p4). Thus, parents can positively or negatively influence the PA behaviour of the adolescent. Strong et al. (2005) stated that an individual perceives the level of overall cohesion in his or her neighbourhood and decides how to contribute accordingly. The individual contributes to the neighbourhood's cohesion through social participation, engagement, and activities that foster a sense of belonging. Adolescents' perceived sense of belonging was found to be beneficial for PA behaviour.

A recent systematic review highlighted the link between the parents, health behaviours, and parenting approaches. The review highlighted the gap in the literature focusing on the health behaviour of adolescents as well as how parents are involved. Farooq et al. (2018) confirmed that parental involvement is vital in the PA health behaviour in which adolescents engage. The parent's influence to increase their child's participation in PA was shown to be the strongest

predictor of PA (Cozett et al., 2016). The family remains the nucleus of society and adolescents model the health behaviours of their parents (Farooq et al., 2018). Thus, parents can play an important role in their child's experience of PA.

2.3.2 Parenting Approaches and Benefits

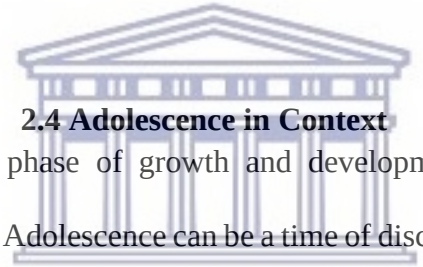
Parenting is a dynamic process and contributing factor to an adolescents' development (Doggui et al., 2021). Parents provide for the needs of adolescents in the adoption of goals, aspirations, and well-being (Roman et al., 2015). Parenting style refers to the emotional and relational climate created by parents and is a combination of emotional involvement (warmth) and demandingness (control) (Doggui et al., 2021). The styles and approaches of parenting include; authoritarian, authoritative, permissive, and neglectful. These parenting styles often depend on the personality of the parent and the type of support offered to the adolescent (Doggui et al., 2021). Authoritative refers to parents helping, supporting, encouraging, reprimanding, guiding, and assisting in the progress and for adolescents to become the best version of themselves. The authoritative style combines strict rules, emotional support, and guidance to help a child grow into the best version of themselves. The permissive parent outlines rules, but they fail to enforce them and have a laid-back attitude toward parenting. Neglectful parenting is the most undesirable style of parenting to choose from. Neglectful parents frequently leave their children to their own devices providing little or no support or guidance. Authoritarian parents set very strict rules and enforce those rules consistently. High standards of behaviour are set for adolescents. This style demands the child to respect their parents. There are set rules involved that a child should follow, however, the rules are always properly explained so a child understands what they mean. When an individual follows this parenting style they ensure that they are continually creating a positive relationship with their child.

Adolescent behaviour management necessitates mutual respect and the establishment of clear boundaries. Parents establish specific household rules and guidelines. Thus, the parent's parenting style and approach guide how these rules and support are provided. Household rules and guidelines are instilled during adolescence in the following ways: Curfews on weekdays and weekends, monitoring friendships, limiting television time, controlling food choices, and providing guidelines for appropriate clothing. Weekly parent-adolescent communication time should include discussions with adolescents about dating, personal problems, schoolwork, and PA. Adolescents learn about PA habits from their parents. As a result, parents encourage their children to enjoy PA. Caregivers play a critical role in determining how much, how often, and what type of PA youth participate in (CDC, 2012). Furthermore, the role of the family in supporting the adolescent by encouraging, supporting, directing behaviour, and overcoming barriers in the transformational phase of adolescence is the main link to increasing PA participation (Doggui et al., 2021; Roman et al., 2015).

Parental involvement in PA is beneficial to both adolescents and parents. Parental involvement in sports contributes to the enrichment of the parents' sports knowledge and establishes a bond between parent and adolescent. It creates a platform for parents to better understand the adolescent. Parental involvement plays a role in strengthening parent-child interaction. During training sessions and competitions, the parent and the adolescent can discuss important issues related to the child's sporting experience. It also creates time for parent-to-child togetherness. Parents who support adolescents at sporting events take on roles such as transporting the child to the sporting facilities and acting as coaches, as parental involvement extends far beyond simply providing resources to the youth. This provides an opportunity for the child and parents to spend more time together.

Despite numerous advantages that emanate from parental involvement in PA, there have been reported cases where parental involvement has led to some negative ramifications. When

parental pressure causes an adolescent to be less active, this is an example of this. Directive behaviour is one such method used by parents involved in the adolescent's lives. According to Lee and MacLean, (1997), parental directive behaviour is the extent to which adolescents feel controlled by their parents. Instead, in PA, directive behaviour promotes the perception of parental pressure (Wuerth et al., 2004). According to the current study, a high-quality parent-adolescent relationship is critical during early adolescence, including the adolescent feeling accepted by the parents. Improving this aspect of parent-child relationships is an important component. Thus, positive or negative parental involvement through directive behaviour may negatively influence the adolescent's attitude towards PA. Regardless of the benefits and drawbacks, being an involved parent still entails a financial and time investment in the adolescent's development (Kohl, 2013). Parents first get involved in the PA lives of their adolescents.



2.4 Adolescence in Context

Adolescence is a transitional phase of growth and development between childhood and adulthood (Sawyer et al, 2018). Adolescence can be a time of discovery that can raise questions of independence and identity as adolescents cultivate their sense of self, during which they make choices about PA behaviour (Csikszentmihayi, 2020). The World Health Organization defines an adolescent as any individual between the ages of 10 and 24 years (WHO, 2018). Furthermore, according to Nagata et al. (2016), adolescents account for over 16% of the global population. Thus, it is a time to develop healthy behaviours, knowledge, and skills that will be important later in life. Thus, understanding the adolescent and environmental factors provides researchers with the necessary experience to develop strategies to increase PA. The graphic illustration in Figure 2.5 illustrates how adolescents are impacted by various.

2.4 Adolescents' Health

Adolescent health has become a global health concern (Mokdad et al., 2016). Understanding adolescent health is vital. Yet, limited empirical evidence on adolescent health presents a gap in research, which allows for the development of strategies to improve health among adolescents (Aubert et al., 2021; Mokdad et al., 2016). Adolescents do not meet the health-related guidelines of engaging in at least 60 minutes of moderate-to-vigorous daily PA (Oyeyemi et al., 2016). Some adolescent health behaviours pose a threat to contracting non-communicable diseases (Nagata et al., 2016). The health-related behaviours that arise during adolescence can track into adulthood and have health implications (Nagata et al., 2016). The NCD statistics indicate that they account for more than a third of all deaths in South Africa (Draper et al., 2019). Notably, there are increases in risks related to NCD's such as physical inactivity. The development of these risky health behaviours adopted throughout adolescence adds to the economic burden of government health aid.

The Healthy Active Kids South Africa (HAKSA), introductory statement by Dr. Craig Nossel head of Vitality wellness, points out that while the levels of overweight, obesity, and inactivity in adolescents are on the rise, their health is in decline. Not enough is being done to guide our almost 19 million adolescents towards being healthy" (Draper et al., 2014). Effective policies and guidelines for parents are required to make informed PA decisions (Reddy et al., 2012).

Adolescent health has been documented in the Youth Risk Behaviour Report (YRBS) (Kann et al., 2014), which estimated that 29% of adolescents do not do a sufficient amount of PA. Moreover, Cozett et al. (2016) found that the trend in health declined due to increased physical inactivity. Adolescents are also at risk because they have fewer opportunities to engage in PA in schools and communities; thus, PA is linked to health and health behaviours. Girls especially are at risk due to barriers to PA.

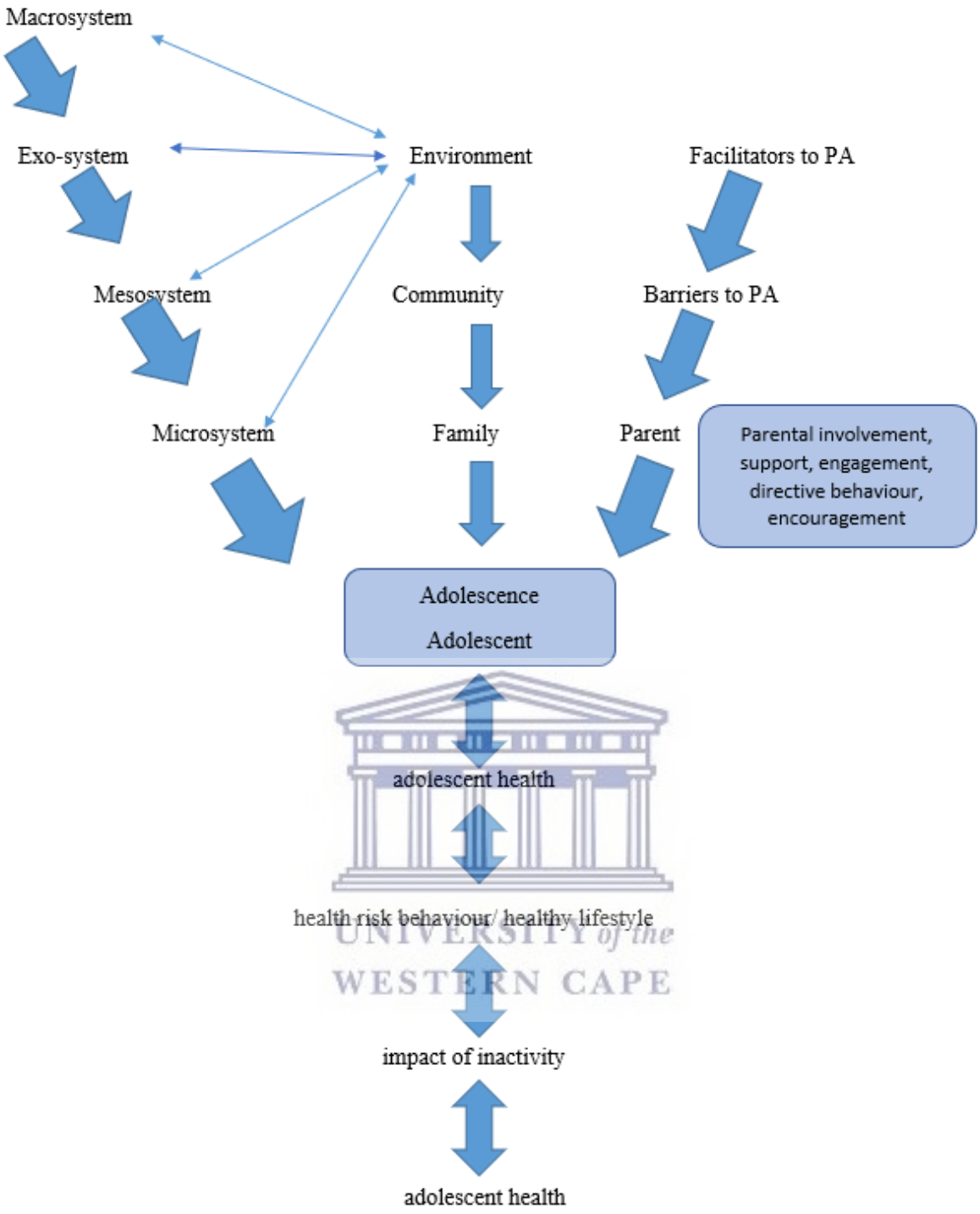


Figure 2.4

Environmental Factors Impacting Adolescents

2.5 Physical Activity in Adolescence

Piggin (2020) defines PA as any bodily movement produced by skeletal muscles that require energy expenditure. It includes activities undertaken while working, playing, carrying out household chores, traveling, and recreational pursuits. The term "physical activity" should not be confused with "exercise". Exercise is a subcategory of PA that is planned, structured, repetitive, and aims to improve or maintain one or more components of physical fitness (Piggin, 2020). Beyond exercise, any other PA done during leisure time has a health benefit, which would include PA for transport to get to and from places, or as part of a person's work, cleaning the house, and gardening (Piggin, 2020). Both moderate- and vigorous-intensity PAs improve health.

Physical activity is a complex behaviour with various types and intensities. Types of PA may be categorised by type of movement (e.g., walking, skipping), by sport (e.g., soccer, badminton), by life context (e.g., at school, at home, during transportation), or by predominant physiologic effect (e.g., cardiorespiratory conditioning, muscle strengthening). Regardless of the categorisation, PA operates through multiple physiologic pathways to influence many health outcomes. Although PA is categorised in many ways, aerobic activities are the most common and have the broadest physiologic and health effects. Aerobic activities are commonly categorised as being sedentary, light, moderate, or vigorous-intensity based on the rate of energy expenditure. Globally 23% of adults, and 81% of adolescents, do not do enough regular PA to meet the global requirements. In most countries, levels of inactivity are higher in girls compared with boys. Levels of inactivity increase with age. It has been shown that regular PA of 60 minutes during adolescence promotes health and wellbeing (WHO, 2021). Therefore, the World Health Organisation recommends adolescents do at least 60 minutes of moderate to vigorous-intensity PA daily (WHO, 2018).

Moderate-intensity Physical Activity (Approximately 3-6 METs) Requires a moderate amount of effort and noticeably accelerates the heart rate.	Vigorous-intensity Physical Activity (Approximately >6 METs) Requires a large amount of effort and causes rapid breathing and a substantial increase in heart rate.
Examples of moderate-intensity exercise include:	Examples of vigorous-intensity exercise include:
• Brisk walking	• Running
• Dancing	• Walking / climbing briskly up a hill
• Gardening	• Fast cycling
• Housework and domestic chores	• Aerobics
• Traditional hunting and gathering	• Fast swimming
• Active involvement in games and sports with children / walking domestic animals	• Competitive sports and games (e.g. Traditional Games, Football, Volleyball, Hockey, Basketball)
• General building tasks (e.g. roofing, thatching, painting)	• Heavy shovelling or digging ditches
• Carrying / moving moderate loads (<20kg)	• Carrying / moving heavy loads (>20kg)

Figure 2.5

Description of Moderate to Vigorous Physical Activity (WHO, 2018)

2.5.1 Benefits of Physical Activity

Adolescents who engage in regular PA have stronger bones and reduced symptoms of anxiety and depression (WHO, 2021). Risk factors for chronic diseases can develop early in life if adolescents make inactive lifestyle choices. Health benefits can be achieved by doing moderate-to-vigorous intensity PA for at least 60 minutes or more per day (WHO, 2021). Regular PA of moderate intensity – such as walking, cycling, or doing sports – has significant benefits for health. The benefits of being physically active outweigh the potential risks at all ages, and some PA is better than doing none. By becoming more active throughout the day in relatively simple ways, adolescents can achieve the recommended activity levels. Regular and

adequate levels of PA will improve muscular and cardiorespiratory fitness, bone and functional health, reduce the risk of hypertension, and prevent coronary heart disease, stroke, and diabetes (Piggin, 2020). Regular PA in adolescents is also beneficial as it not only makes them healthier but also fits during the developmental phases (Kohl, 2013). The United States Office of Disease Prevention and Health Promotion guidelines recommend that children and adolescents aged 6 to 17 do 60 minutes (1 hour) or more of PA each day (Kohl, 2013). This includes aerobic activities most of the 60 or more minutes a day that should be either moderate- or vigorous-intensity (such as running, dancing, or biking), and include vigorous-intensity PA at least three days a week. Muscle-strengthening includes weight-bearing activities such as climbing trees and using playground equipment, or lifting light weights at least three days of a week. Bone-strengthening should also be part of the 60 minutes or more of daily PA, which includes running or jumping rope at least three days of the week (Berk, 2003). Adolescents who engage in PA have a reduced risk of depression, reduced risk of falls and hip or vertebral fractures, and are fundamental to energy balance and weight control. On the other hand, insufficient PA is one of the leading risk factors for global mortality and is on the rise in many countries (Aubert et al., 2021; Bull et al., 2018).

2.5.2 Insufficient Levels of Physical Activity

Physical inactivity is defined as doing very little or no PA at work, at home, for transport, or during leisure time. In 2018, WHO indicated that around 23% of adolescents were not active enough globally (WHO, 2018). Internationally, 26% of men and 35% of women were insufficiently active compared to 12% of men and 24% of women in low-income countries. Low or decreasing PA levels often correspond with a high or rising gross national product. The drop in PA is partly due to sedentary behaviour at home. Likewise, an increase in "passive" modes of transportation also contributes to insufficient PA levels (WHO, 2018). Furthermore, adolescents in Africa engage insufficient levels of PA (Hankonen et al., 2016). In South Africa,

the PA of adolescents tends to decline with age and varies by gender, with boys reporting higher PA levels than girls (Cozett et al., 2016). While current health-related PA guidelines expect adolescents to be physically active in all domains of life, most studies in Africa have focused mainly on adolescents' overall PA levels.

It has been reported from other African countries that less than 50% of adolescents between 13 and 15 years of age are physically active for at least 60 minutes a day at least three days a week (Micklesfield et al., 2014). Insufficient PA is increasing amongst adolescents, with many studies in high-income countries reporting a consequent increase in overweight and obesity (Micklesfield et al., 2014). In the South African setting, a prevalence of combined overweight and obesity of 15-25% among participants between the ages of 10 and 20 years, a finding that is higher than anticipated. In low and middle-income countries, urbanisation and the nutrition transition are largely responsible for decreasing PA levels. Adolescents do not meet the current PA recommendations of 60 minutes of moderate to vigorous PA per day. The need for more PA surveillance data from Africa was highlighted (Micklesfield et al., 2014).

2.5.3 Increasing Physical Activity Participation

Communities should take action to provide individuals with more opportunities to be active and to increase PA (WHO, 2018). Interventions to increase PA aim to ensure that: In cooperation with relevant sectors PA is promoted through activities; activities such as walking, cycling, and other forms of active transportation are accessible and safe for all; labour and workplaces are encouraged to create PA opportunities; schools are safe spaces and provide facilities for students to be active. Quality PA supports the development of behaviour patterns in children that will keep them physically active throughout their lives. Therefore, schools have been identified as ideal settings for the promotion of youth PA. The CAPS Life Skills curriculum allocates 1 hour per week to physical education, leading to a lack of time spent on

school-based physical education (PE) (Dobbins et al., 2009). Therefore, addressing the promotion and increase of PA in less active adolescents is by examining the prevalence of sedentary behaviour and using intervention strategies to reduce it. For example, focus on behavioural health changes through the promotion of active learning in classrooms and the accessibility of the PA environment. Parents and peers working together using school-based guidelines may present positive models to decrease the adoption of sedentary behaviours. Another example is the previously mentioned CAPS interventions that purport to modify knowledge, attitudes, and motivation towards PA by fostering parents, students, and teachers' social support and providing an atmosphere that encourages students to engage in PA. Policies and plans to address physical inactivity have been developed in about 80% of WHO countries by 2018 (WHO, 2018). National and local authorities are also adopting policies in a range of sectors to promote and facilitate PA. Although PA has received increased attention from different disciplines over the past decade, physical inactivity remains a concern for policymakers.

2.6 Barriers to Physical Activity

The main categories of barriers that hamper participation in PA are as follows; individual barriers, social barriers, and environmental barriers. Firstly, individual barriers are defined as those that are specific to the individual (self) (Martin et al., 2015). Social barriers are linked to barriers that adolescents experience within the community. Lastly, environmental barriers refer to those barriers that exist in the environment in which the adolescent is supposed to do PA (Martin et al., 2015).

2.6.1 Individual Barriers

Adolescents expressed a range of individual barriers to PA such as a lack of physical skills to be able to participate in sports/exercise, body image issues related to being overweight, a lack

of priority for PA, as well as guilt for actually taking the time to be physically active (Zaragoza et al., 2011). The perceptions of intrapersonal barriers to PA include a lack of motivation and fatigue. Difficulties finding appropriate clothing to wear for PA (sports bra, shoes, and clothes that don't stand out too much, which might attract negative attention) limit many adolescents' participation in sports and PA (Zaragoza et al., 2011).

Interpersonal barriers include non-supportive parents, cultural acceptance, and being intimidated by the social environment through negative experiences about body size and shape, including weight-related teasing of other adolescents (Martins et al., 2015). A lack of support was a consistent barrier to PA, school obligations, and family obligations (chores). Financial barriers to PA are also consistently mentioned as a limit to adolescent participation. An adolescent who does not have the means to pay for transportation, clothing costs, and registration fees will miss out on PA opportunities (Martins et al., 2015).

2.6.2 Social Barriers

Community barriers render PA opportunities unaffordable. A lack of appropriate PA, sports, and exercise programs for girls, a lack of women coaches/leaders, the unavailability of facilities, no time for training, and PA resources in languages other than English have also been reported as barriers to PA (Martins et al., 2015). Web-based information provides recreation opportunities but is usually available in English only, and despite the multilingual characteristics of South Africans, these promotional materials do not provide for a large section of the population. Policy barriers include limited access to facilities for those whose family income is limited. The environment in which adolescents grow up determines the way, the number of times, and the time of day, in which an adolescent can do PA.

2.6.3 Environmental Barriers

The area in which adolescents live can have an impact on their PA behaviour. Social environmental barriers such as crime, violence, transport, and parental influence are barriers highlighted by adolescents (Martins et al., 2015). Accessibility to a safe and secure environment is a key barrier for both male and female adolescents (Martins et al., 2015). Parents are concerned about crime and the lack of safe neighbourhoods and playgrounds for participating in PA (Martins et al., 2015). Parks are used as gathering places for gang members in communities and dirty needles, cigarettes, crack pipes, broken glass, and discarded rubble can also be found where they hang out (Martins et al., 2015). Another limitation is the lack of the removal of community dumps and rubble. Furthermore, unsafe roads and crossings can make walking in communities hazardous (Martins et al., 2015). Thus, there is a need to find effective solutions to act as facilitators to the individual, social, and environmental barriers. Social support is needed to make viable changes in the lives of adolescents by providing adolescents with alternative facilitators to PA.

2.6.4 Facilitators of Adolescent Physical Activity

Facilitators are factors that improve functioning and increase the opportunities for an adolescent to participate in a PA (WHO, 2006). An accessible environment, positive attitudes from people in the adolescent's context, services, systems, and policies to increase participation are examples of factors that, by their presence, improve functioning. Other facilitators to PA include positive PA experiences, personal factors such as fun, perceived competence, support of family and friends, and access to PA programs. According to Wright et al. (2018), the most salient facilitator of participation described by clinicians was "planning programs to promote success and inclusion" (p. 4), whilst young people described two main facilitators: "the right people make physical activity fun!" (p. 5).

Other facilitators of PA mentioned by adolescents are outdoor facilities and safer streets. Students identified that the facilitators most likely to increase PA participation were the availability, safety, and cleanliness of the PA facilities (Wright et al., 2018). Another facilitator to PA was convenient hours to participate and a variety of PA options that encouraged students to stay active. Lastly, social support from family and friends in PA was important. Thus, parents and adolescents experience challenges in participating in PA due to barriers that exist within the environment that hampers PA. The parent's ability to carry out their responsibility towards their adolescent is based on the perceived barriers to PA participation.

2.6.5 Interventions to Increase Physical Activity Participation

Developing guidelines for adolescents may help translate the research knowledge into the development of future programs and interventions. Strong evidence exists that adolescents benefit from doing PA, and globally, there has been a call for action since the publication of PA and Health: A Report of the Surgeon General in 1996 and the 2008 Physical Activity Guidelines for Americans. More recently, there has been a call for action to stop preventable lifestyle diseases and to improve the care provided to individuals living with chronic diseases through PA. The Global Action Plan 2016-2025 (WHO, 2018) envisions the provision of equitable access to supportive environments that enable appropriate and effective programs, events, and services. The U.S. Department of Health and Human Services (2018) provides guidelines to help children to improve their health through PA. In America, communities and organisations have joined together in annual campaigns such as the "Every Body Walk!" campaign in an attempt to overcome behaviour change and social barriers that keep people from being physically active (U.S. Department of Health and Human Services, 2018). Locally, the prevalence of inactivity in adolescents in South Africa is increasing, according to the strategic plan on PA (Mickelsfield et al., 2014). One risk factor of inactivity is obesity, and South Africa has the highest overweight and obesity rate in Sub-Saharan Africa. Therefore,

there is a need for a coordinated multi-sectoral approach to increasing activity levels in South Africa. The interventions that were developed were for targeted audiences at workplaces to promote healthy eating and PA. Schools were targeted by promoting healthy eating, tuck shops, vendors selling at the school, and promoting PA. Lastly, schools were targeted to increase PA participation. The figure below illustrates the framework with key actions in the form of interventions.

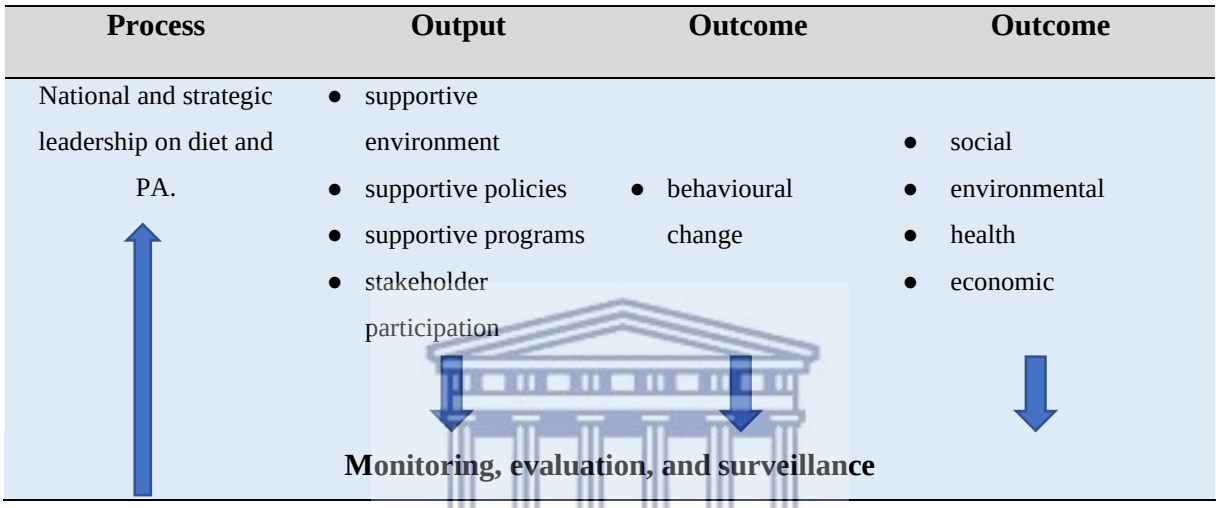


Figure 2.6

Implementation Framework of Key Actions

The WHO evaluated current PA interventions in 2009 and 2018, and it was discovered that an effective intervention meets the following criteria: The interventions are most effective in communities when they include both dietary and PA components. The majority had a strong educational component, were theory-based, and aimed to facilitate behavioural changes. Common issues are that interventions lack critical components and are not cost-effective. Furthermore, it was evident that interventions were not sustainable. As a result, interventions developed for schools and adolescents must be sustainable.

2.7 Summary of the chapter

In this chapter, the health promotion theory was discussed about physical activity, adolescents, and the context of increasing PA. Secondly, the ecological systems theory was discussed in relate about activity, adolescents, and the context of increasing PA. It is envisioned that adolescents, parents, educators, and community stakeholders together with healthcare practitioners within the field of PA will help of parents to find strategies for support to increase PA to increase participation. The next chapter consists of the methodological framework in the current study.

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CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter focuses on the methods and procedures employed in the study. The chapter begins with a recap of the research aims and objectives as well as the research questions. Then a description of the methodological framework, and the types of mixed methods used. The process and steps followed are described, along with trustworthiness, reflexivity, and ethics considerations during the research process.

3.1.1 Research Questions, Aim, and Objectives

The research question aims and objectives remain the golden research thread. Thus, the central question and sub-questions, along with the objectives, are highlighted below:

a) The main research question of this study was:

What are the required guidelines to improve parental involvement and adolescent physical activity amongst adolescents?

b) The following research sub-questions were formulated:

1.What is the prevalence of parental involvement in adolescent physical activity (influence, support, involvement, encouragement).

2. What is the current physical activity status of adolescents?

3. What are the physical activity preferences to encourage adolescents to participate in physical activity?

4. What are the barriers and facilitators to the physical activity participation of adolescents?

5. How can the results of this study be used to design guidelines to improve parental involvement and increased physical activity in adolescents?

6. What guidelines could be developed to improve parental involvement and increase

physical activity in adolescence?

c) Aims and Objectives of the Study

The study aimed to develop guidelines to increase parental involvement and physical activity amongst adolescents.

d) Research objectives

The phases and stages of the current study are linked to the research questions and the study's aim and objectives. To answer the main question, the following objectives were:

PHASE 1: Problem identification phase

Stage 1: Review stage

To conduct a systematic review with REAIM features to determine the best practice models/interventions to inform the guidelines to improve parental involvement and increase physical activity in adolescents.

Stage 2: Quantitative stage

To determine the current physical activity status of adolescents.

To select current physical activity preferences that would encourage adolescents to participate in physical activity.

To determine the level of parental involvement in adolescents and the relationship between adolescent physical activity levels PA and parental involvement.

Stage 3: Qualitative stage

To explore the barriers and facilitators to adolescent physical activity participation to increase physical activity in adolescents and parental involvement.

PHASE 2: Development of Guidelines phase

Stage 1: Concept mapping and guideline planning

To develop and design a framework for guidelines to increase physical activity in adolescents and parental involvement using concept mapping.

Stage 2: Workshops

To conduct a workshop to reach a consensus on the final guidelines.

3.2 Methodological Framework

A mixed-methods approach was used in the current study. According to Johnson and Onwuegbuzie (2004), "mixed methods combine quantitative and qualitative research techniques, methods, approaches and concepts into a single study". The section that follows discussed different types of mixed methods. A sequential explanatory mixed-method within the design-based research framework. The study included two phases. Phase 1 consisted of stage 1 (review stage), stage 2 (quantitative stage), and stage 3 (qualitative stage). Phase 2 consisted of stage 1 (concept mind map and developing a framework for guidelines), and stage 2, the final guidelines developed in a consensus workshop with rounds. The justification for using the mixed-method approach was in that it provided useful solutions to developing the current guidelines. Thus, the use of quantitative research designs within the mixed method approach allowed the researcher to describe, experiment, and measure variables (Carey, 2012). The use of the qualitative research designs within the mixed method approach allowed the researcher to gain insight, collect data, and evaluate information to gain knowledge and understanding (Carey, 2012). Figure 3.1 below illustrates the current study plan and the phases and stages related to the current study.

Chapter 4: Phase 1, Stage 1

Best Practise on models to inform the guidelines

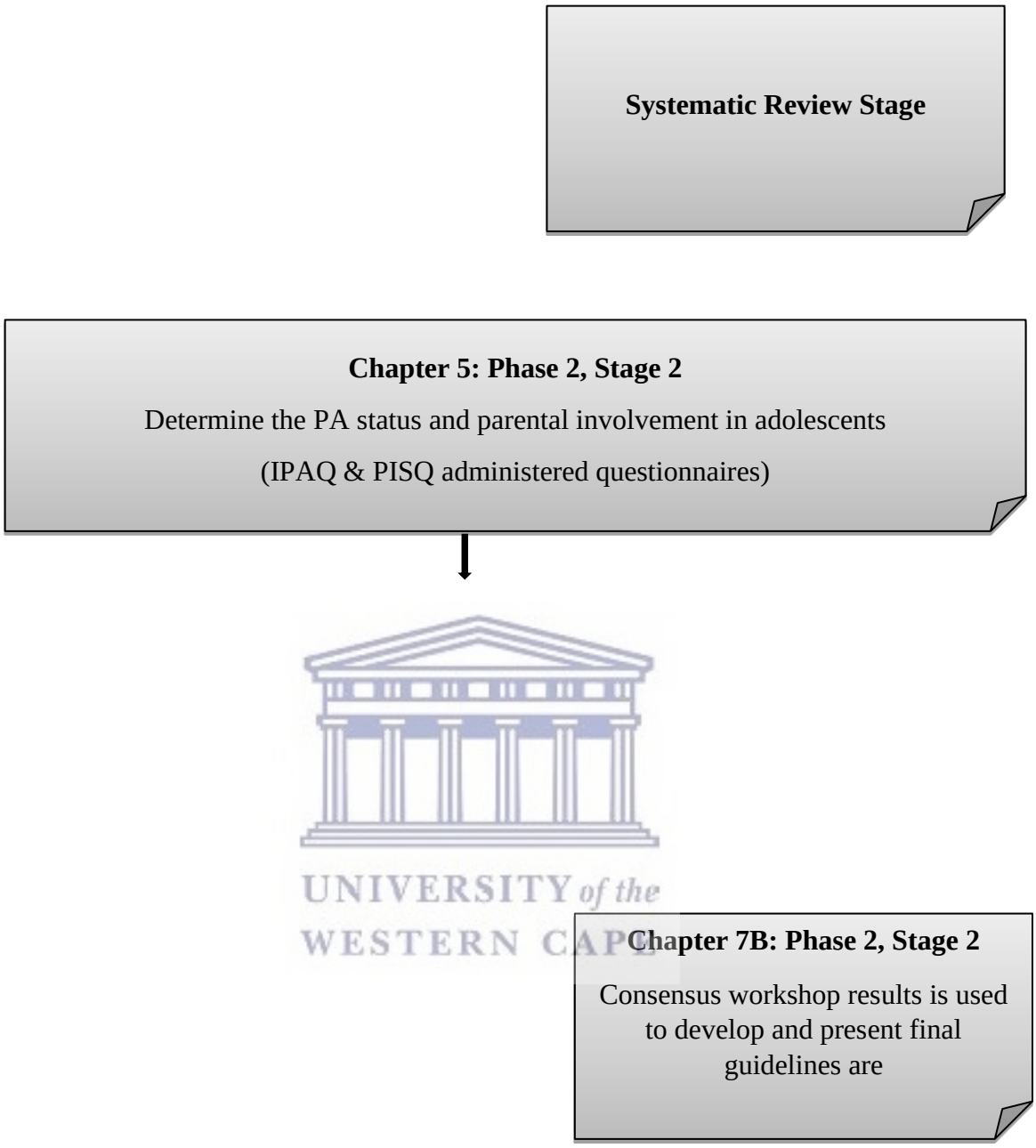

Figure 3.1

The Study Plan

3.2.1 Framework for Mixed Methods

It is important to note that the research question is fundamentally linked to the research methodology employed, as the methodology aids in answering the research question(s) (Creswell & Plano, 2011). Thus, mixed-method research requires proficiency in philosophy of science, research ethics, quantitative research methods, and qualitative inquiry approaches (Badiee et al., 2012; Bryman, 2007; Leech & Onwuegbuzie, 2010;). A mixed-method approach was adopted as the methodological framework to guide the phases and stages of this study. Rajasekar et al. (2013) suggest that a research methodology is "the systematic procedure by which researchers go about their work describing, explaining and predicting phenomena" (p. 5). Mixed methods provide comprehensive evidence of a phenomenon (Creswell et al., 2006; Mertens, 2012; Onwuegbuzi, 2004). Creswell et al. (2006) suggest that our methods are suitable for use in health science disciplines to explore, view, and understand the social world. The notion that mixed methods combine both research approaches, research techniques, and concepts into one study, is supported by Johnson and Onwuegbuzie (2004). In the decision taken to use mixed methods in the current study, the functions of mixed methods were explored (Johnson & Onwuegbuzie, 2004). The following functions are included in Table 3.2 below: Triangulation function, complementary function, development function, initiation function, and expansion function are included in the list of functions explored. Lathlean and Simons (2010) describe the three main purposes of mixed methods research as follows: 1) Triangulation refers to adopting two or more methods to corroborate the findings from one method with the other by doing cross-checking; 2) Facilitation, is where one method is used to facilitate the following stage of the research by developing a sampling strategy for instrument development; 3) Complementarity is the weakness of one method that can be offset by combining an alternative method that complements one another. Table 3.1 describes the functions of mix-method designs.

Table 3.1

Functions of Mixed-method Designs (Johnson & Onwuegbuzie, 2004)

Type of functions	**Functions of mixed-method design**
Triangulation function	Seeks convergence and corroboration of results from different methods and designs.
Complementarity function	Seeks elaboration, enhancement, illustration, and clarification of the results phases and stages.
Development function	***Includes using the findings of one method to help inform another method***.
Initiation function involves	Seeks paradoxes and contradictions that lead to a reframing of the research question.
Expansion function	Uses different inquiry methods.

The current study made use of the development function in that each phase and stage of the study contributed toward developing the guidelines. The development function allows for such integration as it permits more complete and synergistic use of the data.

The other chapters referencing qualitative and quantitative research designs must be connected here. Otherwise, there is not much to explain them in this section.

3.2.2 Practical Considerations

According to Creswell et al. (2015), three practical considerations are priority/weighting, timing/implementation, and integration.

a) Priority/weighting

Priority and weighting are determined in research when equal priority is shared between the two forms of data in a mixed-method (Creswell et al., 2004; Plano & Ivankova, 2015). Priority/weighting refers to the importance of the quantitative and qualitative methods in answering the study's research questions. A qualitative priority refers to the greater emphasis on qualitative data collection and analysis, which is known as unequal weighting which was

used in the current study. In contrast, a quantitative priority emphasises quantitative data collection and analysis, which indicates an unequal weighting. A greater emphasis was placed on qualitative methods in the current study, meaning there was an unequal distribution of weight, favouring qualitative methodology.

b) Timing/Implementation

Timing/Implementation refers to when a researcher can collect and analyse quantitative and qualitative data simultaneously (concurrently) and/or at different times (sequentially). In concurrent timing, the results of the mixed method are collected at different times but are combined during the interpretation. Thus, sequential timing allows researchers to collect and analyse mixed-method data in a particular sequence, i.e. depending on the other one to progress. The current study used a concurrent method for the phases while the stages ran sequentially.

c) Integration/Mixing

Integration/Mixing refers to the mixed methods research process and places more emphasis on combining the mixed-method data (Creswell et al., 2004). The combination process occurs in various stages of the research methodology (Fetters et al., 2013). Three methods that may be used to facilitate the integration process are narrative-weaving, contiguous (connecting) staged data transformation, and joint display. Narrative-weaving means that both quantitative and qualitative research are written together. Contrary to this, a staged approach is used to integrate the data by collating the data in a visual means. The current study was integrated using a concept map. Consequently, a fit of data integration may be gained, which refers to the coherence of the quantitative and qualitative findings (Fetters et al., 2013). Confirmation assessment occurs when the findings from both types of data confirm each other. Additionally, Fetters et al. (2013) and Johnson and Onwuegbuzie (2004) both support expansion as another assessment of integration fit. Overall, mixed methods seem to provide comprehensive evidence

of the phenomenon because of quantitative and qualitative research approaches. A mixed-methods approach is, therefore, appropriate for the current study to fulfil the study's aims and objectives of developing guidelines to increase PA participation and parental involvement by using a mixed-method approach in which the stages and phases of the current study contribute to the development process. This tends to resonate with a pragmatic worldview (Johnson et al., 2007; Morgan, 2007). Therefore, a staged approach to data integration was used in the current study in the form of concept mapping to integrate the findings of the phases and the stages.

3.3 Pragmatic Worldview

Pragmatism as a worldview refers to a philosophy that lends itself to the practical nature of reality to find solutions for problems and actions (Shaw et al., 2010). The pragmatic worldview applies to the current study and is the most appropriate for use in this study. Thus, the worldview promotes applications and solutions to solving problems by using possible available approaches (Creswell, 2008; Klenk, 2008; Sharp et al., 2011). Johnson and Onwuegbuzie (2004) recognise the importance of acknowledging that actions, situations, and consequences are central to the worldview (Creswell, 2008; Klenk, 2008; Sharp et al., 2011). Therefore, pragmatism appears to adopt diverse beliefs and knowledge (Denzin & Lincoln, 2005; Klenk, 2008; Shaw et al., 2010). Shaw et al. (2010) and Johnson et al. (2007) highlight the importance of the physical, social, and psychological world. In addition, Shaw et al. (2010) highlight that individuals construct their social world to facilitate the growth and development of culture, thoughts, and beliefs. Hereafter, pragmatism and other worldviews are outlined based on mental beliefs.

3.3.1 Basic Beliefs of Worldviews

Basic beliefs of worldviews are based on the following philosophical concepts: Axiology (ethics beliefs), and Ontology (nature of reality).

3.3.2 Axiology

Axiology is the philosophical study of values and refers to the ethical beliefs of the worldview. Post-positivist worldview indicates respect for privacy, informed consent, minimizing harm (beneficence), and belief in justice and equal opportunity. Constructivism tends to raise participants' awareness and community rapport. Transformative views instill respect for norms and standards, human rights, and social justice. A pragmatic worldview is gained in the pursuit of knowledge of desired outcomes and political values (Denzin & Lincoln, 2005; Guba & Lincoln, 1994). The axiological belief of the pragmatism worldview refers to the presentation of truth, meaning, and knowledge over time. The pragmatic philosophy supports the value-oriented approach to research. This is supported by Morgan (2007) in that the pragmatic approach shows values, ethics, politics, epistemologies, and perspectives. Moreover, Johnson and Onwuegbuzie (2004) and Sharp et al. (2011) agree with the notion that pragmatism is more practical and theoretical in informing effective practice.

3.3.3 Ontology

Ontology refers to the nature of reality. Various versions of reality are based on social positioning. Thus, a single reality and all individuals have their unique interpretation of reality (Denzin & Lincoln, 2005; Guba & Lincoln, 1994). Johnson et al. (2007) argue that knowledge is gained through considering multiple perspectives. In this study, multiple perspectives were gathered from learners, parents, and experts to gain an understanding of the reality of adolescents in communities. The perspectives and input contributed to the development of guidelines to increase PA and parental involvement.

3.3.4 Methodological Approach to Systematic Inquiry

Mixed methods can be used between various approaches. According to Grove et al. (2012), studies designed to gather data to transform information needed, solve a problem, or offer a

strategy that will find support within pragmatism. Moreover, Shaw et al. (2010) stipulate that the epistemological belief that knowledge may be considered a transformation in an individual's physical or social functioning or the surrounding environment. According to Grove et al. (2012) and Klenk (2008), an advantage of pragmatism is that it promotes goal-oriented practice and actions to effect change.

3.3.5 Epistemology

Objectivity is the interactive link with participants and values are made explicit. Johnson and Onwuegbuzie (2004) and Creswell (2008) think that the pragmatism worldview values a pluralistic positioning and combines quantitative and qualitative methods. Pragmatism supports the notion of using one's common sense (Creswell, 2008; Klenk, 2008). The integrative methodology appears to be consistent with mixed methods research which highlights the importance of gaining an understanding of the problems based on factors such as social, language, culture, human subjectivity, and historical contexts (Creswell et al., 2007; Creswell, 2008; Morgan, 2007; Sharp et al., 2011). In addition to this, a pragmatism worldview has been recommended for mixed methods studies of inquiry and design-based research to identify the effects of objects and actions in research (Barab & Squire, 2004). Therefore, this worldview was selected as being appropriate for the current study. This gave the researcher freedom to choose methods, techniques, and research procedures that best suit the study's needs and purposes. In doing this, it provided an opportunity to gain an understanding of and insight into the phenomenon related to PA, factors that influence adolescents, and what guidelines are appropriate for inclusion in the current study (Creswell et al., 2007).

3.3.6 A Pragmatic Alternative to Key Issues

The following section presents a pragmatic alternative to the critical issues in social science research methodologies, which tend to resonate with mixed methods.

These pragmatic key issues are:

1. connection of theory and data (abduction),
2. the researcher's relationship to the research process (inter-subjectivity) and
3. inference (transferability)

Morgan (2007) points out that:

> The great strength of this pragmatic approach to social science research methodology is its emphasis on the connection between epistemological concerns about the nature of the knowledge that we produce and technical concerns about the methods that we use to generate that knowledge. (p. 73)

The types of mixed methods are used in more than one methodology including sequential and concurrent procedures.

3.3.7 Sequential Procedure

There are three types of sequential designs that exist, they are sequential explanatory, sequential exploratory, and sequential transformative (Hanson et al., 2005). These procedures assist researchers to collect data that may be used to elaborate on the findings of one method with the findings of another method (Creswell et al., 2003; Leavy, 2017). The current study used the sequential explanatory method: The current study plan describes the phases and stages in chapters in the current study in the figure below.

3.3.8 Concurrent Procedure

The current study used a sequential procedure that is concurrent. Meaning, that in sequential data collection procedures, one form of data was collected before the other. The quantitative data was collected before the qualitative data in the study. Thus, the stages ran sequentially but data collection was done concurrently. Quantitative and qualitative data were consolidated in

the current study (Creswell et al., 2003; Leavy, 2017). Priority is given to qualitative data in terms of weighting versus quantitative data in the current study. Interpretation typically involves discussing the extent to which the data triangulate or converge (Hanson et al., 2005). In the nested approach, mixed-method data are collected and analysed simultaneously (Hanson et al., 2005). Thus, equal priority is given to the forms of data. The design in which both qualitative and quantitative collection and analyse data simultaneously. Priority can be unequal and given to one form of data, however, it can be equal and given to both forms of data (Hanson et al., 2005). Accordingly, the current study employed diverse methods: a systematic review, quantitative inquiry, cross-sectional descriptive surveys, qualitative FGD, concept mapping, and a consensus workshop. Overall, these diverse methods enhanced the use of abductive reasoning and moved back and forth during the study processes. The systematic review findings and quantitative and qualitative studies were collated using concept mapping to inform the design and development of the guidelines to increase PA in adolescence. Thus, chapters were introduced and articles were submitted to reputable four international and local journals. Figure 3.2 is a representation of the study procedure.

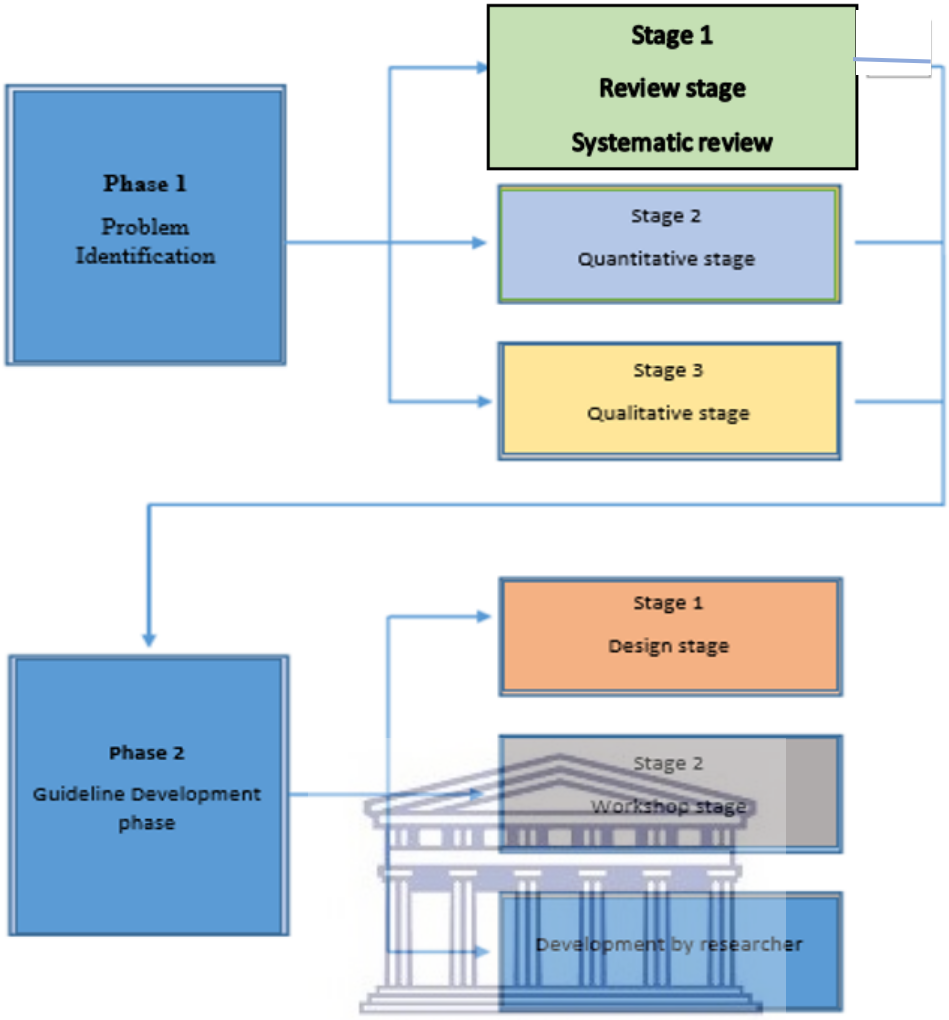

Figure 3.2

Research Framework

3.4 Research Design of the Current Study

This study used multiple designs in which the phases were sequential, but the stages ran concurrently and sequentially. The study consisted of two phases. Phase 1, consisted of three stages. Stage 1, the review stage, focussed on conducting a systematic review for problem identification. Stage 2 is the quantitative stage to determine the PA status using the International Physical Activity Questionnaire (IPAQ) (see Appendix 7B) and the Parental Involvement in Sport Questionnaire (PISQ) (see Appendix 7B). Stage 3, the qualitative stage,

explores adolescents' perceptions of parental involvement, barriers, facilitators, and factors contributing to PA. Phase 2, consisted of two stages. Stage 1 is the concept mapping and guideline developing stage using the framework for guidelines with stakeholder input. Stage 2 consisted of the workshop format presented to stakeholders to reach a consensus on the guidelines.

The sequential procedure began with a qualitative method as a priority, leading to a quantitative method with lesser emphasis, known as a sequential exploratory mixed method (Creswell et al., 2003; Hanson et al., 2005). Thus, this study used a *sequential explanatory design to address the current research question*. The sequential explanatory design consisted of two distinct phases (Creswell et al., 2003) where the results of phase 1 were used to inform phase 2.

Table 3.2

Study procedures per phase and stage

Phase	Stage	Explanation of study procedures
Phase 1	1	A systematic review stage 1, for problem identification. A quantitative article was submitted to a repeatable journal in a review format.
	2	A quantitative descriptive study stage 2, to determine the PA status using the International Physical Activity Questionnaire (IPAQ) and the Parental Involvement in Sport Questionnaire (PISQ) administered in one questionnaire.
	3	The qualitative stage 3, is the exploration of stakeholders' perceptions to explore adolescents' perceptions of the barriers and facilitators to PA. The sequential exploratory mixed methods research design was used so that the findings from the first phase could be used in the second phase.
Phase 2	1	In phase two, firstly, the concept mapping in stage 1 using the steps of concept mapping the results of the preceding stages were collated to inform the design phase. A framework for the development of guidelines was developed in stage 1 of phase 2. The consensus workshops and consensus procedure were used to design the guidelines in stage 2 of phase 2.
	2	The final guidelines were presented with input from stakeholders and guidelines were developed and presented using the findings of the consensus workshop.
	Final procedure	The entire study was presented in article format to reputable journals. In total 5 articles were submitted and reviewed for publication.

3.5 Study Context

This section describes the context of the current study based on the research setting, study population, and sampling.

3.5.1 Research Setting

The research setting t of the study was set in the Metro South Education District (MSED) in Mitchell's Plain in the Western Cape, South Africa. In the present study, there were five randomly sampled public high schools in the MSED of the Western Cape Education Department (WCED). When the data was collected, the WCED had 1458 public schools and 936 534 learners from grades 1 to 12 (Department of Basic Education, 2013). In 2021 the WCED has 1 523 schools in the system. Currently, the province has 33 865 teachers for nearly 1.1 million pupils (Lepule, 2021). Mitchell's Plain is a large township with coloured and black inhabitants about 32 km from the city of Cape Town. Mitchell's Plain is one of South Africa's largest townships. It is located on the Cape Flats on the False Bay coast between Muizenberg and Khayelitsha (Theunissen, 2010). The township was built during the 1970s by the apartheid government to provide housing for the coloured community who were victims of forced removals. The forced removals resulted from the implementation of the Group Areas Act (Louw, 2010). The townships are constructed in neighbourhood units with open spaces, localised public facilities, and transport routes. Housing types provided in Mitchell's Plain included freestanding, semi-detached, and duplex houses. However, by the late 1980s-1990s, major areas of Mitchells Plain had deteriorated into urban ghettos (Theunissen, 2010). "Gangsterism, drug abuse, and social challenges have increased and several informal settlements have sprung up in several areas of Mitchell's Plain" (Theunissen, 2010, p1). Other social challenges have an impact such as poor infrastructure, unemployment, low socio-economic conditions, drug use, alcohol use, and gangsterism influence these adolescents daily (Theunissen, 2010). In the study context, it can be referred to as a risk environment. Mitchell's

Plain was selected as the research setting in the present study because it consisted of a unique environment that was accessible. Figure 3.3 indicates the map of the Education Districts found in Cape Town.

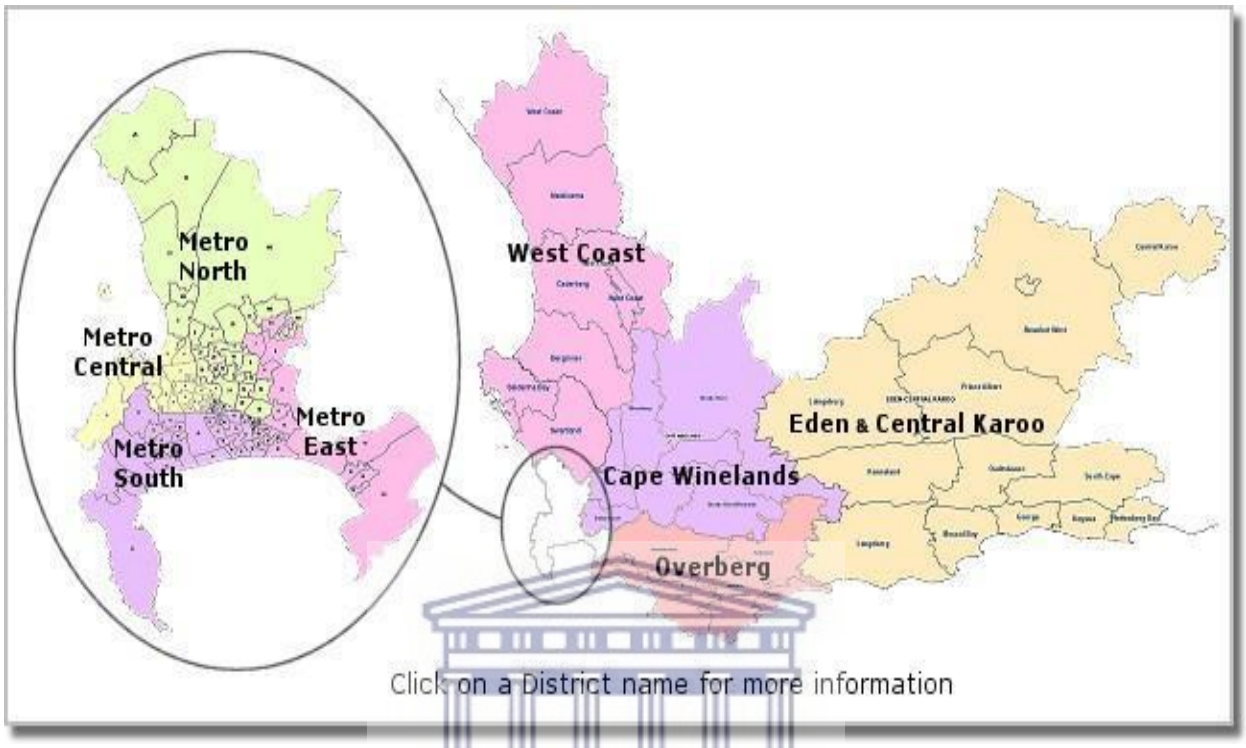

Figure 3.3

Map of Education Districts

Figure 3.4 illustrates the data collection framework developed for the current study in which the phases, stages, and data collection linked to the study framework is described. The data collection framework provides a summary of the populations and sample sizes in the current study. Furthermore, the sample sizes are discussed in each stage and phase.

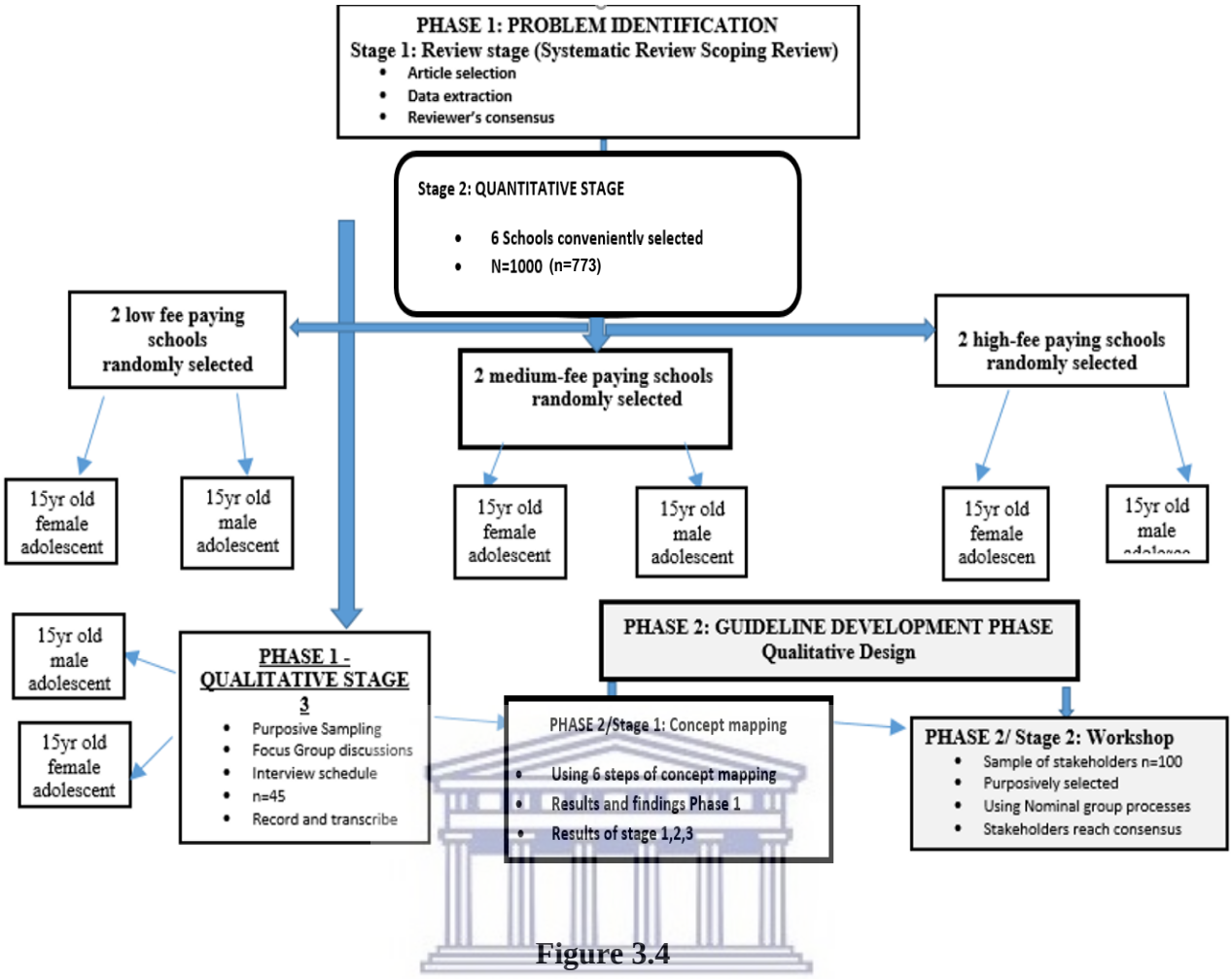

Figure 3.4

Study's Data Collection Framework

3.6 Implementation of the Current Study

In phase 1, the problem was identified and consisted of the following stages. Stage 1 (review stage), stage 2 (quantitative stage) and stage 3 (qualitative stage). In this phase, a clear description of the problem of physical inactivity was explored. Additionally, a review of literature relating to the problem, a summary of adolescents' perceptions, and preliminary research questions are discussed. Herrington and Reeves (2011) list three key areas, which are important for the first phase. These key areas are identification of the problem, literature review chapter two, systematic review, and consultation. The systematic review was presented in article format in chapter four, and a subsequent section of discussion related to the current study

is presented. Drawing on Herrington and Reeves' (2011) writings, this phase explored the problem of physical inactivity organically identified in adolescence and the link between parental involvement to increase PA.

3.6.1 Phase 1, Stage 1: Problem Identification (Systematic Review)

A systematic review was conducted focusing on what other researchers have contributed in terms of guidelines developed in adolescence, physical activity, physical inactivity, parental involvement, and the guidelines for inclusion. This provided the preliminary information needed for the creation of draft guidelines to inform the design and development phase of the current study. Information related to adolescence, physical inactivity, PA, key concepts and definitions, adolescents and their preferences to elements needed in potential guidelines. The systematic literature review is presented in Chapter 4.

a) Stage 1: Objectives

The goal of stage one was to conduct a systematic review to determine the link between adolescent PA levels, adolescent PA status, and the link with parental involvement. Moreover, to determine the best practice models and current interventions used in practice to inform the guidelines. The RE-AIM framework was used to map the body of literature on the current topic (Arksey & O'Malley, 2005). Thus, the objective was:

1. to conduct a systematic review to determine the best practice models/interventions/ to inform the guidelines and parental involvement.

b) Method for the systematic review

The systematic review was conducted focusing on current interventions to inform the guidelines to be developed in this study (2010-2020). This systematic review focussed on the (i) current guidelines to increase adolescent PA participation. (ii) parental involvement to increase adolescent PA participation. Electronic searches were conducted using electronic databases,

journals such as CINAHL, Ebscohost, BioMed Central, and ScienceDirect were searched from 2010-2020. The review was conducted using the RE-AIM framework as follows: Reach into the target population, Efficacy or effectiveness, Adoption by target settings or institutions, Implementation consistency of delivery of the intervention, and Maintenance of intervention effects in individuals and populations over time.

c) Methodological quality appraisal

The methodological quality of the studies that met the inclusion criteria was assessed using an appropriate methodological quality appraisal tool (see Appendix 8 and 9). All articles were assessed by three reviewers and discrepancies were addressed until an agreement was reached. The RE-AIM framework proposes that the translatability and health impact of such initiatives is best evaluated by examining all five of the following dimensions in the RE-AIM process: 1) Reach the target population, 2) Effectiveness or efficacy, 3) Adoption by target staff, settings, or institutions, 4) Implementation consistency, 5) costs and adaptions made during delivery, 6) Maintenance of intervention effects in individuals and settings over time (Holstrop, 2021).

d) Data collection

Relevant studies were found according to the usual means such as databases and websites as a starting point. Electronic searches will be conducted using electronic databases and journals such as CINAHL, Ebscohost, BioMed Central, and ScienceDirect from 2010 to 2020. The review was conducted using the RE-AIM framework suggested by (Schardt et al., 2007). Studies were selected purposively and key concepts were searched included: PA guidelines for adolescents, the relationship between parental involvement and adolescent PA status, parental involvement, parental encouragement, PA, increasing PA in adolescents, strategies to increase PA participation parental involvement in adolescent PA. Studies that were included were relevant to the research and the following selection criteria were applied: (a) studies published

in the English language, (b) the study would have been published between 2010 and 2020, (c) the study would have to use the link between adolescents PA and parental involvement (d) studies that include the research questions key concepts: such as PA guidelines adolescents.

e) Data extraction

The researcher used a newly developed tool, an adapted version of the data extraction tool was used by the two reviewers, Roman & Frantz (2013), to extract data in the addendum section. The tool was used to extract relevant data such as the article details contained in chapter 4 of the current study. The details extracted included the author's details, title, demographics, sample size, age and gender, country, description of the interventions, and the findings of the studies. This information was used to determine current literature trends on guideline development to increase PA participation in adolescents and parents.

f) Data Analysis

The systematic review phase was used to identify and analyse the problem. The review aimed to rapidly map the key concepts underpinning the research area and to identify best practice models to determine the link between parent involvement to increase PA in adolescents. The details were extracted using the data extraction tool (see Addendum). Data collected during the review were analysed and included the author's details, title, demographics, sample size, age and gender, country, description of the interventions, and quantitative study findings of the studies. This information was used to determine current literature trends on guideline development to increase PA participation. Analysis and methodological quality of the studies were assessed using an adapted quality appraisal tool (see Addendum 3.2). All articles were assessed and the reviewer's discrepancies were addressed until an agreement was reached. The RE-AIM framework was used to synthesise the findings in result tables.

3.6.2 Phase 1, Stage 2: Quantitative Inquiry

Stage 2 of Phase 1, the quantitative stage, consisted of the researcher administering two existing questionnaires (Children's Physical Activity Questionnaire, CPAQ, and the Parental Involvement in Sport Questionnaire, PISQ). These two questionnaires were combined when administered to the adolescents (grade 9 pupils, aged 15 years old) and consisted of two parts (A and B). The CPAQ consisted of the demographic information and scales designed to determine the level of PA in adolescence, which came first. Then the PISQ was followed to determine the level of parental involvement. Data were automatically captured in a raw data sheet then imported to SPSS software and analysed descriptively. This part of the study is presented in Chapter 5.

The objective of Stage 2 was to determine the PA status of adolescents and the level of parental involvement to increase PA participation. The International Physical Activity Questionnaire (IPAQ), (see Appendix 7A) was administered to participants after they gave consent. In part B, the second objective was to determine the relationship between adolescent PA and parental involvement using the parental involvement in sport questionnaire PISQ (see Appendix 7B).

a) Population and sampling

The population and sampling of the current study were depicted in Figure 3.5 which gave a breakdown of the population and data collection procedure. The population of the current study consisted of grade 9 learners in the Western Cape in an education district. The district from which the population and sample were drawn was selected conveniently and based on the accessibility. The district includes sixty-seven schools. In total, six schools were randomly selected from a district in the Western Cape Education Department's list of schools. The schools selected were clustered into low fee-paying schools, medium fee-paying schools, and high fee-paying schools. An illustration of the sampling structure is shown in Figure 3.4. All

the eligible grade 9 learners were randomly selected to give consent to be a part of the study. Therefore, the sample will include male and female adolescents aged 15 years.

b) Tools: instrument selection, validity & reliability

The International Physical Activity Questionnaire (IPAQ) was administered to grade 9 students in the data collection process in Phase 1, Stage 2. The IPAQ and PISQ are presented in Appendix 7A and 7B. The IPAQ was administered to determine the PA status of adolescents.

c) Validity and Reliability of IPAQ and PISQ

The validity and reliability of the International Physical Activity Questionnaire (IPAQ) was tested by Cleland et al. (2018). The participants (n = 101) were selected randomly from an ongoing research study, stratified by level of PA and gender. The IPAQ demonstrated graded differences across categories for step count, body mass index, waist circumference, percent fat, fitness, and accelerometer measured activity. Short-term test-retest reliability (10 days) ranged from 0.83 to 0.96 while long-term reliability (three months) was 0.53 to 0.83. These data provide moderate validity and generally acceptable reliability evidence for the IPAQ. Reliability coefficients were of moderate to substantial strength (Kappa 0.67 to 0.73; Spearman's rho 0.67 to 0.81). Results on concurrent validity in the IPAQ also showed a moderate to a strong positive relationship (range 0.45 to 0.65). Results on criterion validity were in the fair (range 0.06 to 0.35). Overall, the IPAQ provides reproducible data and showed a moderate-strong positive correlation with the IPAQ, a previously validated and accepted measure of PA. Overall, the results indicate that IPAQ is a suitable and acceptable instrument for monitoring PA in population health surveillance systems, although further replication of this work in other countries is warranted. An adapted version of the parental involvement in sport questionnaire (PISQ) was administered to determine the link between adolescent PA levels and parental involvement. Three scales included questions related to parental involvement, parental directives, and parental encouragement. The validity and reliability of

the PISQ were determined in a study by Wuerth et al. (2004). The PISQ was used in the study to examine the pattern of involvement of parents in youth sports careers. They found that all the scales showed satisfactory internal consistency and retest reliability. The scale structures include directive behaviour, parental involvement, and parental encouragement as illustrated in Appendix 7B.

d) Data analysis Stage 2

Demographic data were analysed using the Statistical Package for Social Sciences (SPSS) version 24. A raw data table was generated and data cleaning was conducted. Descriptive statistics for the participant's demographic characteristics were performed using quantitative analysis. Participants were asked questions on a four-point LIKERT scale. The number of PA sessions for adolescents was quantified by taking the number of 60-minute sessions and multiplying it by sessions per week. The sample was structured according to adolescent variables such as age and gender and the number of 60-minute sessions of PA. The mean and standard deviation was calculated for the adolescent scores to determine the adolescent's PA status. The level of PA participation was presented in numerical tables and graphs.

3.6.3 Phase 1 Stage 3: Qualitative Stage

The objective of stage 3 was to explore the perceptions of adolescents on the barriers and facilitators to adolescent PA participation. Moreover, to understand participants' perceptions on the preferred PA activities to be included in the proposed guidelines and how to overcome barriers. In stage 3, the researcher consulted qualitatively with adolescents to gain an understanding of the adolescent's perceptions of factors that contribute to PA. The consultations with the students were conducted using Focus Group Discussions (FGDs) to produce the valuable data needed to develop guidelines. Adolescents were interviewed in three FGDs in familiar surroundings such as schools and community venues. The FGDs were

conducted using an interview schedule focussing on the problem related to physical inactivity, preferred PA activities, barriers to PA, PA preferences, and strategies to overcome barriers to PA. In describing the benefits of FGDs, Herrington and Reeves (2011) emphasize that "ideas can be bounced off other participants, often resulting in a more robust understanding of the issues, together with potential solutions and ideas for the design of the intervention" (p. 597). The FGDs became an interactive experiential platform that enabled parents and students to discover and learn about the importance of regular PA and how to overcome barriers to its implementation. Data were collected until saturation was reached and thematically analysed. The themes and approaches obtained from these stages informed the subsequent phase of design and development of guidelines in Phase 2. Themes identified in phase 1, stage 1, 2, and 3 were consolidated in phase 2 stage 1, in the concept mapping stage. For example, if more than one theme with the same focus area were identified, then themes were consolidated into one section (safety was consolidated into one theme, and support focus areas were consolidated into one theme).

a) Population and sampling

The population for stage 3 consisted of grade nine learners (15 years old) from an education district in the Western Cape. Participants who participated in stage 2 were invited to participate in stage 3 and be a part of the focus group discussions. Only those participants who gave consent were included in the final sample. The final sample in stage 3 was purposefully selected based on those participants who give consent. The ethics involved in the selection process ensured that participants remained anonymous and free to withdraw from the study at any time.

b) Data collection stage 3

The data was collected during focus group discussions. An interview schedule (see Appendix 8), with open-ended questions, was used to guide the discussions. The data collection framework in the current study is depicted in Figure 3.5. The researcher/facilitator explained terms such as barriers and facilitators to participants. Focus groups with adolescents were in a familiar environment to participants. Moreover, discussions were conducted in schools as a setting comfortable and convenient to the participants. Discussions were recorded and transcribed verbatim.

c) Data analysis stage 3

The data analysis of the qualitative stage 3 was analysed using thematic analysis. Mills et al. (2010) describe thematic analysis as a tactic for reducing and managing large volumes of data without losing the context. It involves identifying salient themes, recurring ideas, and patterns of belief that link people and settings together (Mills et al. 2010). The information gathered from discussions will be arranged into themes to make sense of the experiences of adolescents. Central to the process of thematic analysis is a basic analytic strategy which is called data coding. De Vos et al. (2011) describe the researcher's task of coding as recognizing persistent words, phrases, and themes within the data collected to retrieve and resort at a later stage. Therefore, data coding was used to categorise transcriptions using qualitative means. The credibility and trustworthiness are in the following paragraphs and are explained in one section.

3.6.4 Phase 2: Consensus Workshop and Guideline Development

Phase 2 known as the guideline development phase, consisted of stage 1, the concept-mapping stage, and framework development using the first round of the consensus workshop. Stage 2 was the second round of the consensus workshop during which the final guidelines were presented.

3.6.4.1 Stage 1: Concept Mapping and Framework Development

In stage 1, concept mapping was used to integrate the findings of phase 1, stages 1-3. The themes and findings of phase 1, stages 1-3 were combined in a concept map to consolidate the findings of phase 1. The themes and approaches obtained from these stages informed the subsequent phase 2 and the concept map that was developed. The concept map allowed the researcher to begin to structure the guidelines for inclusion before stage 2, the workshop stage, and develop a framework for guidelines on which experts made input to refine the guidelines. The consensus workshop was conducted, stakeholders made input to develop themes and a framework was developed.

a) Stage 1: Concept mapping and developing a framework

The objective of this stage was to develop and design guidelines to increase participation in PA in adolescents and parents by using concept mapping. "A concept map is a schematic device for representing a set of concept meanings embedded in a framework of propositions" (Novak & Gowin, 1984, p. 15). Concept maps are created with the broader, more inclusive concepts at the top of the hierarchy, connecting through linking words with other concepts that can be subsumed. The purpose of concept mapping is to provide health promotion program planners with a framework for effective decision making at each step in the design and development of guidelines. The concept mapping process involves six major steps: 1) Identify the focus of the project, participants selected, and project schedule and logistics determined. 2) The generation of ideas is accomplished through some form of brainstorming. In the current study, brainstorming forms a part of the workshop. 3) The ideas generated are synthesised; 4) Organisation takes place to sort data and rate data variables of interest (e.g. relative importance, feasibility). In the current study, the organisation takes place when participants reach a consensus. 5) The representation includes planning of the ideas in maps. 6) Participants are actively involved in interpreting data by reaching consensus and associating the visual maps to

results. A mind map was used to identify key concepts and themes that were derived from the study phases and stages.

3.6.4.2 Stage 2: Consensus Workshop and Guidelines Presented

On completion of Phase 2, the guidelines developed for parents to support adolescents to increase PA participation were designed, developed, and informed by existing literature trends, input from adolescents, parents, a panel of experts, and stakeholders in communities. Herrington et al. (2009), describe the second phase of design-based research by listing two key features, which are discussed below in the current study. This section consisted of the themes identified in phase 2, stages 1-3. The themes and approaches obtained from these stages informed the subsequent phase of the design and development of guidelines. On completion of phase 2, the workshop phase, the guidelines developed for parents to support adolescents to increase PA participation were designed, developed, and informed by existing literature trends, input from adolescents, parents, a panel of experts, and stakeholders in communities.

a) Description of proposed guidelines stage 2 of phase 2

The researcher developed guidelines to increase PA participation for adolescents and parents based on the relevant literature and the findings of the phases and stages of the study. The guidelines were developed in consultation and collaboration with the adolescents, parents, educators, experts, policymakers, and community workers. The panel of experts provided feedback and gave input on the guidelines. The consensus was reached on the final guidelines by the experts and the stakeholders in the workers. In total, 13 items were removed ed, and six guidelines with 52 subcategories evolved as guidelines for parental involvement to increase participation in adolescents' physical activity. The final guidelines were accepted as a final article in a reputable international journal. The researcher compiled guidelines in preparation for disseminating findings to parents and educators, the Western Cape Education Department (WCED), or other health and research disciplines worldwide.

b) Population and sampling

The sample for the consensus workshop in stage 1 and stage 2 was selected purposively and combined. Workshop participants were selected from the stakeholders involved in the study. The participants included parents, educators, community stakeholders, researchers, and interest groups. Both stages aimed to develop guidelines using the findings of the phases and stages by reaching a consensus. The guidelines were to be developed with parents and adolescents in mind, and it would serve as a resource for increasing PA. Initially, a panel of experts took part in the pilot of the workshop. The process allowed the researcher to do a test run of the workshop. The two supervisors (professors), three educators, parents, and one researcher made up the panel of experts. The population for the workshop consisted of 100 participants. Only 65 participants gave consent and completed a preliminary survey (held during the COVID-19 pandemic) to gauge their understanding and preliminary input. A final FGD was held with a total of 20 participants, who gave consent. However, only 11 of the subject matter experts gave final input. The question then posed to the participants was: "Who would like to be a part of the final workshop to develop the guides?". Participants who agreed were given consent forms to gain access to the online workshop. Participants included educators, parents, coaches, community workers, policymakers in government departments, parent-athletes, interested community members, and NGO officials. The final workshop consisted of 20 participants taking part in the online Zoom workshop.

c) Data Collection

Invitations to the workshop were sent via Zoom, along with an agenda, workshop outline, meeting preparation tips, and workshop pre-reading. During the workshop participants had the opportunity to hear the researcher present the study aim, objectives, findings, and key concepts discussed and clarified while the researcher facilitated the process. The researcher then shared the guidelines derived from the previous findings of the phases and stages of the

study. Participants had the opportunity to provide input throughout the process and consensus was given on the developed guidelines. Data were collected in the workshop process, during which the facilitator posed questions to the group, who used the raise hand feature or the comment feature to express their views during the online meeting. In the final workshop, the researcher used two assistants, as the need became apparent during the pilot session. The use of a flip chart and meeting recordings helped the researcher to keep track. For the researcher, the assistants took notes and kept track of online comments. In a round-robin fashion, participants reported their responses on the Zoom recording. The facilitator checked with the group members to make sure that all of the information had been recorded, and the group members made preliminary rankings, which were recorded and discussed. Following the discussion, the group members decided on the final list's ranking, which was recorded by the facilitator.

d) Data analysis stage 1 of phase 2

Concept maps can provide one strategy to deal with the methodologic challenges of qualitative research. A concept map (Novak, 1998) can be used to frame a research project, reduce qualitative data, analyse themes and interconnections in a study, and present and synthesize findings. The concept map is presented in article format in chapter 7A. The maps allow the researcher to see participants' meaning, as well as, the connections that participants discuss across concepts or bodies of knowledge. Finally, concept maps can be used to present the findings of a qualitative research study. As a graphical display, the maps can help readers understand the findings by providing a vehicle whereby the actual data quotes can be connected to larger parts of the study. A framework for guidelines was developed using thematic analysis in which themes were identified and sub-themes. The participants in the study were experts in the field of PA, parental involvement, physical education, and adolescent health and reached a

consensus on the round 1 framework for guidelines. In round 2, additional changes were made based on expert feedback, and the framework was refined for developing guidelines.

e) Data analysis stage 2 of phase 2

The data analysis process in the workshop stage has been based on the participants agreeing on a clear purpose which helped to identify engagement objectives, and anticipated outcomes and helped to determine the scope and depth of the engagement. A consensus plan was developed, which informed the decision-making processes. New collaborative ways were implemented from the consensus plan. Certain standards must be established before the workshop begins, according to a community planning toolkit developed in the United Kingdom in 2014. Participant involvement standards were determined, referring to who would be involved in the workshop, support standards related to overcoming barriers, planning standards referred to gathering evidence linked to the needs of the participants and the objectives of the study, and method standards referred to the fact that the engagement with participants must be fit for purpose, the share and work-together standards were linked and referred to the sharing of information and effective communication, the improving standards referred to the active development of guidelines and the feedback standards were the sharing and dissemination of results. In this study, results were shared through a process of research by publication. A series of articles were published in the process of finalising the thesis, which included the final guidelines and the systematic review process conducted to finalise the guidelines. All the discussions during the group sessions were audio-recorded and transcribed verbatim. All written notes and information on flip charts and concept maps completed during the discussions were kept for analysis. A process of elimination and prioritising was followed. The participants were asked to prioritise guidelines in terms of importance until consensus was reached about which final guidelines to include. Finally, the researcher compiled guidelines in preparation for disseminating findings to parents and educators, the Western Cape Education Department, or

other health and research disciplines worldwide. The workshop phase was hampered by the COVID-19 lockdown procedures in 2020. Therefore, the researcher adopted the workshop format to an online workshop format.

3.7 Reflexivity

Reflexivity applies to the following qualitative stages in the present study. Stage 3 of phase 1, the qualitative stage; stage 1 of phase 2 the concept mapping and guideline development stage; and stage 2 phase 2, the workshop phase, made use of reflective processes. It is important to acknowledge that the researcher influences and shapes the research process. Willig (2013) argues that the researcher influences the research processes both as a person (personal reflexivity) and as a theorist/thinker (epistemological reflexivity). Reflexivity allows the researcher to reflect upon how he or she might influence the research and its findings. The researcher used a process of reflection about her role in the research and how this affected the research process. In reflexivity, the researcher needed to apply 'vigilance of self' which is described by Carey (2012) as a way by which "one's assumptions [are recognised] as potential sources of bias" (p. 20). In the proposed study the researcher made use of the suggestion by Carey (2012) that reflexive considerations are discussed under a separate heading, at the end of a research report, whereby the researcher may reflect on how the research has changed him or her and their way of thinking about the subject matter of the research. This section reflected the researcher's feelings, values, and biases and how these were present and dealt with during the research process.

3.8 Trustworthiness

The researcher needs to conduct verification of data within the qualitative phase to ensure that the data is trustworthy. According to De Vos (2011), four elements of trustworthiness should be taken into consideration by qualitative researchers. Thus, trustworthiness was vital in the pursuit of doing a project that is true, valuable, applicable, consistent, and neutral. Truth and value are the degrees to which the researcher has established confidence in the truth of the

research findings for the subjects and the context in which the research was undertaken (De Vos et al., 2011). This can be done by looking at the credibility of the findings which aims to show that the inquiry was conducted in such a manner as to ensure that the subject was accurately identified. Applicability refers to the degree to which the findings can be applied to other contexts and settings. Consistency focuses on whether the results would be consistent if the research were to be repeated in the same context with the same participants. Dependability refers to the issue that if the work were to be done again in the same context, using the same methods and selecting the same participants, the result will be the same as well. Neutrality is referred to as confirmability and refers to the qualitative researcher's objectivity. Neutrality is described by De Vos et al. (2011) as the degree to which the findings are a function solely of the informants and conditions of the research and not of other biases, motivations, and perspectives. The researcher commented in a reflexive thought process to ensure that her judgment, beliefs, and practices do not influence the research process. To ensure the trustworthiness of the data the researcher used a variety of methods such as member checking, using thick descriptions, and reflexivity (described in the previous section). Member checking is described by Creswell (2007) as when a researcher takes the final report or specific descriptions or themes back to the participants and determines whether the participants felt that they are accurate. The researcher did ongoing member-checks with participants at each stage of the research to ensure the truth value of the data. This was done by checking if the interpretations done by the researcher are true representations of the respondent's meanings. Creswell (2007) argues that when the researcher uses rich, thick descriptions to convey the findings, to ensure that the results become more realistic and richer. Trustworthiness enabled the reader to make her judgments about the validity of the interpretation. Discussions with the research team and subject matter experts were used until a consensus was reached.

Trustworthiness in qualitative research simply poses the question of whether the findings can be trusted (Lincoln & Guba, 1985). Trustworthiness is seen as the backbone or strength of the qualitative analysis (Creswell, 2009). The study had to reflect the accuracy of the information that was provided by the participants and these accounts needed to be trusted and seen as credible (Creswell & Plano, 2011). There are four criteria used to measure the trustworthiness of data; credibility, dependability, transferability, and confirmability. These four criteria as explained by Lincoln and Guba (1985) are:

1. *Credibility*: The confidence that can be placed in the truth of the research findings. One strategy for ensuring the credibility of the research study is data triangulation. *Data triangulation* refers to the use of more than one approach when researching a question and therefore increases confidence in the findings (Heale & Forbes, 2013). Data triangulation was used by gathering data through different data collection methods such as a scoping review, questionnaires, unstructured interviews, field notes, and a consensus workshop. Furthermore, two study supervisors were involved in the organisational aspects of the study and the process of data analysis. In addition to the above, data were analysed by an independent coder.
2. *Transferability*: Transferability concerns the aspect of applicability. In the current research study, the researcher provided a rich account of descriptive data, such as the context in which the research was carried out, where it was set, the sample, sample size, sample strategy, demographics, interview procedure, and excerpts from the interview guide.
3. *Dependability*: Dependability includes the aspect of consistency and involves participants' evaluation, interpretations, and recommendations of the findings, and is supported by data (Korstjens & Moser, 2018). In the current research study, the

interpretation or viewpoints of the data is not that of the researcher but is grounded and embedded in the analysis of the data.

4. *Confirmability*: Confirmability concerns the aspect of neutrality. Confirmability is widely used in triangulation to ensure the credibility of qualitative research (Korstjens & Moser, 2018) and make sure it is not based on the researcher's imagination but is a result of the data. To ensure confirmability in the current study, the researcher made use of an independent coder to assist with the triangulation and credibility of the data.

3.9 Ethics Considerations

The following ethical guidelines were adhered to in this study: Permission to conduct the research study was obtained from the University of the Western Cape (UWC) Human Social Science Research Ethics Committee (see Appendix 1 and 2), as well as the Western Cape Education Department (WCED) (see Appendix 3). Consent forms were provided to all participants (see Appendix 4 and 5), including the participating schools in the WCED (see Appendix 6). Since this is a vulnerable and easily recognisable group, no names of organisations and schools were mentioned. An information sheet was provided to all participants detailing the purpose and procedures for conducting the study. Permission was obtained before audio-recording the interviews (a detailed explanation was first provided to do so). In addition, a provision was made to ensure confidentiality – a confidentiality clause was included to ensure the confidentiality of all information during the interviews, and pseudonyms were used to conceal the identity of the participants (instead of using their names, and alphabetical letters were assigned to the participants). The participants' identities were protected during the research as well as during the publishing of the final research report.

Non-maleficence means that researchers should not unintentionally cause harm to the participants of the study. The research posed no harm to the participants. It is envisaged that the research study will contribute to the existing body of knowledge in the field of physical

activity and develop guidelines to increase PA in adolescents and parental involvement. For beneficence, researchers are accountable for ensuring that participants benefit from the research study. In the current study, participants did not receive incentives for participating in any stage or phase. However, the participants gained more understanding of, and insights into, strategies to increase PA and parental involvement. Consequently, knowledge gained from this study might assist participants to consider adolescents, and parents to increase PA. With regards to justice in the current study, adherence is according to the tenets of the Constitution of the Republic of South Africa, which stipulates that everyone has the right to be treated fairly and without discrimination. Thus, in this study, the participants were treated fairly and shared their opinions freely without being judgmental or judged.

3.10 Conclusion

This chapter discussed the methodological framework implemented in this study. The study used a mixed-methods approach with a sequential explanatory design using a two-phased approach. The chapter outlined the two-phased approach, each with different stages of the research process. In summary, phase 1 defined the problem by implementing a systematic review using a REAIM framework in stage 1; stage 2 implemented a quantitative inquiry, and stage 3 implemented a qualitative inquiry. Phase 2 of the research process included a consensus workshop conducted in two stages. Stage 1 implemented a pilot study with a panel of experts, and stage 2 implemented the actual consensus workshop with a panel of stakeholders to develop and present the final guidelines.

The following chapters, Chapters 4, 5, 6, and 7, are written in an article format, providing the results of the systematic review, the quantitative and qualitative data analysis, as well as the results of the consensus workshop.

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INTRODUCTION TO THE FINDINGS OF THE STUDY

The current section introduces the findings chapters to follow. Thus, the findings of Chapters 4, 5, 6, and 7 Section A and B are presented in article format. The references for each section were developed and based on the requirements of each journal. Therefore, this introductory section provides clarity in terms on the structure of the sections to follow.

Chapter 4: In stage 1 of phase 1, a Systematic review with REAIM features was carried out to address stage 1 of Phase 1 of the research study. This phase was done to meet the first objective of the study which was to conduct a systematic review with REAIM features to determine the best practice models/interventions to inform the guidelines to improve parental involvement and increase physical. An article related to this chapter was submitted to the Advances in Public Health journal in March 2022. The article was reviewed and resubmitted for final submission for publication on 20 March 2022.

Chapter 5: In stage 2 of phase 1, a quantitative inquiry was done to meet objectives 2 and 3, which were to determine the current physical activity status of adolescents, to determine the physical activity preferences that would encourage adolescents to participate in PA and to determine the level of parental involvement in adolescents and the relationship between adolescent physical activity levels PA and parental involvement. This chapter was submitted in article format to the AJPHES Journal in January 2022. The article in question is pending review.

Chapter 6: In stage 3 of phase 1, the qualitative inquiry was done to meet objective 4 of the study which was to explore to explore the barriers and facilitators to adolescent physical activity participation to increase physical activity in adolescents and parental involvement. The article was accepted by the AJPHES. Final editing for publication was done in March 2022.

Chapter 7 was divided into 7A and 7B. In stage 1 of phase 2, or section 7A of the study – the consensus workshop. The consensus workshop was conducted, completing objective 5 of the study, which was to develop a framework for guidelines to increase physical activity in adolescents and parental involvement using concept mapping.

Cozett, C. & Roman, N.V. (2022). Developing a framework for guidelines for parental involvement to increase physical activity participation: A consensus workshop. Health Informatics Journal – Manuscript is currently under review.

Chapter 7 stage 2 of phase 2, or section 7B of the study –To conduct a workshop to reach a consensus on the final guidelines. The final stage aimed to reach a consensus on guidelines related to increasing parental involvement and adolescent physical activity. The chapter was accepted and published in January 2022 in the International Journal of Environment Research and Public Health.

CHAPTER 4

RESULTS & FINDINGS: PHASE 1, STAGE 1

(SYSTEMATIC REVIEW)

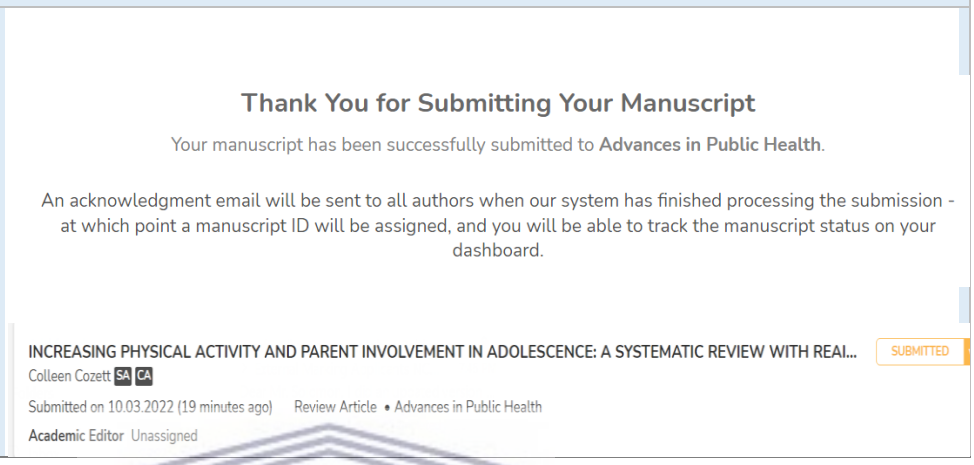
Cozett C, Adebiyi, B.O Roman, N.V. & Bassett S.H (2022). Increasing physical activity and parental involvement in adolescence: A systematic review with REAIM features. *Journal, Advances in Public Health*. Article submitted March 2022.

4.1 Introduction

In the previous chapter, an overview of the research methodology was presented. Chapter 4 addresses objective 1, to conduct a systematic review to determine the best practice models/interventions/ to inform the guidelines. Therefore. a systematic review was conducted using various databases in the EbscoHost, Science Direct, and search engines. The findings of the systematic review provided significant information on conducting a systematic review using the REAIM Framework as an organizing framework to synthesize results and to determine the best practice models/interventions/ to inform the guidelines.

4.2 Publication Details

This chapter, looked at the systematic review and objectives related to Phase 1, stage 1 to conduct a systematic review to determine the best practice models/interventions/ to inform the guidelines: A systematic review with REAIM features, has been submitted for review to Journal, Advances in Public Health in March 2022.

Title	Increasing physical activity and parental involvement in adolescence: A systematic review with REAIM features
Authors	Cozett, C, Adebiyi, B.O, Roman, N.V. & Bassett S.H (2022).
Journal	Journal: Advances in Public Health (Hindawi)
Volume	
Issue Number	To be determined by the Journal editor.
Pages	1-12
Journal Details	Peer-Reviewed
Status	Reviewed, corrected, and resubmitted 29 March 2022.
Permission from Journal/editor to use in the PhD thesis	

4.3 Aims and scope

Advances in Public Health is a peer-reviewed, Open Access journal that publishes original research articles and reviews articles in all areas of public health. *Advances in Public Health* is an open-access journal. All articles are immediately available to read and reuse upon publication.

4.4 Conclusion

This systematic review was intended to determine the best practice models/interventions/ to inform the guidelines. The positive findings revealed that and this systematic review also highlights the limited research and publications in the area of systematic reviews on increasing physical activity using a RE-AIM framework. Therefore, a strong recommendation is made that the implementation of the RE-AIM framework is considered an effective practice tool to facilitate consistent and useful information when reporting on interventions.

Journal: Advances in Public Health: Systematic Review with REAIM features

Title: INCREASING PHYSICAL ACTIVITY AND PARENT INVOLVEMENT IN ADOLESCENCE: A SYSTEMATIC REVIEW WITH REAIM FEATURES

Colleen Cozett *, Adebiyi, B.O; Roman N.V, Bassett, S.H

1 Colleen Cozett PhD candidate in the Department of Sports Recreation and Exercise Science, Faculty of Community and Health Sciences, University of the Western Cape, Bellville, 7535 Cape Town, South Africa *Correspondence: colleen.cozett@northlink.co.za

2. Dr. Adebiyi, B.O has a PhD in Public Health, Postdoctoral fellow at the Centre for Interdisciplinary Studies of Children, Families, and Society, Faculty of Community and Health Sciences, University of the Western Cape atommega@yahoo.com

3. Professor Nicolette V Roman has a PhD in Psychology, is rated as an established researcher in South Africa, a South African Research Chair in the Development of Human Capabilities and Social Cohesion through the Family, in the Centre for Interdisciplinary Studies of Children, Families, and Society, in the Faculty of Community and Health Sciences at the University of the Western Cape nroman@uwc.ac.za

4. Professor Bassett SH, Department Sports Recreation and Exercise Science, Faculty of Community and Health Sciences, University of the Western Cape, Bellville, 7535 Cape Town, South Africa *Email: sbassett@uwc.ac.za

Abstract

Background: Physical inactivity during adolescence may track into adulthood and places a burden on public health resources. Thus, the purpose of the systematic review was to apply the Reach, Efficacy, Adoption, Implementation, and Maintenance (RE-AIM-framework) to evaluate the extent to which previous literature determined the best practice models linked to parental involvement to increasing physical activity participation. **Methods:** MEDLINE, CINAHL, Ebscohost, BioMed Central and ScienceDirect, PubMed, Google Scholar, Web of Science, and SCOPUS were searched to identify physical activity intervention studies and quantitative studies focussing on adolescent populations. RE-AIM indicators, including reach (n =7), efficacy/effectiveness (n = 7), adoption (n = 5), implementation (n =6), and maintenance (n = 7) were identified. Articles were included using inclusion criteria (i) peer-reviewed journals, ranked and approved; (ii) full-text articles; (iii) English articles related to the topic, and, (iv) articles published 2010-2020 using adolescent participants. **Results**: The RE-AIM framework was used to synthesize results. A total of 28 full-text articles were included according to set criteria. The study's methodological quality was assessed using newly developed tools adapted from existing tools. All studies displayed moderate to strong qualities post-assessment. Six studies reported on parental involvement, 11 studies reported on best practice models, 8 studies reported on increasing physical activity, and 10 studies reported on the benefits of physical activities. **Conclusion:** The categories of findings were focused on parental involvement as crucial to increasing physical activity participation. Therefore, parents need to understand key concepts in physical activity and that adolescents should accumulate 60-minute of physical activity. Literature trends were identified for increasing physical activity participation. The trends were: the types of activities, benefits for adolescents, barriers were identified, type of activities, frequency and duration of physical activity were confirmed. Therefore, strategies available should provide support to adolescents and parents to enable adolescents to increase participation. Parents may by increasing parental involvement may encourage adolescents to sustain participation. Physical activity in adolescence should be fun, age-appropriate and based on individual preferences, and social.

Keywords: physical activity; physical inactivity; adolescent; adolescence, REAIM

1. Introduction

Adolescence is a phase of growth and development between childhood and adulthood. However, adolescence is a transitional period in which physical activity (PA) decreases (1). The World Health Organization (WHO) defines an adolescent as any person between the ages of 10 and 19 [1,2,3]. Moreover, this age range falls within WHO's definition of young people, which refers to individuals between ages 10 and 24 [4,5,6]. In many societies, however, adolescence is narrowly equated with puberty and the cycle of physical changes culminating in reproductive maturity [7,8,9,10]. In broader terms, adolescence encompasses psychological, social, and moral terrain as well as the strictly physical aspects of maturation. Boundaries are tested and increase the risk of participation in risky behavior [7,8,9,10]. Therefore, it is important that adolescents stay physically active in this phase of life. According to the United States Office of Disease Prevention and Health Promotion guidelines, it is recommended that adolescents do 60 minutes (1 hour) or more of PA each day [11]. This includes aerobic activities most of the 60 or more minutes a day that should be either moderate- or vigorous-intensity (such as running, dancing, or biking), and include vigorous-intensity PA at least 3 days a week. In terms of muscle-strengthening, include weight-bearing activities such as climbing trees and using playground equipment, or lifting light weights on at least 3 days of the week. However, PA levels decline naturally during adolescence [12,13].

In South Africa, the PA of adolescents tends to decline with age and varies by gender, with boys reporting higher PA levels than girls [14,15,16,17]. It has been reported that less than 50% of adolescents between 13 and 15 years of age are physically active for at least 60 minutes a day on at least 3 days a week [1,19,20]. Thus, this transitional phase and decline in PA levels coupled with an array of personal, social, environmental, and physical factors that hamper participation, places the onus on parents to become more involved to ensure that adolescents engage sufficiently in PA. Globally, adolescents partake insufficient levels of physical activity (PA) among adolescents have become a major health concern [21,22,23] stated that insufficient levels of PA during adolescence may track into adulthood and increase risk factors that contribute to poor health in adulthood [24]. Globally 81% of adolescents, do not do enough regular PA to meet the global requirements.

[25] defines PA as any bodily movement produced by skeletal muscles that require energy expenditure. Physical activity is a complex behaviour with a wide range of intensities and types of activities. Although PA is categorized in many ways, aerobic activities are the most common and have the broadest health effects. Aerobic activities are commonly categorized according to the following levels: sedentary, light, moderate, or vigorous-intensity which is based on the rate of energy expenditure [26]. Furthermore, PA includes activities undertaken while working such as playing, household chores, traveling, and engaging in recreational pursuits. The term "physical activity" should not be confused with "exercise". Exercise is a subcategory of PA that is planned, structured, repetitive, and aims to improve or maintain one or more components of physical fitness [25]. Beyond exercise, any other PA that is done during leisure time has a health benefit, which would include PA for transport to get to and from places, or as part of a

person's work, cleaning the house, and gardening [25]. Both moderate- and vigorous-intensity PAs improve health. It has been shown that regular PA of 60 minutes during adolescence promotes health and wellbeing [26]. Therefore, [27] recommend that adolescents do at least 60 minutes of moderate to vigorous-intensity PA daily.

Adolescents who engage in regular PA have stronger bones and reduced symptoms of anxiety and depression [28]. Risk factors for chronic diseases can develop early in life if inactive lifestyle choices are made by adolescents. Health benefits can be achieved by doing moderate-to-vigorous intensity PA for at least 60 minutes or more per day [29]. Regular PA of moderate intensity – such as walking, cycling, or doing sports – has significant benefits for health. At all ages, the benefits of being physically active outweigh the potential risk, and some PA is better than doing none [30,31,32,33]. By becoming more active throughout the day in relatively simple ways, adolescents can achieve the recommended activity levels. Regular and adequate levels of PA will improve muscular and cardiorespiratory fitness, bone and functional health and reduce the risk of hypertension, prevent coronary heart disease, stroke, and diabetes [34,35,36]. Regular PA in adolescents is also beneficial as it not only makes them healthier and fit during the developmental phases [37]. Bone-Strengthening should also be part of the 60 or more minutes of daily PA, which includes activities such as running or jumping rope on at least 3 days of the week [38]. Furthermore, adolescents who engage in PA have a reduced risk of depression, reduce risk of falls as well as hip or vertebral fractures, and are fundamental to energy balance and weight control. On the other hand, insufficient PA is one of the leading risk factors for global mortality and is on the rise in many countries [39, 40]. Therefore, health professionals and parents should focus on increasing the levels of PA in adolescence by increasing parental involvement and PA in adolescents.

Parental involvement emphasizes the role of the parent in providing parental support, parental role-modelling (being active themselves), PA facilitation, parental encouragement of PA, attitudes about PA, and parenting styles [43,44,45]. Increasing parental involvement through engaging in targeted strategies and co-activity increases adolescents' opportunities to be active with parents. This form of support, models an active lifestyle, encourages healthy family interpersonal dynamics and parents are more active [44]. Adolescents, parents, communities, and educators need to collaborate to create a supportive environment for adolescents (46). The development of effective strategies helps parents to support adolescents in increasing PA levels. Developing strategies to increase PA may provide support to adolescents and parents [42]. In Africa, the situation remains bleak, 35% of adolescents engaged in insufficient levels of PA [19,20,21]. Furthermore, in Africa, more than 50% of adolescents engaged in low levels of PA (13). In South Africa, a decline in PA comes with an increase in age [14]. Gender trends indicate that boys report higher levels than girls [14]. Parents themselves engage in insufficient levels of PA and adolescents emulate parents. The reason why parents have low PA levels is due to working hours, socio-economic concerns, and worries, and thus parents do not prioritize adolescents' PA health and do not recommend PA to adolescents. Several factors influence parental PA status, parental socioeconomic status, parental health, parental lack of awareness of PA, parental divorce, and parental indifference [43,44,45,46,47].

Therefore, this systematic review with RE-AIM features highlights that by providing parents, educators, and adolescents with strategies to increase and sustain PA in adolescence, a collaborative effort yields results [48,49,50]. This study fits within a broader study towards the completion of a PhD within which the current manuscript is Stage 1 of Phase 1. The broader study aims to develop strategies to increase PA participation in adolescents. Thus, the objectives of this review with RE-AIM features were to: (1) to determine the link between adolescent PA levels and the level of parental involvement and (2) to review evidence on best practice models and current interventions used in practice. The Reach, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM- framework) is utilized in the current study [51,52,53,54,55].

RE-AIM translates research into practice by promoting the development and evaluation of interventions [56,57,58,59]. The framework is suitable for use in the current manuscript as it allows for synthesis results using the framework. The RE-AIM framework plays a role in strengthening the effectiveness of strategies to increase PA participation. Thus, the RE-AIM framework is applied to evaluate the internal and external validity of interventions to guide the dissemination and implementation of evidence-based interventions into practice [56,57,58,59]. Specifically, the RE-AIM framework assesses the dimensions of reach, efficacy/effectiveness, adoption, implementation, and maintenance to determine the public health impact of interventions which reflects the number, proportion, and representativeness of intervention participants, adoption, which reflects the number, proportion, and representativeness of intervention settings and staff, and maintenance, which at the setting level reflects if an intervention integrates into routine organizational practices and policies, allow researchers to evaluate external validity [56,57,58,59]. RE-AIM has been used to assess the internal and external validity of physical activity interventions previously in Latin American populations [56,57,58,59].

2. Method

Protocol and registration

This systematic review is registered with the PROSPERO international prospective register of systematic reviews at the Centre for Reviews and Dissemination, UK, and adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting guidelines. The PRISMA checklist is available as Additional file 1.

Eligibility criteria

Study inclusion criteria are described in Table 1. Articles were excluded if they: 1) were not intervention studies, 3) did not include an adolescent population (15+ years old, or mean age < 15 years). Furthermore, while the goal of this review is to apply the RE-AIM framework to evaluate best practice models about parental involvement to increase adolescent PA, explicitly stating that RE-AIM indicators were used for reporting was not part of the eligibility criteria when searching for the current review.

Table 1: Study inclusion Criteria

Data Type	Inclusion Criteria
Participants	Adolescent participants and Parental involvement
Language	English
Study design	Randomized controlled trials and non-randomized trials with a control group (including quasi-experimental and natural experiment studies)
Intervention	Increasing physical activity in adolescents
Measurement	Assesses physical activity/exercise/fitness/ types of activities among adolescents at baseline and post-intervention
Outcome	Increased physical activity
Strategies for increasing PA	Studies featuring increasing physical activity through the use of PA strategies
Parental involvement	Studies focussed on parental involvement to increase adolescent physical activity.
Benefits of physical activity	Studies focusing on the benefits of adolescent physical activity participation on adolescent health
Barriers to PA	Studies focussed on barriers to adolescent physical activity participation and their impact on adolescent health

Search strategy

The following five electronic databases were searched for articles: MEDLINE (2010-2020), CINAHL (2010-2020, Ebscohost (2010-2020), BioMed Central and ScienceDirect (2010-2020, PubMed (2010-2020), Google Scholar (2010-2020), Web of Science (2010-2020), SCOPUS (2010-2020) were searched to identify physical activity intervention studies and quantitative studies conducted on adolescent populations. The search strategy was developed in consultation with four reviewers (CSC, BOA, SHB, NVR), researchers, and health professionals who included the following search concepts contained in Table 2. The reference lists of all included full-text articles were further hand searched to identify any additional articles meeting the inclusion criteria, or any companion articles. A companion article is any article related to the primary study that may include additional intervention details. For example, some studies publish study protocols separately from the primary outcomes, in which additional RE-AIM indicators are reported.

Study selection

Search results were managed using an extraction tool (Roman and Frantz, 2013). Citation details for all articles (e.g., year of publication, authors, journal name, title, abstract) were downloaded and loaded into a single file. Duplicate articles were identified and removed from the database. Two coders (CSC, and NVR) independently completed the initial screening of titles and abstracts, separately. The full texts of the remaining articles were then independently reviewed against inclusion and exclusion criteria by two coders (CSC, NVR). Disagreements

between coders were discussed until a consensus was reached. Reasons for exclusion were documented at the full-text screening stage.

Table 2: Review search strategy

Search Number	Search Terms
1 Base	physical activity and parental involvement or physical inactivity or best practice models in increasing physical activity
2 Base and Context	physical activity and parental involvement or parental involvement and physical activity or barriers to participating in physical activity in adolescence.
3 Base and Context	increasing physical activity and parental involvement or parental involvement and physical activity in adolescence.
4 Base and Context	strategies to increase physical activity and parental involvement or parental involvement and physical activity or exercise in adolescence.
5 Base and Context	Best practice models and strategies to increase physical activity or parental involvement and physical activity internationally
6 Base and Context	Physical activity and parental involvement in South Africa or parental involvement and physical activity in adolescent adolescents internationally.
7 Base and Context	Physical activity and parental support or parental encouragement and physical activity or directive behavior in adolescence to increase physical activity.
8 Base and Context	Physical activity and increasing participation or physical education and the role of schools in increasing physical activity.
9 Base and Context	Strategies and guidelines for parents and adolescents to increase physical activity or developing guidelines to increase physical activity participation.
10 Base and Context	Exercise activities and examples of activities

Data extraction and analysis/synthesis

A coding tool adapted from the work of Roman and Frantz (2013) was used by two coders (CSC and NVR) to independently extract and code data from included articles. Disagreements between coders regarding extracted data were discussed until a consensus was reached. Extracted data included citation details, companion article citation details, definition and classification of PA, intervention outcome (e.g., physical activity, type, duration, intensity), target population, study setting, and study design. For each of the five RE-AIM dimensions, the presence or absence of indicators was coded (yes/no), and if present, a description of the indicator was extracted. A total of 61 RE-AIM indicators were coded, including indicators to

describe reach ($n = 7$), efficacy/effectiveness ($n = 7$), adoption ($n = 5$), implementation ($n = 6$), and maintenance ($n = 7$), which are described in Table 4. Data synthesis included a narrative description of primary studies and frequency counts and percentages across reported RE-AIM indicators. The search stages and the selection procedures are depicted in Figure 1 below. The search protocol was discussed and reviewed by the research team (CSC, NVR). The full search was undertaken by one reviewer (CSC). Study abstracts that did not offer adequate information considering the eligibility predefined criteria, were retrieved for full-text evaluation.

REAIM adapted tools application

Newly developed tools for assessment were developed by the research team [48,49,50,51,52,53,54]. The tools were adapted from the original tools (18). The scales enabled the researchers to highlight the strong points and weak points of each study [56,57]. Furthermore, these specific scales were developed for physical activity. The checklist includes 20-items that aim to assess and report on the validity and relevance of articles. Accordingly, studies were classified as "good quality" if they scored 18-20 points. The articles scoring, "moderate quality", were 11-17 points, and "poor quality" were 0-11 points. Independent reviewers evaluated the studies (CSC, NVR). The final ratings were discussed and a consensus for any observed differences had to be reached. Low-scoring articles were excluded. Thus, appraised articles were scored and assessed with the reviewer's consensus. In terms of the RE-AIM protocol the questions 1-3 (Reach), 4-6 (Effectiveness), 7-9 (Implementation), 13-14 (Maintenance), 15-20 (Relevance). The questions allowed for the swift screening of studies for inclusion and included the appraisal tools for qualitative, quantitative, and intervention studies. Scores of 50% and below would only be included if the researcher deemed it vital and if the article contained valuable information contained in the article. Studies scored at 70% and above were included with the reviewer's consensus. Thus, the methodological quality of the studies for inclusion was fully assessed, using these appropriate, quality appraisal tools. Qualitative studies were not included in the final study although the screening score indicated relevance it was included only for a specific section showing relevance to the current study Table 3. Studies selected n=25 of which Intervention studies accounted for n=13 that were included for relevance to the study objectives. Intervention studies were scored 1-20 according to the assessment screening tool. The 20 questions are related to Table 2 above. Questions 1-3 (Reach), questions 4-6 (effectiveness), questions 7-9 (Implementation), questions 10-12 (implementation) and questions 13-14 (Maintenance). Questions 15-20 are to determine relevance and credibility. The questions posed allow you to screen an intervention quickly and accurately. You are given an option to answer (yes)=1 or (no)=0. The total achieved post-assessment determines if the articles are included or not. If the final score is 69% and below it is excluded. Such Interventions could only be excluded. Interventions scoring 70% and above are recommended for inclusion. The REAIM features were built into the questions as follows: * REACH: 1. Does the study clearly state the target audience (Inclusion and exclusion criteria), 2? Does the study report on the target population? 3. Does the article report on the rate of participation? EFFECTIVENESS: 4. Did the program achieve its objectives? 5. Do they report on the limitations? 6. Reports on at least one outcome? ADOPTION: 7. Is the setting clearly described? 8. Does the intervention report on the adoption of the intervention?

9. Does the intervention report on who delivered the program? IMPLEMENTATION: 10. The duration and frequency of the intervention, were mentioned? 11.Reports on the cost implications of the intervention? 12. Reported on the intended and delivered intervention? MAINTENANCE:13. Reports on the long-term effects? 14. Follow-up reports? 15. Were participants appropriately allocated to control groups? 16. Did the study have a clear research focus 17? Were participants blind to participants in the study group? 18. Were all the participants who entered the intervention accounted for? 19. Were the results presented clearly? 20. Were all important outcomes considered so the results can be applied?

Similarly, Table 4 focuses on the assessments of quantitative studies, and the 10 questions are designed to help you appraise quantitative studies. Table 3, indicates the quantitative studies included, n=12. These studies were included due to show methodological relevance to the objectives of the current study. The scoring (1-10) for quantitative studies are indicated in the table. Questions 1-3 pose questions about the validity of the sampling process and measurement tools. Question 4 is about the measurement tool. Question 5 was about the sources of data. Question 6-7 was about the ethical approval and the limitations of the study. Questions 8-10 are about the design and methods used in the studies. The questions posed, allowed for quick and accurately screening. Reviewers were given an option to answer (yes)=1 or (no)=0. The total achieved, determined if the study would be included or excluded. If the score is 7-10 it will be converted to a percentage. Studies that scored 70% and above were included and studies below the margin were excluded. The 10 questions are as follows: 1) Was the definition of physical activity included?; 2) Is the sampling process clearly stated (Inclusion and exclusion criteria)?; 3) Were the non-responses addressed?; 4) Was the measurement tool valid?;5) What was the source of data?; 6) Was ethical approval obtained? 7) Were the limitations of the study clearly explained?; 8) Were the quantitative methods appropriate?; 9) Was the data analysis in line with the research design?; 10) Was the research design appropriate?

Table 3: Intervention Studies after methodological critical appraisal N=12

Author/s	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	%
Cusatis & Gabarski (2017)	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	0	1	1	85
Ha et al. (2015)	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	90
Hu et al. (2021)	1	1	1	1	1	1	1	0	1	0	0	1	1	1	1	0	1	0	1	1	90
Habib-Mourad & Ghandour (2014)	1	0	0	1	0	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	75
Imtiaz et al. (2020).	1	1	1	1	1	1	1	0	1	0	1	0	1	1	1	1	1	1	1	0	85
Ijsbrandy et al. (2017)	1	1	1	1	1	1	1	0	1	0	1	0	1	1	1	1	1	1	1	0	85
Jago et al. (2011)	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	90
James et al. (2018).	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1		90
Rye et al. 2008	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	90
Palmer et al. (2018)	1	1	0	1	0	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	80
Pate et al. (2016) (inclusion due to relevance to the study)	1	1	1	1	0	1	1	0	0	0	0	0	1	0	1	1	0	0	0	0	45
Prins et al. (2010)	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	90
Rosenkranz et al. (2012)	0	1	1	1	1	1	0	1	0	1	0	1	0	1	0	1	1	1	1	1	70
Slaman et al. (2010)	1	1	1	1	0	1	0	0	0	0	0	0	0	1	1	1	0	0	1	1	90
Schoeny et al. (2016)	1	0	1	1	1	0	1	1	1	0	1	1	0	1	1	0	1	1	1	1	80

Table 4: Studies using quantitative methods after methodological critical appraisal N=13

Author/ s	1	2	3	4	5	6	7	8	9	10	%
Autio & Valtonen (2012)	1	1	0	1	1	1	0	1	1	1	**80**
Brooke et. al. (2017)	1	1	0	1	1	1	0	1	1	1	**70**
Brown et al. (2015)	1	1	0	1	1	1	0	1	1	0	**70**
Brunet et al. (2017)	0	1	0	1	1	1	0	1	1	1	**70**
Budd et al. (2016)	0	1	1	1	1	1	0	1	1	1	**80**
De Vos et al. (2016)	1	1	0	1	1	1	0	1	1	1	**80**
Dumith et al. (2011).	1	1	0	1	1	1	0	1	1	1	**80**
Eather et al. (2016)	0	0	0	0	1	0	1	0	1	0	**30**
Fan et al. (2017)	0	1	0	1	1	1	1	1	1	1	**80**
Hardy et al. (2017)	0	1	0	1	1	1	0	1	1	1	**70**
Ion (2013)	0	0	0	0	0	1	1	1	0	0	**30**
Jago et al. (2011)	1	0	1	1	1	0	1	1	0	0	**60**
Kirkman-King et al. (2017)	0	1	0	1	1	1	0	1	1	1	**70**
Knell et al. (2013)	0	0	0	0	1	1	0	1	1	1	**50**
London & Gauranta (2016)	0	0	0	1	1	0	1	1	1	1	**50**
Lupu et al. (2013)	0	1	0	1	1	1	0	1	1	1	**70**
Olivieres (2015)	1	0	1	1	1	0	1	0	1	1	**70**
Pereira et al. (2017)	1	1	1	1	1	0	1	0	1	0	**70**
Ruch et al. (2013)	0	1	0	1	1	1	0	1	1	1	**70**

Results

An initial corpus of 71919 articles was searched, a further search with limits was applied and 16222 articles were searched in PubMed, PsychINFO, MEDLINE, CINAHL, Ebscohost, BioMed Central, and ScienceDirect. After duplicate articles (n= 323) were removed, titles and abstracts of (n= 98) studies were screened, and (n=55) studies were assessed for eligibility with reviewers' consensus. Of these n=28 studies met the final criteria. Studies were appraised and assessed using newly developed tools for quantitative studies and interventions (Fig. 1).

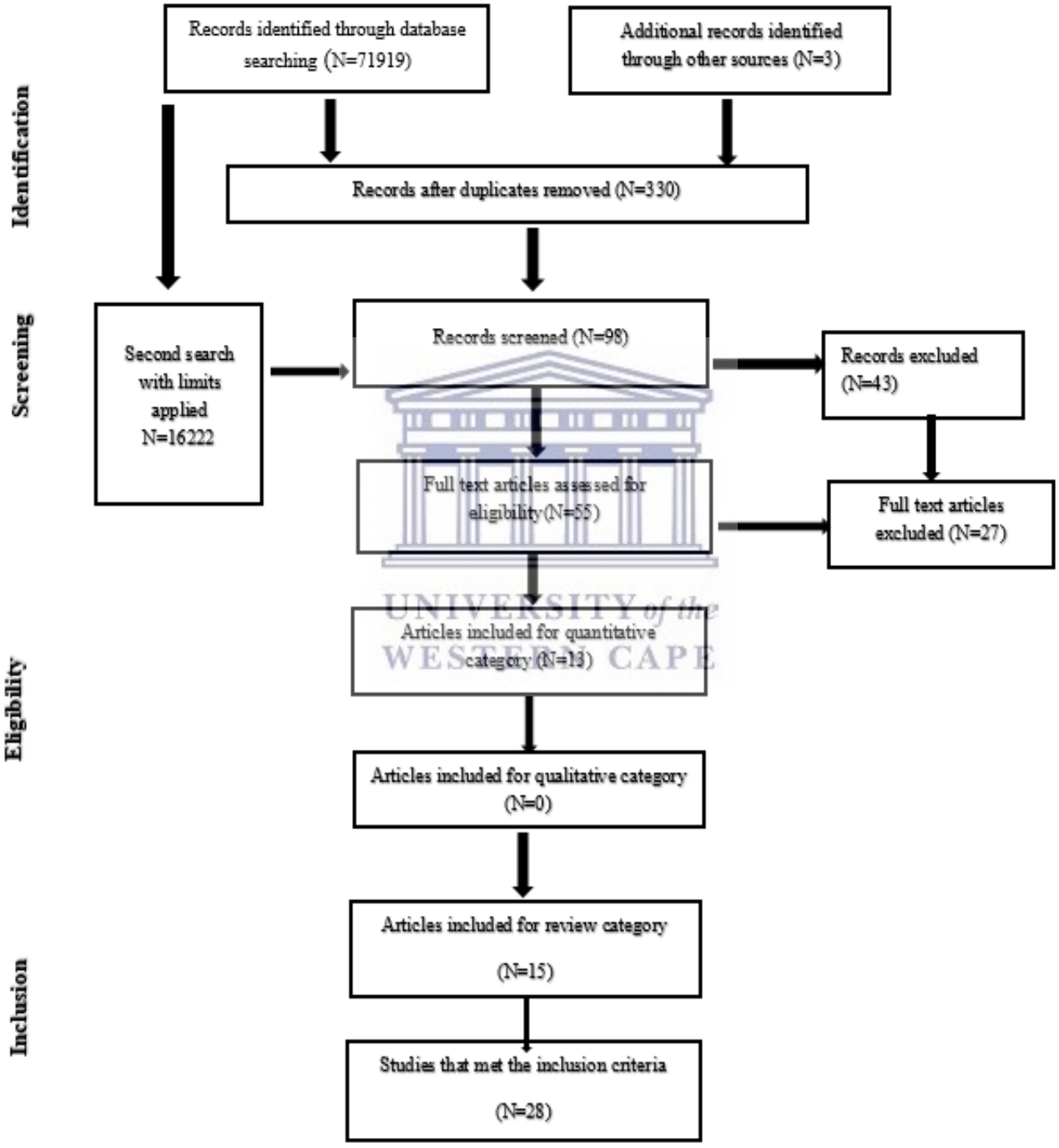


Figure 1: PRISMA flow chart

Summary of articles identified, excluded, and included in the systematic review

Study and participant characteristics

Studies included in this review are described in Additional file 3. Overall, study sample sizes ranged from and (n = 1) included a study exclusively for girls. Studies ranged in duration from 5 weeks to 6 weeks. In-person intervention settings included schools (n = 6, n=2), a mix of various community locations (n = 2), schools (n =10), hospitals (n = 1), community or recreation centres (n = 3), or were unreported (n = 4). Out of the 28 interventions that were not delivered in person, a total of 1 intervention used telephone-based delivery, and 1 intervention was website-based. Most (n = 25) studies reported a significant improvement in at least one physical activity, exercise, or fitness outcome, and n= interventions reported no significant improvements in any physical activity, exercise, or fitness outcome.

RE-AIM indicators

No studies explicitly stated that RE-AIM indicators were used for reporting. Overall, 28 RE-AIM indicators were aimed at increasing PA. The indicators were: Reach (7), Effectiveness (7), Adoption (5), Implementation (6), and Maintenance (7) indicators. Indicators for Adoption and Implementation had lower levels of indications. Table 3 Number of indicators of each RE-AIM dimension across all articles (N = 28). Compared to the number of RE-AIM indicators reported by individual studies (n = 17), when companion articles (n = 10) were included in the synthesis, studies (N = 28) reported a total of 61 RE-AIM indicators.

Table 5: REAIM features

Authors, year	Reach	Efficacy	Adoption	Implementation	Maintenance	Total
	N (%)	N (%)	N (%)	N (%)	N (%)	N
Cusatis & Gabarski (2017)	1	1	0	1	1	4
Ha et al. (2015)	1	1	1	1	1	5
Zhou et al., (2021)	1	1	1	1	1	5
Habib-Mourad & Ghandour (2014)	1	1	1	1	1	5
Imtiaz et al., (2020).	1	1	1	1	1	5
Ijsbrandy et al. 2017	1	1	1	1	1	5
Jago et al., 2011	1	1	1	1	1	5
James et al. (2018).	1	1	1	1	1	5
Rye et al. (2008)	1	1	1	1	1	5
Palmer et al. (2018)	1	1	1	1	1	5
Pate et al. (2016)	1	1	1	1	1	5
Prins et al. (2010)	1	1	1	1	1	5
Rosenkranz & Ta (2012)	1	1	1	1	1	5
Slaman et al. (2010)	1	1	1	1	1	5
Schoeny et al. (2016)	1	1	1	1	1	5
Autio & Valtonen (2012)	1	1	1	1	1	5
Brooke et. al. (2017)	1	1	1	1	1	5
Brown et al. (2015)	1	1	1	1	1	5

Brunet et al. (2017)	1	1	1	1	1	5
Budd et al. (2016)	1	1	1	1	1	5
De Vos et al. (2016)	1	1	1	1	1	5
Dumith et al. (2011)	1	1	1	1	1	5
Eather et al. (2016)	1	1	1	1	1	5
Fan & Cao (2017)	1	1	1	1	1	5
Hardy et al. (2017)	1	1	1	1	1	5
Ion. M (2013)	1	1	1	1	1	5
Jago et al. (2011)	1	1	1	1	1	5
Kirkman-King et al. (2017)	1	1	1	1	1	5
Knell et al. (2013)	1	1	1	1	1	5
London & Gauranta (2016)	1	1	1	1	1	5
Lupu et al. (2013)	1	1	1	1	1	5
Olivieres (2015)	1	1	1	1	1	5
Pereira et al (2017)	1	1	1	1	1	5
Ruch et al. (2013)	1	1	0	1	1	4
	28	28	26	28	28	

Table 6: Results of the REAIM synthesis

Author	Reach female participants (7)	Effectiveness (7)	Adoption (5)	Implementation (6)	Maintenance (7)
Intervention studies: REAIM framework synthesis					
Autio & Valtonen (2012)	Sample characteristics – 10 year-old adolescents.	The reported 104 minutes of at least moderate physical activity was measured.	Adopt the intervention physical education lessons seemed to have a noticeable effect on increasing the activity.	Attendance, the attrition daily amount of physical activity of a 10-year-old boy was measured with this device.	Long-term/short-term, suggest widening and deepening the research of acculturative measurement.
Brown et al. (2015)	Adolescents n=537	Met minutes measured with accelerometer & GPS.	Not mentioned.	Health benefits are mentioned and should be encouraged in transit use.	Future research should encourage transit use.
Brunet et al. (2017)	N=190 youth in the sample	Self-administered questionnaire.	Longitude study long-term adoption.	Co-activity and encouragement sustained participation with parents.	2011-2012 Longitudinal study to encourage sustained coactivity between parents and youth.
De Vos et al. (2016)	Senior phase adolescents in Grade 7	SAS statistics program to decrease. sedentary behavior.	Moderate to high-level PA was measured.	Not mentioned.	Recreational PA and strategies implemented. to decrease sedentary behavior.
Jago et al. (2011)	11-12-year-old girls from 4 secondary schools n=64	Interviews were conducted in FGD or phone interviews.	Issues that focused on strategies to increase PA.	Adolescents experienced a taster session in which they were able to experience the content of the intervention.	Recruit for PA and interventions that focus on enjoyment, social interaction mastery, and fun is appropriate.
Cusatis & Gabarski (2017)	Female participants and lower SES counterparts	Not reported only that it focussed on housework PA and leisure activities.	A two-by-two-factor analysis was conducted.	A two-by-two-factor analysis was conducted with three types of activity housework PA and leisure activities.	Effect on reported PA housework PA and paid work and leisure activities are more prevalent among those less educated.
Schoeny et al. (2017)	Female participants living in Chicago n=284	Accelerometer, vigorous PA, and self-reported PA	A group-based PA intervention was done.	A 24-48-week trial based upon baseline from 2010 to 2012.	Among participants with greater PA barriers supplementing personal sessions with PA, sessions may be an effective way to sustain PA.

Table 7: Intervention study results

Intervention study Authors	No. of participants (7)	Intervention type (7)	Strategies to increase PA (7)	Discussion	Guidelines for inclusion (7)
Rosenkranz et al. (2012)	N=300 in PE classes in school	MALP trail cluster randomized control	Incorporate motivating teaching strategies.	The need, motivation, and satisfaction are referred to in the study.	Parents and teachers motivate and encourage participation in school, and at home.
Prins et al. (2010)	Your action study	Computer tailored activity and PA promotion through technology	Increase the number of neighbourhood facilities for PA. Set goals and stay focused.	Intervention increases the likelihood of effective intervention to increase PA. Schools remain the best setting for effective PA interventions.	Suggest the use of technology to enhance PA (active games).
Jago et al. (2011)	Dance intervention	Dance PA intervention	It is noted that enjoyment and an increase in socialization are part of sustaining PA	Enjoyment and social interaction with friends allow adolescents to choose their activities.	PA enjoyed by adolescents.
Ha et al. (2015)	Star program	Health-related quality of life was measured using acetometers.	Suggest 10-15, minute bouts of activity at least four times per day. Parental involvement ensures sustained PA	Intervention results indicate that 5-6 weeks solidifies an intervention but does not guarantee effectiveness.	Introduce skipping programs, and recess for skipping rope, skipping, and skipping at home.
Rye et al. (2008)	Increase PA opportunity	Using a baseline pre and post-intervention.	Best practice interventions are those that collaborate with adolescents, teachers, and parents.	Suggest that walking remains an optimal way to engage in PA: Indoor walkathon, flexibility training, strength training, walking groups, walking bus to schools, establishing activity side-walks.	Specify indoor and outdoor and categorize according to criteria.

Palmer et al. (2017)	CHAMP intervention	A 5-week period for intervention solidifies the impact.	Intervention focussed on training adolescents on specific skills	Motor skills were effective during the 5week period but did not translate not outside the environment	Suggest that breaks/ recess be extended to allow for at least 20minutes for outdoor play as the school is seen as a protected zone.
Habib-Mourad et al. (2014)	EPALS	Intervention	Fun and enjoyment with peer interaction lead to lifelong participation.	Parental involvement is the key to sustaining PA participation.	non-adherence to positive health behaviour may include the adolescents and parents' lack of awareness, lack of knowledge of the consequences, and lack of perceived health benefits

Table 8: Quantitative Studies: levels, duration, frequency of physical activity

References	Type of study	Type	Duration	Parental involvement strategies	Benefits of PA	Strategies to increase PA	Defined PA,	Barriers
Autio & Valtonen (2012)	Quantitative	Daily PA	60 min OR an average of 104 minutes of moderate PA	Motivate adolescents	PA active child pa active adult	Promote fitness through PE, Walk, Hike, dance, jog, Slow walking, Regular running, Fast running	Yes, daily lifelong activity	Natural ability to move
De Vos et al. (2016)	Quantitative	High intensity	Regular engagements to bouts of activity in high intensity	Parents empower adolescents leading to sustained PA, Parents request knowledge of information about PA preferences per gender, Increase PA opportunities	Self-image self-confidence promotes bone development	Outdoor play due to good weather conditions conducive in SA, sports and games, Limit screen-based, Progressive endurance activities, Themed activities run/ walk, Outdoor play due to good weather conditions conducive in SA, Movement skills in PE lessons, Cultural dancing Fun	Yes	Childhood and adolescent PA levels dropped in developing countries, PE periods are spent doing PA although CAPS documents sedentary behaviour cell-phones use. Tablet. Screen-based. Decrease in PA with an increase in age in adolescents McVeigh 3hr per day of screen-based activities
Kirkman-King et al. (2017)	Quantitative	High intensity	60 min MVPA	Encourage PA activities at school and home, lifelong PA	NA	Increase PA levels of girls,	Yes	Big class sizes, bullying, peer pressure, lack of confidence to participate

Ion (2013)	Quantitative	Physical education	60 min	Motivate adolescents	Emotional involvement, encouragement, awareness about health risk	Games, Sports, and games are attractive to adolescents, Accessibility is the key, Sport must appeal to adolescents based on age leisure music bicycles	Yes	Lack of PA accessibility, Safety of environment
Ruch et al. (2013)	Quantitative	Types of activities	60 minutes of MVPA	Sessions that maximize enjoyment and facilitated socialization were attractive	Make a variety of opportunities available for adolescents and encourage adolescents to keep a fitness diary, Information regarding health benefits is appealing for parents to join	Walking running jumping stationary activities structured and unstructured outdoor activities, Indoor activities, Transitory PA, set goals, target groups of friends to join in PA, Classify activities	Yes	Parental working hours, Financial burden, Girls participate less than boys, a less appealing to girls, Inconsistency in parental support due to working hours
Ruch et al. (2013)	Quantitative	Duration frequency and types of PA	Currently stated 60 minutes MVPA, Free-living environment, Short bouts of 20 minutes 3 times a day	NA	Type duration intensity based on the attractiveness and fun	Walking running jumping stationary activities structured and unstructured outdoor activities, Indoor activities, Transitory PA	Yes	Adolescents might underestimate unstructured household activities
Cusatis & Gabarski (2017)	Quantitative	Which activities count	60 min	NA	prolonged	Housework, PA today refers to PA in leisure time as a choice	Yes	Socio-economic circumstances

Burnett et al. (2015)	Quantitative	Parents' participation with adolescents	4-5 times per week minimum 15-60 minutes hockey, soccer, basketball, swim, tennis, biking, dancing, skating, aerobics, Zumba, rollerblading, bowling, fishing60min MPV	Parents can influence youth participation, better understand factors that influence adolescents, daily contact with adolescents, support, participate with and provide resources.	Reduce stress, and depression, self-esteem improved, social development, reinforce a sense of belonging, support, attitude, role-modeling,	Flexibility, building muscles healthy weight maintenance, Walking	Yes, refer to health-enhancing sustained pa	Parents' participation is limited to types of activities
Brooke et al. (2017)	Quantitative	Frequency and duration	Increase bout intensity and duration start from 20min and increase gradually	PA activities join adolescents	NA	NA	Yes, bouts are periods of sustained activity	NA
Rye et al. (2008)	Quantitative	School-based increased PA	NA	Encourage PA, PE protective factor	Confidence Self-efficacy	Indoor walkathon, flexibility, Strength training, walking routes, Walking bus, Activity sidewalks	Yes	Lack of willpower, Adopt health risk behaviors

4. Discussion

The REAIM framework was used to synthesize the results in comprehensive result-tables. The current review aimed to systematically examine previous literature from 2010-to-2020. The review focussed on best practice models or interventions and the link between parental involvement to increase adolescent PA levels. It has been shown that regular PA during adolescence promotes health and wellbeing [1,2,3,4,5,6,7,8]. Physically active adolescents may reap the benefits of leading a healthy lifestyle which may track into adulthood [8,9,10]. Adolescents who are regularly active have a better chance of an improved quality of life (QOL) in adulthood. Risk factors for chronic diseases can develop early in life and regular PA and makes it unlikely that adolescents remain healthy as adults. Therefore, active adolescents can experience the health benefits achieved from doing PA for at least 60 minutes or more per day [19,20,21,22]. According to (43,44,44,45], parents are instrumental in increasing adolescent PA participation by supporting adolescents during this phase of life to be more active. Moreover, an involved parent is likely to encourage PA in adolescents. Therefore, the strategies to increase PA levels are important for adolescents and parents. The findings indicated certain trends in the literature such as the headings indicate below.

Defining physical activity

Researchers across many countries have identified the importance of increasing PA in adolescence and that it is vital to clarify the PA concepts. The review focussed on the African context, South African context, and international context. In this regard, studies were selected and categorized by location as follows: Africa, Australia, Brazil, Bristol, China, Finland, Germany, South Africa, United State of America, Netherlands, Norway, Romania, Switzerland, and the United Kingdom. This review focussed on trends found within appraised studies. Fourteen articles are based in the fourteen countries mentioned above. Fourteen studies focus on the importance of PA and PA concepts [25; 26; 27,28,29]. The definition of PA is stated as bodily movement produced by skeletal muscles that result in energy consumption. Physical activity in daily life can be defined as work-related PA, sports, conditioning, household chores, or other activities such as physical education at school (4; 5). Physical activity, exercise, and physical fitness are characterized by an ability to perform daily activities [14,15,16,17]. Physical activity, exercise, and physical fitness are terms that describe concepts. However, these concepts are often confused [18,19,20,21].

Key physical activity concepts

Definitions were reported in the following way: physical activity is a vital part of our daily life and a healthy lifestyle. Physical exercise can help maintain a healthy body weight, lower blood pressure, lower cholesterol levels, and the risk of cardiovascular disease and chronic diseases. Exercise should be fun, diverse, and appropriate for the stage of life [25,26,27,28]. Thus, health-enhancing sustainable physical activity provides benefits that track into adulthood.

Parental involvement as the link to increasing physical activity

Six studies reported on the role and strategies parents must employ to be more involved in the lives of adolescents [43,44,45,46,47]. Parents who are involved and support adolescents enhance students' needs satisfaction, motivation, and PA levels (45). Other adults influencing adolescents include educators, family members, and community members like the coaching staff. Although the results tend to point out best practice models, trends in developing physical activity strategies, and strategies for

increasing physical activity, further studies should be considered using other methodological procedures and designs.

Best Practise models identified in Literature trends

Eleven studies reported on the PA frequency, duration, types of activities to include, barriers, and parental strategies to increase PA [30,31,32,33,34,35,36]. According to (25, 15,). PA refers to daily activity. Devos reports that high-intensity PA Includes type duration benefits frequency amount in clear guidelines for adolescents. Specifically, during prolonged periods when outdoor play is not an option. The example refers to the winter months and emergency periods like compulsory lockdown in 2020. Adolescents should do 60 minutes of moderate to vigorous PA daily (25, 27, 3, 55, 41, 23, 44,43). Although (27) agree with this notion, in the study, it is referred to as bouts of activity. According to Brookes bouts are defined as short activity sessions of high intensity. About may last for about 20 minutes (27). According (10) suggest that 60 min Moderate to vigorous is essential for 4-5 times weekly minimum. Furthermore, vigorous bouts of activity for 15-60 minutes are beneficial.

Physical activity benefits

- Ten studies reported on the benefits of PA [30,31,32,33,34,35,36,37,38]. The following benefits were reported:
- PA promotes cardiovascular benefits, a better quality of life
- Improved self-image and improved self-confidence and promote bone development emotional involvement,
- Promotes encouragement, support, and positive self-concept, self-efficacy
- awareness about health risks emotional involvement,
- reduce stress, depression, and social development, reinforce a sense of belonging
- positive role-modelling in communities
- discover own interest
- peer engagement and socializing and making friends
- feel supported and nurtured
- foster autonomy and Confidence
- Barriers to physical activity

Childhood and adolescent PA levels dropped in developing countries. (34) noted concerns about several health risks. The reason was found to be easy access to means of transport. This means, that easy access to transport is the cause of less walking for safety reasons. Another barrier reported was that there were fewer PE opportunities in school. Only 33% of physical education (PE) periods are used for PA. Although the CAPS document stipulate weekly PE lessons must take place. Sedentary behavior has increased due to increased use of phone phones use, and screen-based activities. Adolescents spend up to 3 hours daily on screen-based activities (6). The reasons for the lack of activity include the fact that girls are less active than boys and certain activities are less appealing for girls. Moreover, a lack of PA accessibility is one of the barriers to PA. Big class sizes place pressure on educators to complete the curriculum and PE sessions are used to catch up. Furthermore, the participation rate in PA is influenced due to peer pressure, bullying, and lack of confidence to participate (44). Parents experience barriers to providing support to adolescents due to financial burdens, environmental stressors, long working hours and lack of information and awareness about the health risks related to inactivity. Unreported PA bouts in the case of housework activities being underestimated. House chores are not seen as PA. Thus, adolescents underestimate un-structured household activities and under-report them as PA.

Best practice models and interventions linked to increasing physical activity

Best practice models indicate indicated that strategies to increase participation in PA are vital (30,31,32,33,34,35,36,37,38,39]. Subsequently, the strategies to increase PA participation were identified as a trend in six studies. Strategies for increasing guideline in the format of guidelines for parents and adolescents, highlighted that interventions are effective if it continues for 5 weeks and more. Thus, parents, educators, and friends must provide support, motivation, and arrangement for adolescents to sustain PA behaviour. The use of technology is appealing to adolescents and should be included as a strategy to increase PA. Furthermore, adolescents must be allowed to be part of deciding which activities they would like to take part in. Activities that appeal to adolescents are social. The quick guide provided input on strategies developed in 50 countries summarised according to age, summaries, types of activities, physical activity, and sedentary behaviour recommendations. common guideline structures, format, terms, definitions, and concepts used were as follows: content page, terms, and definition are clarified, benefits of PA, type, frequency and duration of physical activity, benefits of PA, inactivity and related risks, parental strategies for increasing PA, PA categories (indoor, outdoor, aerobic), recommended pa levels are at 60 minutes, although bouts of activity of 10-15 minutes per session are encouraged, safety during participation, guidelines for adolescent participation.

6. Recommendations for practitioners

It is recommended that:

This systematic review builds on the insights generated herein and incorporates the results and findings of the study to inform intervention and strategies for increasing PA for parent involvement to increase PA participation. For instance: 1) assisting parents to adapt their parenting approaches to support adolescents in increasing PA participation; 2) emphasizing and focusing on the barriers to PA and the challenges adolescents are confronted with when participating in PA, and 3) creating awareness of the benefits of PA. Professionals (researchers, educators, sports scientists, parents and practitioners, and community workers) working in this context obtain a deeper understanding of the unique experiences and needs of adolescents and thereby provide support to adolescents through guideline development.

The review highlights parent-adolescent-centred identified in the review to overcome barriers to PA.

Recommendations for future research

- It is further recommended that future research be conducted on:
- Systematic Reviews with REAIM focus to understand the needs of adolescents to increase PA.
- Parenting programs targeting parents and adolescents.
- The role of the mother in PA support offers valuable and unique perspectives and insights.
- The role of the father in PA support offers valuable and unique perspectives and insights.
- The experiences of adolescents with inactive parents. Insight into their lives and growing up in a household with active or inactive parents is an important resource for parents and adolescents.
- Comparative studies comparing the experiences of adolescents in different contexts maybe provide invaluable research and insights.
- The topic in different geographical areas in South Africa, to identify trends as well as compare parents' and adolescents' challenges, experiences, perceptions, and needs.
- The topic through collaborative research at the university level, among organizations of the PA, not only in South Africa but across the African continent.
- Using technology as a strategy to increase PA.

Study limitations

- The following limitations were encountered in this study:
- Metadata limitations in that the consideration of other alternative indexes was limited.
- A Limited number of databases used.

Impact statement

Increasing physical activity participation in adolescents has been widely adopted and remains an important focus area in public health settings, schools, policymakers, parents, and communities. The systematic review identified literature trends in strategies used to increase physical activity participation and identified key guidelines to increase physical activity participation and best practice models. The strategies and models used to increase participation may fill the gap and be beneficial to adolescents, parents, and communities.

7. Conclusion

This systematic review with REAIM features provided a framework for increasing PA participation and parental involvement. Best practice models for increasing PA in adolescents and parental involvement was identified in n=28 studies. It advances the argument that intervention programs for adolescents are essential, and reinforced the need for more research on strategies to increase PA participation; more specifically on the topic of parental involvement. The positive findings revealed that increasing parental involvement requires the adoption of effective support models for parents and adolescents. This systematic review further highlighted limited publications exist in the area of increasing adolescent PA participation and parental involvement using the RE-AIM framework. Therefore, it is recommended that the implementation of the RE-AIM framework be considered an effective practice tool in research. Sustainable PA is linked to lifelong health outcomes. Adversely, inactivity and sedentary lifestyles track into adulthood. Thus, PA that is fun, based on individual preferences, interactive, social, and supported by parents is sustainable. Physical activity with social and peer interaction appeals to adolescents. Furthermore, parents who are consistently involved in PA, encourage, support, motivate, and may contribute to lifelong PA participation from adolescence to adulthood.

Author's note

This work was performed as part of the Authors' work in completing a full thesis in completing a PhD. The findings and conclusions in the study are those of the corresponding author and co-authors.

Authors contribution

Acknowledgments

The authors gratefully acknowledge the University and supervisors for their contributions and the journal for the proposed review of the body of work.

Declaration

The authors declare that no potential conflict of interest exists in the authorship or publication of the article.

Funding

The authors wish to declare that no funding of any nature was received in the form of financial support for the study.

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CHAPTER 5

RESULTS & FINDINGS QUANTITATIVE INQUIRY

Cozett C, Basett S.H & Roman, N.V (2021). Increasing physical activity and parental involvement in adolescents: A quantitative inquiry. African Journal for Physical Activity and Health Sciences (AJPHES). Article resubmitted for review.

5.1 Introduction

Chapter 4 presented the results of Phase 1, Stage 1: A systematic review with REAIM features addressed Phase 1, stage 1 of the research study to meet objective 1, namely, to conduct a systematic review to determine the best practice models/interventions/ to inform the guidelines. Chapter 5 addresses Stage 2 of Phase 1. The current stage addressed objective 2: To determine the current PA status of adolescents. To select current activity preferences that would encourage adolescents to participate in PA. To determine the level of parental involvement in adolescent PA and the relationship between adolescent PA and parental involvement. The current chapter presents the results of the level of parental involvement and the physical activity status of adolescents. Data collection entailed administering one questionnaire that consist of two parts. Demographic variables and descriptive statistics such as mean and standard deviation were determined. Multiple regression and correlation analyses were computed for study variables. Validity and reliability were determined using quantitative means.

5.2 Publication details

Title	Physical activity status and parental involvement in adolescence
Authors	Cozett C, Bassett S.H & Roman, N.V (2021).
Journal	African Journal for Physical Activity and Health Sciences (AJPHES)
Volume	To be determined by the Journal editor. Reference: AJPHES/MS/R/1.12.2021
Issue Number	To be determined by the Journal editor.
Pages	1-10
Journal Details	Peer-Reviewed
Status	Submitted for Review
Permission from Journal/editor to use in the PhD thesis	**Correspondence with the editor on the 6th November 2021** Dear Dr. Cozett, I have received your submission. Thank you for your interest in AJPHES. Kind regards, Prof. Toriola

5.3 African Journal for Physical Activity and Health Sciences (AJPHES)

The African Journal for Physical Activity and Health Sciences (AJPHES) is a refereed journal published quarterly (March, June, September, and December) by LAM Publications Limited. It provides researchers in the field of physical activity, which covers many disciplines, with the opportunity to contribute to the knowledge base of research in physical activity.

5.4 Conclusion

This quantitative inquiry was intended to determine the current PA status of adolescents. To select current activity preferences that would encourage adolescents to participate in PA. To determine the level of parental involvement in adolescent PA. The findings revealed that in this study adolescents lead sedentary lives. Walking remains a popular means of activity for this cohort. Findings linked to paternal and maternal involvement indicate that fathers are involved with the actual activity and mothers help with planning.

ARTICLE

INCREASING PHYSICAL ACTIVITY STATUS AND PARENTAL INVOLVEMENT IN ADOLESCENTS

Cozett C., Bassett S.H., & Roman N.V. (2021)

Abstract

The decline in physical activity is evident in adolescence. Parental involvement in physical activity may encourage adolescents to increase activity levels. Therefore, this quantitative study aimed to determine the level of parental involvement and the physical activity status of adolescents. In this quantitative study, six schools were conveniently selected from Metro South District. A population of N=1000, male and female participants aged 15 years, were randomly selected. Data collection entailed administering one questionnaire that consist of two parts. Part 1, the International Physical Activity Questionnaire (IPAQ). The parental involvement in sport questionnaire (PISQ) was administered in part B. Demographic variables and descriptive statistics such as mean and standard deviation were computed. Multiple regression and correlation analyses were computed for study variables. Validity and reliability were determined using quantitative means. Results suggested that the overall response rate was 77.3% for n=773. The male participants were n=442 or 57.2% and females were 42.8% or n=332 participants. Results indicated that housework as a form of PA was the most prevalent indoor activity and counts as doing moderate work (*M* = 76.77, *SD* = 100.46). Housework done indoors (*M* = 3.13, *SD* = 2.61) and outdoors (*M* = 3.12, *SD* = 2.71) were prevalent. Gardening and yard work were selected less often (M=66.05, SD=83.13). Participants in the current study spent the most time in 7 days, sitting which is a sedentary behaviour (*M* = 261.65, *SD* = 219.52) and this sedentary behaviour increased over weekends (M=272.49, SD=293.128). The participants indicated that they preferred walking as a means of transport in their leisure time. Although less time was dedicated to walking at M=74.45, SD 109.514). Moreover, maternal and paternal involvement results indicated that fathers are perceived as more actively involved with the actual activity and mothers were more involved in preparing for activities. This means, that fathers were perceived to attend events, and mothers encouraged and assisted with game preparation. Thus, parents who were involved in physical activities, encouraged, supported, and positive physical activity behaviour in adolescents.

Keywords: physical activity, physical inactivity, adolescence, adolescents, parental involvement

Introduction

Adolescents take decisions to participate in physical activity (PA) or not, but those decisions are shaped by important adults in their lives according to Coakley et al., (1993). Thus, parents shape and influence health behaviours, including PA during adolescence (Sawyer et al., 2018). Moreover, the role of the parent in the PA experience of adolescents must be acknowledged. Despite significant research on the broader aspects, parent involvement, parent support, influence, and engagement, the link with parent involvement remains understudied (Cozett et al., 2016). Several mechanisms through which parents can be involved in PA have been proposed (Oyeyemi et al., 2016; van Hout et al., 2013). More specifically, the parent's involvement in the adolescent's PA behaviour is vital. According to Ornelas et al. (2007) characteristics of parental involvement include (1) family cohesion, meaning how many people in the adolescent's life understand them, how much the adolescent and family have fun together, and how much their family pays attention to them; (2) parental monitoring 3) parental directive behaviour related to family rules and boundaries and parental encouragement. The current study forms part of a broader study where the findings of this quantitative stage informed the development of strategies to increase PA in adolescence. Boys report higher PA levels than girls (Cozett et al., 2016; Kallio et al., 2021). Furthermore, PA levels remain insufficient and adolescents do not meet the daily recommended activity levels (Cozett et al., 2016; Belton, et al., 2014); Chen et al., 2011). Barriers to PA and factors that influence adolescents such as the lack of parental involvement need to be explored. Therefore, a need existed to develop strategies to increase PA levels and parent involvement to support adolescent health and overcome barriers to PA (Kallio et al., 2021). Keeping that in mind, this study aimed to examine the levels of PA and parental involvement in adolescents.

Methods

This quantitative study measured the PA status of adolescents and parental involvement. The IPAQ and PISQ in Appendix 7A and 7B, respectively, were administered.

Study Population and sampling

The current study population N=1000 was drawn from the Metro South District (MSD). The demographic variables were based on participants aged 15 years and in grade 9. A final total of n=773 participants participated in this study. Sawyer et al., (2018) suggested that convenient samples are an advantage due to the availability of the subject and the ease with which data can be gathered. Thus, only n=227 participants did not consent to participation.

Tools: instrument selection, validity & reliability

The IPAQ (Appendix 7A), part A of the questionnaire was administered to participants in grade 9. The data collection process aimed to determine the PA status of adolescents. The validity and reliability of the IPAQ were tested by Cleland, Ferguson, Ellis, and Hunter, (2018). The IPAQ demonstrated reliability that ranged from 0.83 to 0.96 while the long-term reliability of (three months) was 0.53 to 0.83 reported. These data sets provided moderate validity and generally acceptable reliability evidence for the IPAQ. Overall, the results indicated that the IPAQ is a suitable and acceptable instrument for monitoring PA in populations and for health surveillance systems.

Part B of the questionnaire consisted of the PISQ. The validity and reliability of the PISQ were determined by Wuerth et al., (2004). The PISQ scales showed satisfactory internal consistency and retest reliability. The scale structures include directive behaviour, parental involvement, and parental encouragement. The validity of the PISQ was determined and an adapted version of the PISQ was administered to determine the link between adolescent PA levels and parental

involvement. Three scale questions related to parental involvement, parental directives, and parental encouragement were included in the PISQ (Appendix 7B).

Data analysis

In part A (IPAQ) demographic data were analysed using the Statistical Package for Social Sciences (SPSS) version 24. A raw data table was generated and data cleaning was conducted. Descriptive statistics were computed for the participant's demographic characteristics using quantitative analysis. Participants were asked questions on a four-point LIKERT scale. The number of PA sessions for adolescents was quantified. The mean and standard deviation was calculated for the adolescent scores to determine the adolescent's PA status. The level of PA participation was presented in numerical tables and graphs. In part B, (PISQ) adolescents responded to questions related to maternal and paternal perceived involvement and maternal and paternal desired involvement. The results for part A and part B will be presented next.

Results

The results linked to the demographic characteristics of participants were determined and indicated the following: The population N=1000 was conveniently selected of which n=773 gave consent with an overall response rate of 77.3%. Table 5.1 below illustrates the demographics of participants according to the description of age and gender. The participants in the study totalled n=773. All participants were aged 15 years and in Grade 9. The male participants were the majority with a total of n=442 or a 57.2% response rate. The females responded at a rate of 42.8% or n=332. Table 5.1 illustrates the demographic variables in the current study. The response rate related to the current study is an indication that the parents signed the consent letters of the adolescents and in that way, parents were involved. Thus, the sample is described in Table 5.1 according to age, grade, gender, and response rate.

Table 5.1: Demographics of participants

Variable			N	%	
Gender		Male	442	57.2	
		Female	331	42.8	
Age	**N**	**Minimum**	**Maximum**	***M***	***SD***
	773	15	15	15.00	.000
All the participants were in Grade 9.					

Types of Physical Activities

According to the study participants, housework counted as a form of moderate PA. Housework included sweeping, mopping, picking up and lifting, dusting, and polishing, and housework shows prevalent among adolescents in the current study. Daily housework and chores were selected by adolescents as relevant as an activity. Results in Table 2 suggested that housework as a form of PA was the most prevalent indoor activity and counted as doing moderate work (*M* = 76.77, *SD* = 100.46). This is reported in terms of time (minutes). In terms of days, housework indoors (*M* = 3.13, *SD* = 2.61) and outdoors (*M* = 3.12, *SD* = 2.71) were most prevalent. Gardening and yard work were selected less often (*M* = 66.05, *SD* =8 3.13). Table 5.2 below illustrates housework as a form of PA in terms of time and days.

Table 5.2: Housework as a form of physical activity in terms of time and days

Variables	N	Minimum	Maximum	*M*	*SD*
During the last 7 days, how many days did you do vigorous PA heavy lifting, shovelling, digging, garden work, or yard work	773	0	7	2.22	2.43
How much time did you spend on one of those days doing garden and yard work?	773	0	540	64.30	91.66
During the last 7 days, how many days did you do moderate PA like light work, sweeping, washing windows, raking, housework	772	0	7	3.12	2.71
How much time did you spend on one of those days doing moderate PA in the garden or yard?	773	0	420	66.05	86.13
During the last 7 days, how many days did you do moderate PA like carrying light loads, sweeping inside the house, scrubbing floors, washing windows, raking, housework	773	0	7	3.13	2.61
How much time did you spend on one of those days doing moderate PA inside your home?	773	0	420	76.77	100.46

Walking as a preferred method of transport activity

Table 3, indicated the results in terms of transport as a form of PA in terms of time and days. In the context of the current study, this referred to walking or being inactive or sedentary. Results for transport as a means of physical activity indicated that adolescents spent the most time in 7 days, on average, sitting or in sedentary behaviour (*M* = 261.65, *SD* = 219.52). This phenomenon increased over a weekend (M=272.49, SD=293.128. However, adolescents indicated that they still prefer walking as a means of transport in their leisure time. Thus, walking remains the preferred method of getting from one place to the next. Although not as much time is dedicated to walking (M=74.45, SD 109.514). Table 5.3 below indicates the forms of transport in leisure time activity. In total, n=195 participants did not walk in leisure time

(25.2 %); n= 220 or 28.5 % of participants indicated that they do walk every day of the week. The rest of the participants reported as follows: 1 day, n=85 or (11,0 %), 2 days, n=102 or (13.2 %), 3 days, n=44 or (5.7 %), 4 days, n=19 or (2.5%), 5 days, n=96 or (12.4%), 6 days, n=12 or (1.6%). Table 3, indicates transport as a form of physical activity.

Table 5.3: Transport as a form of physical activity

Variables	N	Minimum	Maximum	*M*	*SD*
How much time did you spend on one of those days in a motor vehicle like a train bus or car	773	0	360	59.95	76.892
During the last 7 days, how many days did you travel in a motor vehicle like a train bus, or car	773	0	7	3.61	2.799
During the last 7 days, how many days did you ride a bicycle for 10 minutes at a time to go from place to place	773	0	7	.90	1.671
How much time did you spend on one of those days bicycling from place to place	773	0	480	34.26	74.537
During the last 7 days, on how many days did you walk10 minutes at a time to go from place to place	773	0	7	4.66	2.670
How much time did you spend on one of those days walking?	773	0	300	56.17	66.516
Recreation: During the last 7 days, how many days did you walk for at least 10min at a time in your leisure time.	773	0	7	3.35	2.819
How much time did you spend on one of those days walking in your leisure time?	773	0	540	74.45	109.514
Recreation: During the last 7 days, how many days did you do vigorous PA like running, aerobics, fast bicycling, or swimming in your leisure time.	773	0	7	1.86	2.298

Variables	N	Minimum	Maximum	*M*	*SD*
How much time did you spend on one of those days vigorous PAs like running, aerobics, fast bicycling, or swimming in your leisure time?	773	0	300	52.95	81.347
Recreation: During the last 7 days, how many days did you do moderate PA like bicycling, or swimming steady pace in your leisure time.	773	0	7	1.73	2.280
How much time did you spend on one of those days to moderate PA like bicycling, or swimming steady pace in your leisure time?	773	0	480	51.88	92.536
During the last 7 days, how much time did you spend sitting on a weekday?	773	0	1140	261.65	219.524
During the last 7 days, how much time did you spend sitting on a weekend?	773	0	1080	272.49	293.128

Parental Involvement

The most prevalent parental involvement was found with fathers perceived active involvement (*M = 3.12, SD = 1.13*). Fathers desired involvement was prevalent (*M=2.5856, SD1.12988).* Mothers desired involvement was more prevalent and indicated in planning for PA and fathers are more actively involved in the actual PA activity. Mothers are more active and involved in terms of the encouragement of adolescents to participate *(M=20319, SD=1.18433).* Fathers are involved with ensuring that behavior is directed and setting the rules (*M=2.4848, M=1.30335).* Table 4 indicates the parental involvement indices.

Table 5.4: Prevalence of parental involvement

Variables	N	Minimum	Maximum	*M*	*SD*
Maternal Active Involvement Perception	760	1.00	5.00	2.8350	0.94973
Maternal Active Involvement Desire	761	1.00	5.00	2.7148	1.02876
Paternal Active Involvement Perception	645	1.00	5.00	3.1192	1.12988
Paternal Active Involvement Desire	684	1.00	5.00	2.5856	1.00765
Maternal Direct Behaviour Perception	768	1.00	5.00	2.3694	1.11500
Maternal Direct Behaviour Desire	769	1.00	5.00	2.3641	1.15873
Paternal Direct Behaviour Perception	724	0.67	5.00	2.4848	1.30335
Paternal Direct Behaviour Desire	735	0.67	5.00	2.3456	1.26314
Maternal Encourage Perception	765	1.00	5.00	1.9503	1.09928
Maternal Encourage Desire	769	1.00	5.00	2.0319	1.18433
Paternal Encourage Perception	727	0.50	5.00	2.1087	1.27275
Paternal Encourage Desire	723	.50	5.00	2.1321	1.29390

Table 5.5 above, indicates the comparison between maternal and paternal regression analysis which indicated a two-tailed significance at 0.05 level for maternal and paternal regression analysis with PA involvement. Fathers are perceived as more actively involved with the actual PA event (Paternal perceived involvement 0.616**). Whereas, mothers are involved in preparing for PA activities. Items showed significance at a 0.05 confidence level. Table 5.6 depicts the maternal and paternal correlation matrix in the table format below.

Table 5.5: Relationship between physical activity and parental involvement

Variables	Maternal Involvement Correlation	Paternal Involvement	Paternal Involvement Correlation
Maternal Active Involvement Perception	0.556**	Paternal Active Involvement Perception	0.617**
Maternal Active Involvement Desire	0.414**	Paternal Active Involvement Desire	0.392**
Maternal Direct Behaviour Perception	0.590**	Paternal Direct Behaviour Perception	0.355**
Maternal Direct Behaviour Desire	0.299**	Paternal Direct Behaviour Desire	0.229**
Maternal Encourage Perception	0.552**	Paternal Encourage Perception	0.368**
Maternal Encourage Desire	0.278**	Paternal Encourage Desire	0.243**

*Correlation is significant at the 0.05 level (2-tailed)

**Correlation is significant at the 0.01 level (2-tailed)

Table 5.6: Correlation Matrix depicting parental involvement in adolescence

Maternal Active Involvement Perception	n=773									
Maternal Active Involvement Desire	.556**									
Paternal Active Involvement Perception	.617**	.414**								
Paternal Active Involvement Desire	.392**	.703**	.660**							
Maternal Direct Behaviour Perception	.590**	.395**	.340**	.302**						
Maternal Direct Behaviour Desire	.299**	.670**	.267**	.508**	.506**					
Paternal Direct Behaviour Perception	.355**	.259**	.657**	.514**	.515**	.322**				
Paternal Direct Behaviour Desire	.229**	.456**	.490**	.699**	.334**	.632**	.651**			
Maternal Encourage Perception	.552**	.386**	.342**	.305**	.677**	.404**	.372**	.309**		
Maternal Encourage Desire	.278**	.650**	.217**	.478**	.420**	.744**	.274**	.521**	.608**	
Paternal Encourage Perception	.368**	.244**	.638**	.475**	.339**	.221**	.711**	.542**	.556**	.366**

Findings

Findings linked to the results of the study indicated that participants had a 77.3% response rate with more males than females participating in the study. Overall n=773 were conveniently sampled to participate. Findings related to PA indicated that according to the type of activities, housework was a common selection among adolescents n=773. Typical activities such as sweeping, mopping, picking up and lifting, dusting and polishing, and housework accounted for moderate PA amongst adolescents in the current study. Therefore, the results in Table 2 depicted moderate housework (*M = 76.77, SD = 100.46*). This is reported in terms of time (minutes). In terms of days, housework indoors (*M = 3.13, SD = 2.61*) and outdoors (*M* = 3.12, *SD* = 2.71) were most prevalent. Gardening and yard work were selected less often (*M=66.05, SD=83.13*).

Adolescents in the current study selected walking as a preferred means of leisure activity. Therefore, walking remains the preferred method of getting from one place to the next. Although not as much time is dedicated to walking (*M=74.45, SD, 109.514*). Table 3, indicated the forms of transport in leisure time and that walking as PA was preferred as a means of moving from one place. However, the sample indicated that they spent the most time in 7 days sitting which is a sedentary behaviour (*M=261.65, SD=219.52*). The sedentary activities increased over weekends (*M=272.49, SD=293.128*). The findings related to parental involvement indicated that fathers were perceived as more actively involved (*M=3.12, SD = 1.13*). Fathers desired involvement was prevalent (*M=2.5856, SD1.12988).* On the other hand, mothers are more involved in planning for PA and fathers are more involved in the actual PA activity. Mothers are more active and involved in terms of the encouragement of adolescents to participate *(M=20319, SD=1.18433).* Fathers are involved with ensuring that behavior is directed by rules (*M=2.4848, M=1.30335),* indicating that fathers ensure that the rules in the home are upheld. In comparing mothers and fathers in regression analysis the findings indicated a two-tailed significance at a 0.05 confidence level for maternal and paternal PA involvement. Fathers are perceived as more actively involved with the actual PA event (Paternal perceived involvement

0.616**). Whereas, mothers are involved in preparing for PA activities. Items showed significance at a 0.05 confidence level.

Discussion

The study aimed to determine the level of PA and parental involvement in adolescence. The current study forms part of a broader study where the findings of this quantitative stage informed the development of strategies to increase PA in adolescence. Previous research suggested that parents shape PA pursuits of adolescents and they are more active if parents are involved (Belton et al., 2014; Chen et al., 2014). Therefore, parent involvement encourages adolescents to sustain PA. Cozett, Bassett & Leach (2016), stated that adolescents' model positive PA behaviour that parents' model. In contrast to this. physical inactivity in adolescence tracks into adulthood (Cozett, Bassett & Leach, 2016; Mackintosh et al., 2011). Kalio et al., (2021) agree that a persistent PA in adolescence leads to a poor cardiometabolic risk profile in adulthood.

Findings in the current study indicate that adolescents have high levels of sedentary behaviour and that behaviour increased over weekends. Sedentary lifestyles are linked to screen time and inactive time. Adolescents prefer walking as a method of activity and free play. Moreover, the current study findings indicated that adolescents are doing a reasonable amount of housework which accumulated to moderate PA. Other types of activity include free play, garden chores, physical education, and activities. The WHO (2017) spells out the benefits related to regular PA that promote physical, mental, and cardiovascular health. Adolescents in the current study had an opportunity to comment on the desired parental involvement and perceived parental involvement. The findings revealed that adolescence perceives paternal involvement as the strongest compared to maternal active involvement, However, the maternal involvement in preparing for an actual event was more significant. The role of the parent provides guidance and encouragement. Parental encouragement showed a significant correlation with physical activity. However, the strongest correlations were shown for parental active

involvement. Meaning, that the more involved the parents are in the PA lives of adolescents the more PA is sustained.

Conclusion

The current study aimed to determine the level of PA and parental involvement in adolescence. Based on the findings of the current study, adolescents lead sedentary lives. Sedentariness increased over the weekend. Parents, educators, and communities must make a concerted effort to ensure adolescents increase PA. Moderate activity such as walking, housework, and free play remains the preferred PA types selected. Findings related to parental involvement revealed that fathers play an active role in involvement in games and mothers are actively involved in planning and encouraging adolescents. Directive behaviour and setting realistic boundaries may lower screen time. Further, research into the strategies to increase PA in adolescence is vital. Parent involvement including support, parental directive behaviour, parental encouragement, and encouragement will assist to increase PA in adolescence.

Limitations

The limitations of the present study were as follows: responses from participants are dependent upon the recall ability. Adolescents' perception of PA time spent may be inaccurate. The amount of time engaging in PA may be misjudged. Using convenient sampling as the participant selection method limited the generalizability of the findings.

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CHAPTER 6

RESULTS & FINDINGS: PHASE 1, STAGE 3

(QUALITATIVE EXPLORATION)

Cozett, C., Bassett, S.H., & Roman, N.V. (2022). Adolescents' perceptions of factors promoting physical activity participation. *African Journal for Physical Activity and Health Sciences*, 28(1), xxx. DOI: https://doi.org/10.37597/ajphes.2022.28.1

6.1 Introduction

In the previous Chapter 5, an overview of the quantitative inquiry was presented. Chapter 6 addresses Phase 1, stage 3 of the research study to meet the objective to explore the barriers and facilitators to adolescent PA participation. Furthermore, the factors that influence physical activity in adolescents were explored in focus group discussions using an interview schedule. Thematic analysis and data coding were used to develop themes. The current chapter presents the results and findings related to this qualitative exploration.

6.2 Publication Details

This chapter looked at the qualitative explorative study with objectives related to exploring the barriers and facilitators to adolescent PA participation and exploring the factors that contribute to physical activity participation. The article was approved and published in March 2022.

6.3 African Journal for Physical Activity and Health Sciences (AJPHES)

The African Journal for Physical Activity and Health Sciences (AJPHES) is a refereed journal published quarterly (March, June, September, and December) by LAM Publications Limited. It provides researchers in the field of physical activity, which covers many disciplines, with the opportunity to contribute to the knowledge base of research in physical activity.

Title	Exploring adolescent perceptions of factors that influence physical activity participation
Authors	Cozett, C, Roman, N.V. & Bassett S.H (2021).
Journal	**African Journal for Physical Activity and Health Sciences (AJPHES)** Cozett, C., Bassett, S.H., & Roman, N.V. (2022). Adolescents' perceptions of factors promoting physical activity participation. *African Journal for Physical Activity and Health Sciences,* 28(1), xxx. DOI: https://doi.org/10.37597/ajphes.2022.28.1.
Volume	March 2022
Issue Number	Vol 28 (1) March 2022
Pages	1-10
Journal Details	Peer-Reviewed
Status	Approved for publication
Permission from Journal/editor to use in the PhD thesis	**Correspondence with the editor on August 2021** Dear Ms Cozett, **RE: ACCEPTANCE OF MANUSCRIPT FOR PUBLICATION** I am pleased to inform you that your manuscript submitted to the African Journal for Physical Activity and Health Sciences (AJPHES) titled, "**Exploring adolescents' perceptions of factors contributing to increasing physical activity participation,**" has been technically reviewed, found publishable and accepted for publication in the journal. The paper will be published in AJPHES Vol. 28(1) March 2022. The galley proof of the paper will be sent to you for your approval well in advance of the scheduled publication date. You are kindly requested to attend to the attached invoice, which is meant to defray the very high cost of publication. You are also requested to sign the enclosed authors' agreement form and e-mail it to the Editor-In-Chief at the above e-mail address. Thank you. Yours sincerely,

6.4 Conclusion

This qualitative explorative study intended to explore Exploring adolescent perceptions of factors that influence physical activity. The positive findings revealed that adolescents prefer enjoyable activities that are age-appropriate, fun, and social, which is appeal most to adolescents. The adolescents suggested that parental involvement is the key to increasing physical activity and sustaining positive physical activity behaviour. The study evidence revealed that collaboration between adolescents and their parents enables adolescents to sustain positive physical activity participation that may affect health later in life.

Adolescents' perceptions of factors promoting physical activity participation

COLLEEN COZETT, S.H. BASSETT AND N.V. ROMAN

Department of Sport Recreation & Exercise Science, Faculty of Community & Health Sciences, University of the Western Cape (UWC), Bellville, South Africa; E-mail: colleencozettconsulting@hotmail.com

ORCID nos.: CSC (https://orcid.org/0000-0002-4789-9530*); SHB (http://orchid.org/ 0000-0002-1202-120x); NVR (00000-0002-4506-437X)*

(Submitted: 8 November 2020; Revision Accepted: 30 August 2021)

DOI: https://doi.org/10.37597/ajphes.2022.28.1.

Abstract

Despite the known benefits of physical activity, adolescents worldwide do not adequately engage insufficient physical activity levels Limited empirical evidence exists on the role of enabling factors of PA among adolescents and the role of parental involvement. Therefore, the importance of understanding adolescent health behaviour has become a global health concern. The objective of this study was to analyse the barriers and facilitators of PA participation among adolescents. Three focus group discussions (45-90 minutes each) were held with a group of South African learners (n=35), purposively sampled from the Metro South education district in Mitchell's Plain, Cape Town. The focus group discussions explored the adolescents' perceptions of the barriers and facilitators of PA participation. Thematic analysis revealed eight themes: Theme 1: Parental involvement, Theme 2: PA barriers, Theme 3: PA preferences, Theme 4: PA parental support, Theme 5: PA facilitators, Theme 6: PA encouragement, Theme 7: Parental directive behaviour, and Theme 8: Strategies to promote PA. Results showed that enjoyable activities that are age-appropriate, fun-filled, and social, were most appealing to adolescents. Findings further indicated that parental involvement is key to promoting and sustaining adolescent PA behaviour.

Keywords: Adolescence, physical activity, barriers, facilitators, parental involvement.

Cite:

Cozett, C., Bassett, S.H., & Roman, N.V. (2022). Adolescents' perceptions of factors promoting physical activity participation. *African Journal for Physical Activity and Health Sciences,* 28(1), xxx. DOI: https://doi.org/10.37597/ajphes.2022.28.1.

Introduction

The importance of understanding adolescent health has become a global concern and the development of strategies to improve health amongst adolescents has become a priority (Davids *et al.,* 2017). Piggin (2018) defines physical activity (PA) as any bodily movement produced by skeletal muscles that require energy expenditure and suggests that regular PA during adolescence promotes health and wellbeing. Physically active adolescents have higher levels of cardiorespiratory fitness and stronger muscles, lower body fatness, stronger bones, and reduced symptoms of anxiety and depression (Piggin,2018). Given that the risk factors of chronic diseases originate early in life (Draper *et al.,* 2014 and members of the HAKSA, 2019), regular PA could mitigate the impact of the risk factors thereby increasing the likelihood of adolescents developing into healthy adults.

Despite the widely acknowledged benefits of PA, adolescents engage in far less PA than is recommended (Hankonen *et al.,* 2016). It is generally agreed that adolescents in both developed and developing countries do not meet the health-related guidelines for engaging in at least 60 minutes of moderate-to-vigorous (MVPA) PA daily (Oyeyemi *et al.,* 2014). In Africa, the situation remains bleak, with only 8-35% of African adolescents engaging insufficient levels of PA for 60 minutes a day on at least 5 days per week (Piggin, 2020). In Nigeria, about 72% of school-going adolescents reported engaging in PA at least once a month, 59% participated in moderate PA levels, and more than 50% were involved in low levels of PA (Hallal *et al.,* 2006; Oyeyemi *et al.,*

2014). In South Africa, PA tends to decline during adolescence and varies by gender, with boys reporting higher levels of PA than girls (Cozett *et al.,* 2016). Only 51.7% of South African adolescents meet the recommended 60 minutes of moderate to vigorous (MVPA) PA threshold per day (Draper *et al.,* 2019; Piggin, 2020). While current health-related PA guidelines expect the youth to be physically active in all domains of life, the majority of African studies have focused mainly on adolescents' overall PA levels with only a few reporting on the role of parents in a PA context (McVeigh & Meiring, 2014).

Cozett *et al.* (2016) reported that parental involvement was the strongest predictor of adolescents' participation in PA. Therefore, the environment in which adolescents are raised can greatly influence their health and development (Teran-Escobar *et al.,* 2021), as they tend to model the health behaviours of their parents (Farooq *et al*, 2018). Thus, parents can play a key role in their children's PA experiences. Despite the preponderance of research on the broader aspects of parental involvement, such as parental engagement, support, and communication, the role of parents in promoting adolescents' PA participation remains understudied (Oyeyemi *et al.,* 2014; Jeynes, 2007). Several mechanisms through which parental involvement can increase PA participation during adolescence have been proposed (Oyeyemi *et al.,* 2014; Erkelenz *et al.,* 2014). These include high levels of parental monitoring, directive behavior, parent-child communication, and engagement in activities, which could lead to higher levels of PA.

According to Ornelis (2007) and Morrison (1978), characteristics of parental involvement include (1) household cohesion; meaning who in the adolescent's life understands them, how much the adolescent is having fun with parents, and how much parents pay attention to the adolescent; (2) parental monitoring, which refers to parents providing specific household rules and guidelines. These include curfews and setting boundaries, monitoring friendships, limiting the number of TV shows watched, and screen-based activities, controlling food choices, and setting guidelines for appropriate clothing; (3) parent-adolescent communication which indicates communication that the adolescent has had with the primary caregiver in the last four weeks, communication about issues like dating, a personal problem and school-work), and (4) parental engagement, that is defined as the number of activities that parents participated with their adolescent over the last four weeks (Niermann *et al.,* 2020). Examples of activities jointly involving adolescents and parents include: Attendance at religious events, shopping, going to the movies, attending school plays, taking part in sports events, working on a school project, and eating evening meals together for at least five days a week (Ornelis, 2007). Whereas adolescents could decide to participate intensively in PA, that decision is closely tied to an awareness of alternatives and rewards, and is shaped by important adults in their lives (Coakley *et al.,* 1993). Thus, the adolescents in the current study present a unique opportunity to gain insight into parent-adolescent dynamics that would bring about a greater understanding of the phenomenon. Adolescents exist in unique circumstances which may include parents being absent due to working long hours or work responsibilities. Single parent households or, parents who are not taking responsibility for raising adolescents in households where grandparents are the responsible guardian meaning adolescents are losing out on parental involvement. The reasons for inactivity at schools include the transformation of the curriculum where Physical Education periods or time are utilized to ensure that the CAPS curriculum in South Africa is completed. The lack of PA time may further include environmental pressures and the continued increase of external factors pressuring adolescents. Thus, adolescents who partake in insufficient levels of PA, are inactive and these unhealthy habits may lead to the early onset of lifestyle diseases and obesity due to inactivity. Therefore, this study aimed to explore the perceptions of adolescents on factors promoting habitual PA participation in an education district on the outskirts of Cape Town, South Africa.

Methodology

Study design and sampling

This study used a qualitative approach (Cresswell & Plano, 2011) and an interpretivist paradigm as a methodological framework to explore how people make sense of their lived experiences and reality (Hennink *et al.,* 2011; Willig, 2013; Cresswell & Plano, 2011). The purposive sampling (i.e. selective sampling) technique was used to recruit 35 adolescents from grade nine (aged 15 years) at 3 public schools located in Mitchell's Plain in the Western Cape province of South Africa. The schools are situated in disadvantaged communities situated in areas rife with unemployment and socio-economic circumstances that influence the communities. Adolescents in the communities are exposed to influencing factors that limit their access to safe PA spaces.

Data collection

The participants' lived experiences (Hennink *et al.,* 2011). The FGDs were conducted using an interview schedule (Willig, 2013). Only the primary researcher and participants were present at the time of the FGD and participants had no prior knowledge of the researcher. The interview schedule used in this study (Table 1) was validated by the co-authors who are experts in family studies, community health science, and/or PA. The FGDs sought to find out the adolescents' perceptions about factors influencing PA, explored the role of parental involvement, and analysed PA facilitators, barriers, and preferences as well as strategies needed to increase PA participation (CSC, NVR, SHB). A probing technique was used to explore emerging concepts to gain a deeper understanding of the variables of interest to the study.

Table 6.1: Interview schedule for focus group discussions with adolescents

Domain	Questions
Background	Briefly tell me about your physical activity experiences.
Facilitators	What helps young people to become/remain active?
Strategies	How can positive PA behaviour be maintained?
Barriers	What prevents young people from doing PA? (barriers)
Support	In your opinion, do young people get support from family and the community to be active.
Parental involvement	Are your parents involved in your PA participation?
Strategies	How could your parent(s) be more involved?
Directive behaviour and Monitoring	Do your parents monitor your conduct? How do your parents monitor you?
Activity preferences	What PA you would like to do weekly? What kind of activities do you do with your parents?
Benefits of PA	Do adolescents and parents enjoy/not enjoy doing activities together?
Strategies to increase PA	What are some ideas to increase PA behaviour for adolescents?

The interview schedule facilitated the gathering of rich data undertaken by manually transcribing the audio-recorded FGDs and providing the participants the opportunity to review the transcript. These processes were carried out as part of an audit trail to validate and correct the transcript as well as clarify any issues raised by the respondents. The FGDs were conducted until inductive thematic saturation was reached. Eight themes emerged from the three FGDs which allowed the researchers to gain a deeper insight into the phenomenon of interest to the study and its cardinal objectives. Participant total response rate was 78% (n=35). Specific gender-related characteristics of the total participants and FGD's respective samples are provided in Table 6.2.

Table 6.2: Descriptive demographics

Participants	Gender	Number (n)	Response Rate (%)
Participants	**Total**	**35**	**78**
	Female	20	44
	Male	15	33
Focus Group 1	Female	8	23
	Male	7	20
Focus Group 2	Female	5	14
	Male	5	14
Focus Group 3	Female	5	14
	Male	5	14

Trustworthiness and Thematic analysis

Thematic analysis was used to evaluate the data (Liamputtong, 2009). Transcribed FGD narratives were coded manually and analysed thematically in a six-phased process (Braun & Clarke, 2006) as follows: (1) FGDs were freely coded to generate the initial codes with each code described by quotes directly from the transcripts. All data were assigned codes deductively against the interview schedule linked to emerging concepts. (2) The three authors met face to face to discuss and compare coding, ensure consistency, critique each other's interpretation, and identify and agree on key emerging themes and interpretations (CSC, NVR, SHB). (3) In the third phase, preliminary categories of similar concepts were created based on the previous two phases. (4) In phase four, emerging themes were discussed by the three authors. (5) Activities in phase five included defining and refining the themes with associated categories by the principal researcher who presented the outcome to the team of authors involved in the data analysis. Reliability and validity checks followed the steps consistent with qualitative methods. (6) Phase six consisted of developing a concise, logical narrative. The position of the researchers, as university lecturers (Professors), and the primary interviewer as an educator, was acknowledged in a reflective process (Liamputtong, 2009).

Trustworthiness is achieved through a process of the components such as credibility, transferability, dependability, and confirmability. *Credibility* refers to the confidence that can be placed in the truth of the research findings. Credibility establishes whether the research findings in the current study represent plausible information drawn from the participants' original data and is a correct interpretation of the participants' original views. *Transferability* in the current study refers to the degree to which the results of qualitative research can be transferred to other contexts or settings with other respondents. Dependability involved participants' evaluation of the findings, interpretation, and recommendations of the study such that all are supported by the data as received from participants of the study. *Confirmability* was concerned with establishing that data and interpretations of the findings are not figments of the inquirer's imagination, but derived from the data. Lastly, reflexivity is the process of critical self-reflection about oneself as a researcher (own biases, preferences, preconceptions), the research related to respondents, and how the relationship affects adolescent participants' answers to questions.

Reflexivity

The reflective process used in the current study acknowledged the researchers' influences on the study and shaped the research process. Willig (2013) argues that the researcher influences the research processes both as a person (*personal reflexivity*) and as a theorist/thinker (*epistemological reflexivity*). Reflexivity allows the researcher to reflect upon how he or she might influence the research and its findings. Researchers reflected on their role in the current research and examined how it affected the research process. In reflexivity, the researcher needed to apply 'vigilance of self' which is described by Carey (2012, p. 20) as a way by which 'one's assumptions are recognised as potential sources of bias.' The researcher overcame bias by engaging in reflective journaling.

Ethical considerations

Ethics approval for this study was obtained from the University of the Western Cape (South Africa), Research Ethics Committee (BMREC Ref. HS/17/10/19). Informed assent/consent was provided by all participants and their guardians, respectively. The adolescents' identity was protected and anonymity was assured by using pseudonyms during data collection instead of their actual names.

Results

Thematic analysis of the three FGDs conducted with n=35 participants yielded eight themes as illustrated in Figure 1: Theme 1: Parental involvement, Theme 2: Physical activity barriers, Theme 3: Physical activity preferences, Theme 4: Physical activity parental support, Theme 5: Physical activity facilitators, Theme 6: Physical activity encouragement, Theme 7: Parental directive behaviour, and Theme 8: Strategies for promoting physical activity.

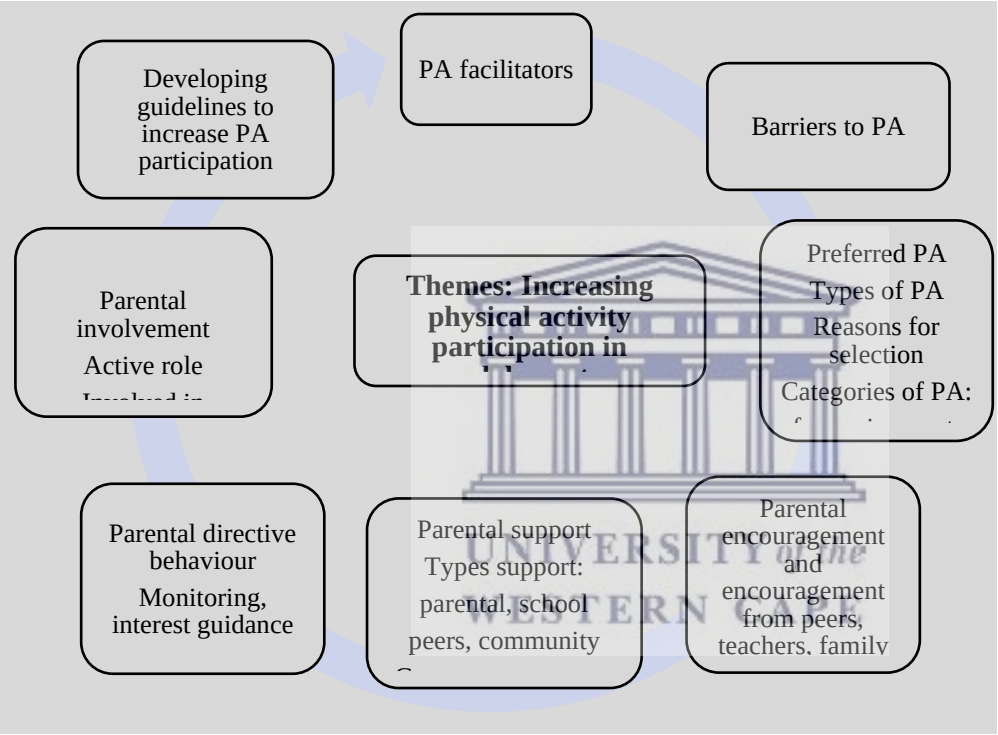

Figure 1: Thematic analysis

Table 6.3: Thematic Evidence table

Themes	Defining the theme	Theme link	Verbatim quotes
Theme 1: Parental involvement in physical activity	Parental involvement: Refers to how parents show an interest in the activities of adolescents (monitor, support, check-up, follow progress, pick up, check-in with coaches, friends, attend games, etc.)	Most adolescents reflected that parents help them to plan for activities and choose activities. Adolescents reflected that they would like their parents to participate with them in fun activities with their friends.	Participant 2: "My mom and dad are not agreeing about PA. My mom is active and walks a lot but my dad doesn't like it. Participant 3: "My family is not involved, I would like them to be involved. My mom plans my schedule." Participant 1: "My mom stresses when I'm outside because it is very dangerous here and others got shot when they were playing outside. Adolescents are referring to dangers in their environment and bullying from others if they participate." Participant 4: "My friends sometimes make jokes but most of the time we do PA together". Participant 16: "Things such as lack of finances, personal barriers, lack of confidence, no safe areas to be active are some issues mentioned." Participant 7: "PA opportunities are needed like more facilities, bring more stuff like pitches. Participant 11: "I want choices and do lots of stuff for our age group. That's what we need and I suggest that it is better if activities are fun."
Theme 2: Physical activity barriers.	Physical activity barriers refer to personal, social, environmental, infrastructural, and policy-related barriers that prevent or hamper physical activity.	Adolescents reflected on the barriers that prevent them from participating in physical activities.	
Theme 3: Physical activity preferences	The need exists for parents to be more involved in the selection of PA activities their children participate in.	The adolescents indicated that their parents do monitor their activities, and say no to some of their preferences, but cannot give them other alternatives.	
Themes	**Defining the theme**	**Theme link**	**Verbatim quotes**
Theme 4: Physical activity parental support	Adolescents need multi-level support, such as Personal, support from family, friends, community, school, policy, and infrastructure. The support allows adolescents to increase their PA opportunities. Adolescents feel supported in what they do if they know they can ask for help when they need to be active (e.g. finances to travel or to purchase a PA kit).	Adolescents pretend that they do not need anyone, but in truth, they indicated that they like it when someone from their family is a spectator at their games. The PA attitude of the mother and/or father becomes the attitude of the child. If parents do activities with children, it motivates both the parent and the adolescent, who feels supported.	Participant 15: "Yes, my parents support me, take me to my games and they come and watch me at the game."

Theme 5: Physical activity facilitators	Facilitators are defined as factors that by their presence or absence improve functioning and increase the opportunity for an adolescent to participate in physical activities (World Health Organization, 2017). Examples of factors that by their presence improve functioning are an accessible environment, positive attitudes from people in the adolescent's context as well as services, systems, and policies that aim to increase participation	While, for example, the absence of negative attitudes can be facilitating. Facilitators are not only found within the child's context, but can also be found on a personal/ individual level, and in the context of family, community, services, systems, and policies.	Participant 3: "In terms of facilitators, I think it's when people around you, like family, help you to be active, support you, take you to games and they are there for you."
Theme 6: Physical activity encourage-ment	Adolescents reported that seeing their parents enjoying PA and getting encouragement from their parents means that they are more likely to be active.	It is encouraging for adolescents to be active with their parents. Furthermore, they feel that by their parents encouraging them, they are more eager to learn something new.	Participant 5: "When I'm tired, my mom always says don't give up and she makes sure I am on time for all my stuff." Participant 32: "My dad always says well done to me and he means it. He is always so happy when I do well."

Themes	Defining the theme	Theme link	Verbatim quotes
Theme 7: Parental directive behaviour	Directive behaviour refers to a situation where parents monitor adolescents and guide them to reach their PA goals. Adolescents respond differently to parenting styles. It is important to note that an authoritarian style of parenting might not get the desired result. Authoritarian or controlling behaviour can be restrictive versus nurturing parenting styles that develop innate abilities.	Parents and adolescents need to have a bond of trust, acceptance, and understanding which will help the adolescent to grow into responsible young adults who can make appropriate health and activity choices. Can't you put this quote in the next column?	Participant 10: "My mom is worried about me, I know. If she works late she phones me to check if I came home from school on time. She always told me to be careful and pick the right friends. My mum kept my phone-because she caught me chatting late at night. On school nights, I can't watch TV too long: First homework she said… (rolls eyes)." Participant 11: "I am grateful for our families to watch us…its dangerous out here."

Theme 8: Strategies for promoting physical activity	Strategies to increase PA participation include ways and opportunities such as indoor/outdoor, fitness, leisure, and fun. Strategies include modification of guidelines for adolescents and parental recommendations to increase PA.	Strategies identified by adolescents to increase physical activity participation, those suggested by parents and for the families included ball games, walks, runs, indoor/outdoor sport, family time, gaming, and hiking.	Participant 1: “60 minutes (1 hour) of activity daily is a lot.” Participant 2: “Regular physical activity in children and adolescents per week”; (P3) “PT classes should be activity time.“; (P4) ”Playing formal and informal games with our bodies, rather than with our hands-on video game controls.”; (P5) “Games are important.“; (P16) wanted to play “ball games, basketball, netball, soccer, rugby, cricket.”; (P17) said, “Any activity or sport will do as long as it is fun, chosen by the adolescent, not forced.”; (P18) suggested, “Join a sport-organizations and clubs, PA camps.”; (P26) added, ‘Join a team or group to meet new friends such as hiking and learn new activities that are accessible to everyone regardless of income.”; (P30) stated, ”When they are interested and invested in PA they enjoy, they are more likely to spend.”

Discussion

The study expanded our insight into exploring adolescents' perceptions of parental involvement, facilitators, barriers, and strategies to increase PA. The focus areas according to adolescents' perceptions included parental involvement, physical activity barriers, physical activity preferences, parental support, physical activity facilitators, physical activity encouragement, parental directive behaviour, and increasing physical activity strategies. This study qualitatively explored adolescents' perceptions about enabling factors and barriers to PA participation. The adolescent learners were able to narrate their lived experiences regarding the value of PA involvement, parental support, and encouragement. The participants also identified barriers and facilitators of PA as well as provided valuable strategies to increase PA participation**.**

Parental involvement

Parental involvement is an important determinant of children's PA (Cozett *et al.,* 2016; Davids *et al.,* 2017). Adolescents whose parents were involved and role-modelled positive PA behaviour were more likely to be physically active. Therefore, physically active parents were more-committed to supporting their children's PA development. The findings related to the theme "parental involvement in adolescent's PA" are synthesized as follows: the relationship between the school and the parent reinforces children's health in multiple settings. Parents stay involved when engaged in their adolescent children's activities. Thus, the school can assist parents by identifying beneficial potentials in students and guiding them to select appropriate activities. As active parents tend to have active kids, parents can be involved in school activities by selecting preferred activities, giving consent for adolescents to attend such activities, and financially supporting them. Furthermore, parents can be involved by monitoring and preparing for PA participation by buying equipment, managing adolescents' time, and scheduling PA involvement. Furthermore, the adolescents in this study stated that it is important that their parents show interest and positive attitudes towards PA engagement. Parental involvement is therefore inextricably linked to support for adolescent PA.

Physical activity support (parental encouragement and directive behaviour)

The adolescents interviewed felt encouraged and supported when parents participated in PA with them. Preferred types of support included those concerning personal, financial, community-related care as well as peer group, policy, and access. The adolescents expressed the need to feel supported on a personal level, i.e. being accepted for who they are. They also preferred PA to be fun rather than a chore or obligation. Furthermore, the participants preferred selecting their activities, which included time spent with family or with friends to engage in walking, biking, gaming, playing, socialising, and hiking. The adolescents felt supported when their parents endorsed and funded their PA choices. Specifically, they cited the need for transport fares and the purchase of equipment.

Community support is needed to make the environment safer, protect facilities used for PA and make them freely accessible to adolescents. Therefore, access and safe entry to parks and sports facilities are vital. The support from both the parents and the community can assist adolescents to overcome PA barriers. Parents who are more knowledgeable about how to assist children to meet their PA needs usually provide more support. Therefore, parental PA information sessions are needed, targeting aspects such as PA activities, access, entrance requirements, training, and coaching. Parents are more likely to give adolescents more support and encouragement when they are well informed about PA options.

Parental encouragement and support are vital for adolescents to sustain PA behaviour. The adolescents interviewed in this study felt encouraged to partake in PA when it was not used as a punishment by their parents. Furthermore, parents should not use their children's love of PA to punish them as participation in PA must be a positive experience for adolescents. If parents encourage involvement in fun-filled activities, it will motivate adolescents to be more physically active. Parents can encourage adolescents by ensuring that PA is well-planned and safe. The adolescents in our study felt encouraged when they had the appropriate equipment and a dedicated site for PA participation.

Monitoring PA behaviour is important for safety reasons. Adolescents understand the need for parents to monitor their activities and whereabouts for safety reasons. According to adolescents, in the digital age, monitoring is needed by parents so that they do not go overboard with the usage of mobile phones, computer games, videos, and TV (television). It is important for the recommended daily screen time of one to two hours should be adhered to (Australian Government, Department of Health (2017). The learners also noted that as some parents monitor screen time, and schedule sports, they must find out where their children go daily. Scheduling is used to keep adolescents away from wrong influences. However, the adolescents noted that sometimes parents go too far by overbooking them, thereby being too prescriptive and detracting from the fun of PA activities. Therefore, such excessive parental oversight exerts too much pressure on adolescents and limits their ability to sustain participation in PA. Nonetheless, it should be noted that parental monitoring helps with reminders, keeps track of d, rates and ensures that adolescents meet obligations set out for PA. Thus, parenting remains the key influential factor in steering adolescents towards desirable PA behaviour. Influencing factors could potentially affect a child's daily activity, including role-modelling behaviour, encouragement, and enjoyment, which are associated with positive PA behaviour.

Barriers and facilitators of physical activity

The main facilitators of adolescent PA participation were identified as a positive parental attitude, motivation by parents, positive perceptions of competence and body image; the influence of friends, family and physical education teachers as well as enabling environmental opportunities. Martin *et al*. (2015) reported that the influence of family and friends may have a profound impact on the health behaviours of adolescents. The barriers contributing to low activity levels were identified by the adolescents as including personal barriers such as a lack of skills and athletic ability, poor attitude towards PA, negative self-image and self-motivation, and indiscipline. Social and environmental barriers, such as crime and violence, a lack of transport, and parental support, were deemed the three most prominent barriers by the adolescents. Support is needed to make viable changes in the lives of adolescents. Social barriers that hamper PA behaviour include limited information about the benefits of PA, a generally poor societal attitude toward PA, and unsafe social settings. Environmental barriers mentioned by the learners included vandalism of local facilities, weather conditions, pollution, and unsafe facilities that are hazardous to PA participation. Poor infrastructure, inadequate facilities, and a lack of training equipment were also cited as constraining the adolescents' PA involvement. Moreover, PA barriers mentioned were personal, social, environmental, infrastructure, and policy barriers.

Adolescents in the current study viewed facilitators as helpers of PA. Parents who are aware of the benefits of PA can motivate positive PA behaviour. Enjoyable physical activities lure adolescents to repeatedly participate in such activities. Flexibility and open-mindedness to adapt to circumstances enable parents and adolescents to overcome barriers. Thus, fewer rules, more freedom of choice to select the activity, and taking the initiative, are what adolescents prefer. Free activities and transport to activity venues were a few of the facilitators mentioned. Positive attitudes from others, available

information, knowledgeable instructors, financial support, and family transport, were also important to the adolescents. Moreover, adolescents reflected on the involvement of their parents in helping them plan for physical activities, choose activities, and buy sports equipment needed for PA.

Strategies to increase physical activity participation

The adolescents in this study indicated that they were able to be active while juggling multiple stimulating influences, such as walking while being on social media, i.e. they can multi-task. Thus, adolescents prefer activities that keep them healthy while having fun at the same time. They indicated that they like competition, but that too much of it pressurises them. For adolescents, PA should be transformed. For example, the type of activity is not as important as how it is done. Thus, adolescents need PA strategies that are geared towards being age-appropriate, technological in nature, hilarious, and adventurous.

The adolescents expressed the need for variety in their routines and activities that are fit for purpose and fun, endurance-sport related, activities for family time as well as indoor/outdoor activities where they get to choose exactly what to do, with their own rules. Adolescents prefer to participate in family walks, park walks, go for a weekend hike, or get involved in an acting class together. Social activities and gaming with friends are ranked very high as preferred activities. Therefore, opportunities should be created by parents to schedule some active family time to provide an opportunity for adolescents to take the lead.

Study strengths and limitations

The current was designed to analyse the perceptions of adolescents about factors influencing PA participation. Adolescents in grade 9 were allowed to share their views on the factors contributing to PA involvement; specifically, its barriers and facilitators. The participants were knowledgeable about their lived experiences and able to contribute to the body of knowledge in the area of adolescent PA participation. Additionally, the views reported in this study were provided by South African-born participants who gave insights to facilitate our understanding of the central phenomenon of parental involvement, barriers, facilitators, and strategies to increase PA. The majority of the participants in the study emphasised that parental involvement contributed to promoting PA participation. Further strengths of the research include the fact that multiple researchers were involved, improving the triangulation of findings. Thus, the fact that the authors met regularly to discuss and compare theme codes ensured internal consistency. The six-phase analysis process suggested by Braun and Clark (2006) exemplifies another strength of this study. Together, these procedures ensured a high level of rigor in the data analysis process and enhanced the trustworthiness of the findings (Braun & Clark, 2006). Despite the above strengths, this study has several limitations which should be considered in interpreting the results. Despite the above strengths, this study has several limitations that should be considered in interpreting the results. First, given the homogeneity of the sample, more extensive studies with larger sample groups would be beneficial. Secondly, the differences and similarities between several studies and the findings related to the current sample are limited. Limited data exist regarding the influence of parental involvement in South African adolescents.

Research and Practical implications

Parents involved in PA with adolescents are more supportive. The supportive nature of such parents may help adolescents overcome the specific barriers that limit PA participation. Thus, support and parental involvement have been recommended to assist adolescents in coping with environmental barriers of PA. Group and fun-filled PA carried out with peers and parents are recommended to increase adolescent participation. A support model, involving parents well informed and experienced in the promotion of healthy behaviour, could be a veritable resource for promoting PA among adolescents. The current study's findings may be useful to policymakers, parents, and educators to devise strategies targeted at meeting adolescents' PA needs. Theme 1- Parental involvement, theme 2-Physical activity barriers, theme 3-Physical Activity preferences, theme 4-Physical activity parental support, theme 5-Physical activity facilitators, theme 6-Physical activity encouragement, theme 7-Parental Directive behaviour, theme 8-Strategies for promoting physical activity, creates opportunities to future studies.

Conclusion

Various factors influence adolescents' PA participation. Parental involvement, encouragement, and support facilitate sustained PA in adolescence. PA facilitators such as school and community encouragement and support, parental involvement, and directive behaviour, all promote PA opportunities. Providing community and parental support to adolescents could overcome many of the PA barriers. Thus, a collaboration between parents, adolescents, schools, and communities is needed to support and promote opportunities for adolescents to be physically active.

Acknowledgements

The authors thank the University of the Western Cape, South Africa, for granting permission to conduct the study and are grateful to the learners who participated in the study.

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CHAPTER 7

SECTION A: THE DEVELOPMENT OF A FRAMEWORK FOR GUIDELINES FOR PARENTAL INVOLVEMENT TO INCREASE PHYSICAL ACTIVITY PARTICIPATION

Cozett C & Roman, N.V (2021). Developing a framework for guidelines for parental involvement to increase physical activity participation: A consensus workshop. International Journal for Environmental Research. Article is under review.

7. A1 Introduction

Chapters 4, 5, and 6 presented the research that was conducted in Phase 1, comprising stages 1,2,3 of the study. In this chapter, phase 2 stage 1, a consensus workshop was conducted, completing objective 5 of the study, which was to develop and design guidelines to enhance parent involvement and increase physical activity participation. The consensus workshop was conducted from the findings of the previous chapters – Chapters 1, 2, and 3. Before the consensus workshop, the researcher drafted the first set of proposed guidelines emanating from the findings of the three previous chapters. In Round 1, of phase 1 concept mapping was used to synthesize results to present in the consensus workshop for a panel of experts to reach a consensus on the recommended guidelines drafted by the researcher and to make any further recommendations. In Round 2, a consensus workshop was held with stakeholders online, to reach a consensus on the first draft of guidelines emanating from the findings of the previous chapters and conducted with the panel of experts. Once consensus was reached, the researcher drafted the final guidelines into a framework of guidelines for adolescents and parents to increase PA participation. Section A has been submitted for publication to the International

Journal for Environmental Research and Public Health and written in article format according to the aim, scope, and format of the Journal of Environmental.

Planned Papers

The article was submitted in September 2021 to a special edition of the journal International Journal for Environmental Research and Public Health reference: [IJERPH-IF2.468] Special Issue "Community and In-School Based Physical Activity in Children and Adolescent".

Title: Guidelines to Enhance Parent Involvement and Adolescent Participation in Physical Activity

Authors: Colleen Cozett and N.V. Roman

Affiliation: 1Department Sports Recreation and Exercise Science, University of the Western Cape, Bellville, 7535 Cape Town, South Africa

The aims and scope of the journal are as follows: Children and their health are a pair sometimes difficult to disentangle. Many risk factors do exist, sometimes they are modifiable, like all risk factors with a behavioural component, and sometimes not, like gender. Causal pathways are not always clear, most of the time because of the design of the study.

Where to start with disentangling adolescent health? We could start with modifiable risk factors not known so very well. Furthermore, we could try to get more grip on the way risk factors are working by introducing mediation. In addition, we could try to do a study with a longitudinal design, or combine findings in a trend analysis. We should keep in mind that decision-makers require new knowledge to be of assistance to children and health systems in managing these risk factors. These health systems can be those, which were not defined as such before, like schools or municipalities.

7.A2 Publication details

Title	Developing a framework of guidelines for parent involvement to increase physical activity participation
Authors	Colleen Cozett and Nicollete V. Roman
Journal	Health-Informatics Journal
Journal Details	Peer-Reviewed
Status	Abstract accepted and resubmitted for publication April 2022,

Health Informatics Journal is an international peer-reviewed journal. All papers submitted to Health Informatics Journal are subject to peer review by members of a carefully appointed editorial board. The journal operates a conventional double-blind reviewing policy.

7.A3 Conclusion

The aim of the study was successfully realized by employing a consensus workshop to achieve agreement on broad recommendations based on specific themes to complement the research on the development of guidelines for adolescents and parents to increase PA participation: a consensus workshop. These recommendations have the potential for partner collaboration between parents, professionals, educators, subject matter experts, and adolescents. Schools in this context are seen as an ideal environment where adolescents, parents, and teachers work together to increase PA participation through parental involvement, parental encouragement, directive behaviour, support, overcoming barriers to participation, and taking appropriate action to increase opportunities to participate in PA.

Article

Title: Developing a framework for guidelines to improve parental involvement and increase adolescent participation in physical activity

Colleen Cozett [1], Nicolette V Roman

1 Colleen Cozett PhD candidate in the Department of Sports Recreation and Exercise Science, Faculty of Community and Health Sciences, University of the Western Cape, Bellville, 7535 Cape Town, South Africa

*Correspondence: colleen.cozett@northlink.co.za

2 Professor Nicolette Roman has a PhD in Psychology, is rated as an established researcher nationally, in South Africa, a Full Professor, and is Director of the Child, Family, and, Community Studies Unit in the Faculty of Community and Health Sciences at the University of the Western Cape nroman@uwc.ac.za

Abstract: Background: This manuscript reports on the development of a framework for guidelines that sought to enhance physical activity participation in adolescents through increased parental involvement. A two-round consensus workshop was attended by professionals and parents to develop the framework. **Aim:** Thus, the study aimed to develop a framework for guidelines to enhance physical activity participation through increased parental involvement using a consensus workshop format. **Methods:** A two-round consensus workshop design was applied. Experts working in the field of physical activity, adolescents, physical education, and parents were invited to participate in the consensus workshop in rounds 1 and round 2. Participants' responses were recorded, transcribed, and analysed. Data coding supported the identification of key concepts. The initial participant responses were consolidated into a draft framework in round 1. Thus, in round 1, an agreement was reached on 12 broad themes which were identified. In round 2, a panel of experts reviewed themes by discussing, commenting, adding, and deleting to reach an agreement using an agreement or consensus process. In round 2, the 12 themes were further analysed by a panel of experts to reach a consensus on the final terminology by analysing and clarifying responses, terminology, and responses. **Results**: The final framework for guidelines consisted of 6 themes with 52 sub-themes. The six themes identified in the framework were: 1) the key recommended guidelines for adolescents, 2) guidelines for parents, 3) information and resource support, 4) guidelines related to increasing parental involvement, and 5) guidelines related to safety and physical activity environment and sustained physical activity-take-action. The consensus was reached on 51 sub-themes and participants unanimously agreed on the need to develop a resource table for parents. The resource table identified appropriate activities, types of activities, intensities to do physical activity, and the duration of activities. **Conclusion:** The framework for guidelines developed in collaboration with researchers, educators, parents, and community stakeholders holds the framework to contribute to developing guidelines to enhance parental involvement to increase physical activity participation.

Keywords: guidelines, consensus workshop, adolescents; adolescence, parents, framework, physical activity

1.Introduction

The current study intended the framework for guidelines as a type of support for parents and adolescents to increase physical activity (PA) participation, (1). The framework for guidelines highlights 1) what has already been done 2) identify guideline trends and commonalities 3) identify strategies to increase PA participation and, 4) how to overcome barriers to PA (1, 2) The World Health Organization (3) defines guidelines as any document covering recommendations for clinical practice. The need for developing a framework for guidelines stems from the benefits that using guidelines can provide to adolescents and parents. The benefit of developing guidelines in the context of the current study was done as a source of providing information for adolescents and parents to increase PA participation (4). Further to this, having written guidelines serve as a source of information, informing adolescents and parents of the topic at hand (1). Parental involvement is defined as parents who work with or care for adolescents, contributing to developing the guidelines. These adults should be aware that, as children become adolescents, they typically reduce their activity levels. Thus, parents play an important role in

providing age-appropriate opportunities for physical activity. By allowing parents and adolescents to use guidelines it allows for parents and adolescents to make informed decisions about the active role to take to increase PA in adolescents (2). Furthermore, written guidelines are allowing parents to use them as a daily reference guide. Thus, parents view information and consider their options, and may ask questions later for clarity and understanding (3). However, research shows that limited documented evidence exists about how to develop a framework for developing guidelines to increase physical activity (PA) in a South African context (4). More recently, there has been an increased awareness of the importance of increasing PA (5). Parents feel empowered with information in the form of guidelines that aid in the decision-making process. A framework for guidelines provides a foundation to develop guidelines to recommend strategies for increasing PA (6). Thus, developing a framework for developing guidelines and using consensus workshops as a format is unique. However, the development of a framework for guidelines is a collaboration between researchers, parents, educators, community stakeholders, and interested parties (7,8,9). Experts' and stakeholders' participation can lead to tailored guidelines that reflect the processes of engagement and collaboration, contributing to the development of a framework for guidelines (10).

Physical inactivity has been identified as the fourth leading risk factor for global mortality (11). Further to this, physical inactivity levels are rising in many countries with major implications for the prevalence of non-communicable diseases (NCDs) and the general health decline. Breaching this gap is possible by providing parents and adolescents with guidelines. Thus, urgent action was initiated worldwide to increase physical activity and to contribute to achieving health priorities in the 2030 Sustainable Development Goals (SDGs); (12); (13). The development of a framework for developing guidelines for adolescents and parents to increase PA participation is a solutions-centred approach. The framework is developed in collaboration with adolescents, parents, and professionals in the field of PA in the current study.

Increasing PA is considered an important determinant of health, quality of life, and well-being and may trach into adulthood (14, 15, 16). (17), defines physical activity as any bodily movement produced by skeletal muscles that require energy expenditure. Physical activity may be undertaken as a form of transport or house cleaning duties and through play. All forms of physical activity can provide health benefits if undertaken regularly and of sufficient duration and intensity (18; 19). Physical activity is further identified as an essential component of health and inactivity in adolescence may track into adulthood (20, 21). Therefore, it is important to establish the link between the involvement of the parent to support adolescents to increase PA participation (22, 23, 24, 25). Thus, the link between increasing PA and the role of the parents is important to understand to develop effective PA strategies. The role of the parents and the parenting style employed by parents is the foundation of the relationship between parents and adolescents during the phase of adolescence.

Adolescence is a key stage in the development of individuals [26, 27, 28]. It is a time of many physical, psychological, and social changes to which children must adapt to reach the maturity of adulthood [29]. The well-being of adolescents depends on multiple factors that can determine their health-related quality of life. Thus, the role of the parent in mitigating these external factors is essential to overcoming barriers to PA. The factors that determine the quality of life in adolescents have been studied in numerous studies in recent years, most of them finding significant relationships with lifestyle habits: for example, quality of life in adolescence has been associated with physical activity and a sedentary lifestyle (30). According to (31), an adolescent's well-being is measured through self-esteem (academic, social, emotional, family, and physical). The parenting style employed by parents is measured through parental warmth or parental strictness. Parents are classified into four groups: indulgent, authoritarian, authoritative, and neglectful (32, 33). Remarkably, the greatest personal well-being was found for adolescents with higher parental warmth and lower parental strictness levels, Meaning the more indulgent parents achieved the greatest social well-being for their adolescents. Furthermore, adolescents raised with consistently, poorer personal well-being and social well-being were associated with less parental warmth. Meaning, that authoritarian and neglectful parents achieved lower levels of well-being with their adolescents (34). In doing so, parents lay a foundation for lifelong participation, health-promoting PA.

The parent's involvement in the developmental phases becomes especially decisive in adolescence since there is evidence that it is a key stage in the adoption of healthy habits [22] and the strengthening of positive PA behaviors that contribute to the improvement of adolescents' current and future health (35, 36, 37, 38, 39, 40).

Thus, Parents who are involved, encourage physical activity in adolescents by doing sustained and structured activity as they grow older. Adolescents should meet the recommended guidelines by doing age-appropriate physical activity. Parents should be aware that adolescents deal with factors and barriers that hinder PA participation (41, 42, 43, 44, 45). Therefore, increasing parental involvement may be a protective factor against risk behaviors and physical inactivity in adolescents (41, 42, 43, 44, 45).

The current manuscript forms part of a larger study toward completing a Ph.D. The broader study consists of two phases that contributed to developing guidelines using a mixed-methods approach consists a sequential explanatory design. In Phase 1 a systematic review was done followed by a quantitative and a qualitative stage. In Phase Two, the results of phase one were consolidated using a concept map. Thus, the current manuscript depicts the final stage of conducting a consensus workshop in rounds 1 and 2. Providing an overview of the broader study is important to put the current manuscript into context. The broader study sought to (1) identify and explore existing research to conduct a systematic review to determine the best practice models/interventions/ to inform the guidelines. 2) administer a questionnaire to a larger group of adolescents to determine the current PA status of adolescents, select current activity preferences which would encourage adolescents to participate in PA, and determine the level of parental involvement and the relationship between adolescent PA and parental involvement .3) to conduct unstructured interviews to explore the barriers and facilitators to adolescent PA participation. Therefore, the phases and stages of the pre-study informed the framework for guidelines. Figure 1 illustrates the phases and stages of the broader study to provide the manuscript's context.

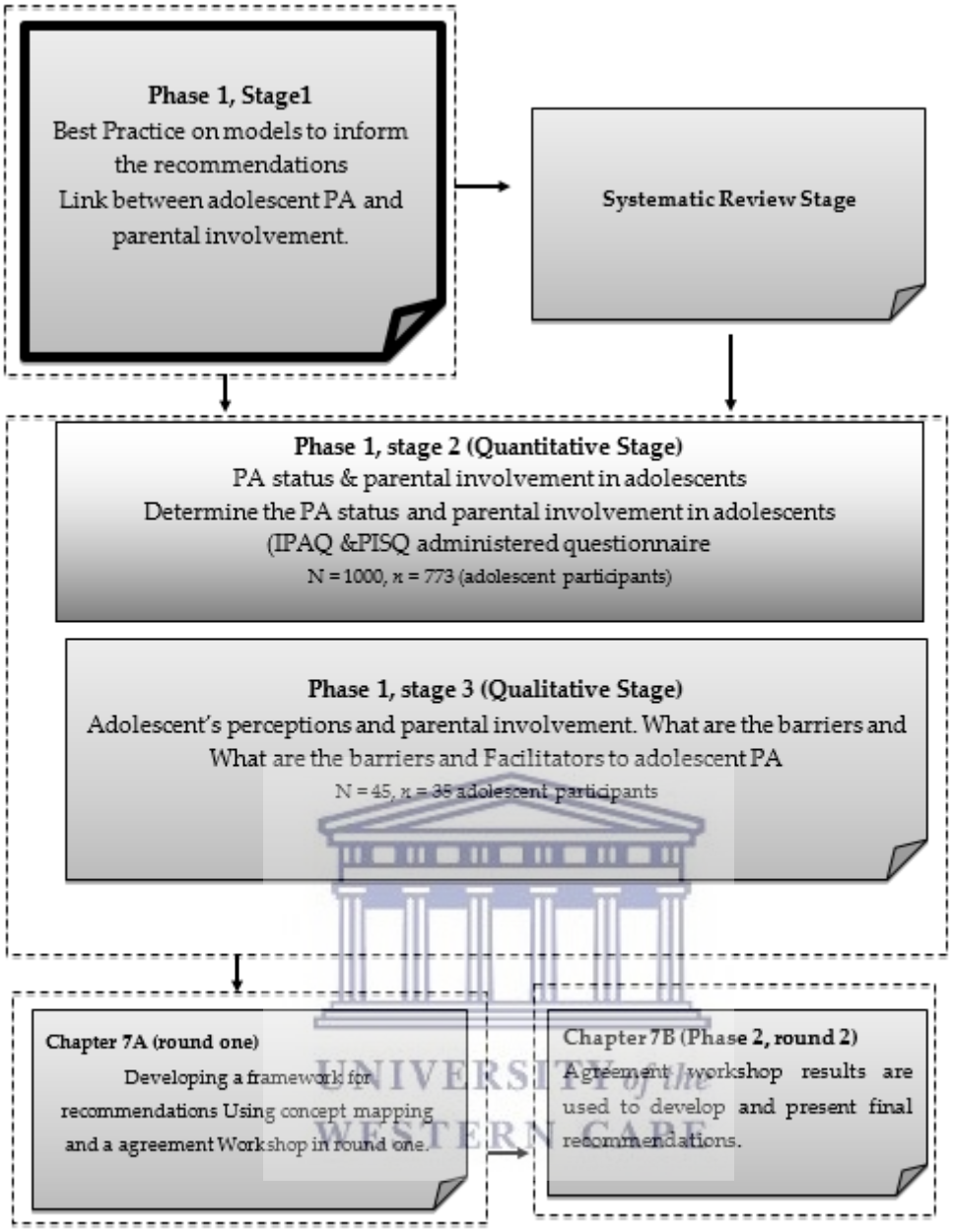

Figure 1. The pre-study plan.

2.Methods

A consensus workshop was conducted in two rounds as the research methodology in the current study. (44, 45), stated in recent findings on workshops that it is a research methodology that is reliable in producing valid data as it aims to achieve participants' expectancies and to provide reliable information. A variety of basic shared features are present in a consensus workshop methodology (1,2,3) namely: 1) workshops are arranged and conducted with participants with a common interest and done within a limited timeframe (2) workshops are carried out with experienced people familiar with the research topic; 3) active participation among all attendees are encouraged, and (4) an expected outcome is the recommended guidelines and the framework. Therefore, this research study was concerned with including the parents and experts by sharing knowledge to define and understand a problem to find solutions (2). The consensus method is illustrated in Figure 2.

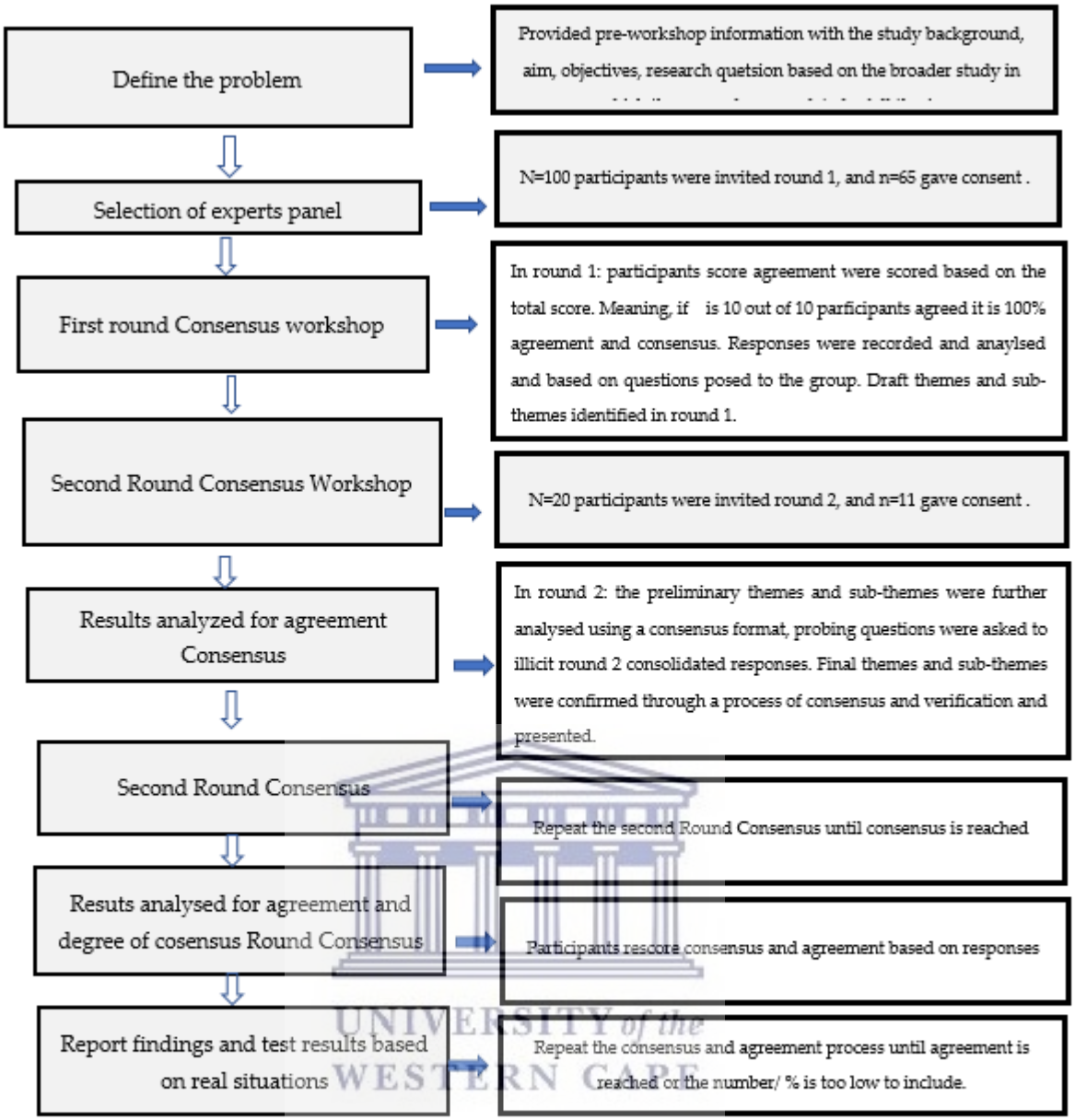

Figure 2: The consensus method

3.Design

The consensus workshop's overview is provided according to rounds 1 and 2. The objective of the consensus workshop was to engage with a panel of experts and stakeholders and work towards reaching a consensus (1,2). Thus, the consensus workshop was best suited for consensus building and assumed that group judgments are more convincing than individual judgments (3,4). During each round, once group consensus was reached, the process was stopped. This study protocol received ethical approval from the Research Ethics Committee at the University of the Western Cape (ethical clearance number HSS: 17/10/16). Before the commencement of the workshop rounds, participants were provided with pre-study information. Further to this, it must be noted that due to COVID19 the workshop format changed to an online workshop on Zoom. The following process was used to share information to put the workshop in context as follows:

1) Providing the pre-study information to participants and the COVID19 workshop protocol.
2) The meeting Zoom-link meeting was shared and participants were allowed to scrutinize the background study information which linked the information manuscript to the broader study.
3) The study's aim, objectives, and research questions were shared to provide participants with the results of the phases and stages of the broader study for discussion.
4) Basic keywords were clarified and discussed which included adolescents, physical activity, physical inactivity, parental involvement, and the phase of adolescence.
5) During the workshop and introduction and results sharing section preceded the workshop.

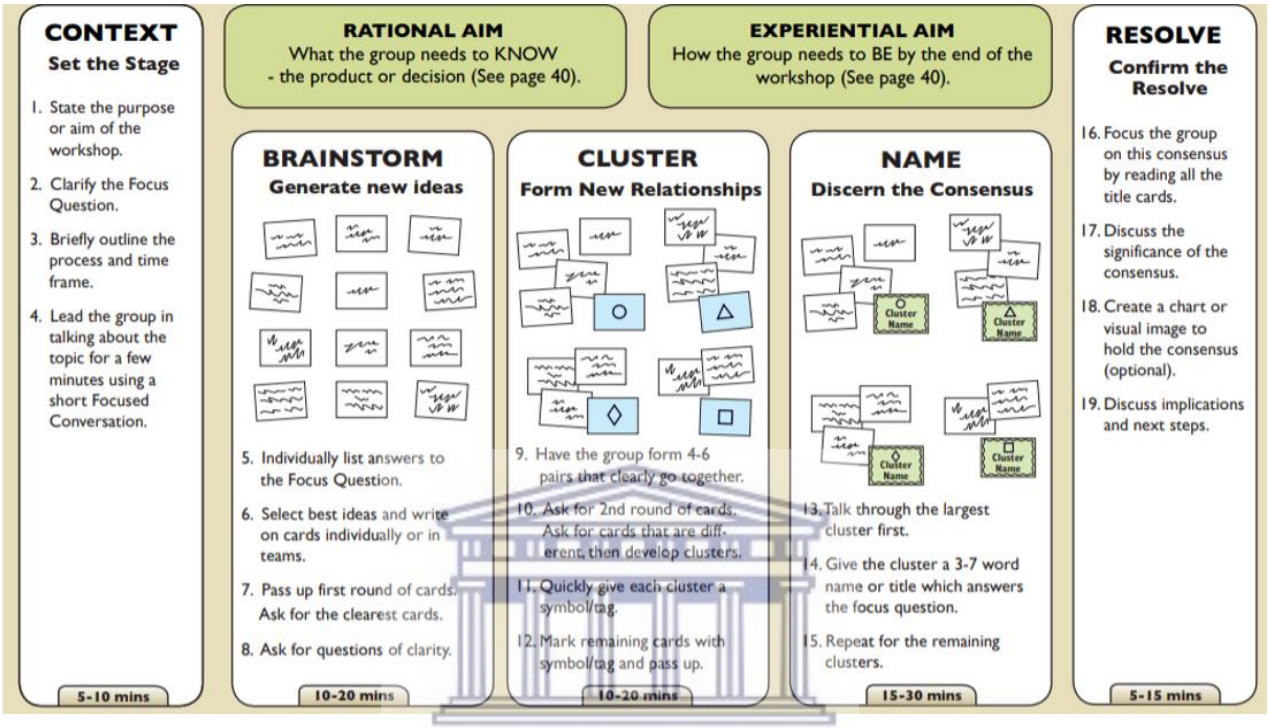

Figure 3. Consensus workshop overview.

4. Inclusion and exclusion criteria

Participants in the current study were as follows; participants who gave consent to participate in the study by completing the participant confidentiality sheet. Furthermore, participants who gave consent and attended the actual session. Participants who were experts in the field of physical activity, parenting, research family studies, and physical education were purposively selected to be in the study. The sessions were held online on Zoom due to the lock-down procedure that existed in the South African context. Participants who did not give consent and who did not attend the online sessions were excluded.

5. Data Collection: Round 1

The current study was developed in two rounds and based on the stages and phases of the broader study which contributed to developing the framework for guideline development to increase parent involvement and PA in adolescence. In round 1, a panel of experts and academics participated n = 65), to reach a consensus and reach an agreement on the draft framework and the themes identified in round 1 based on participants' responses. Addendum 1 illustrated the draft framework for guideline development that formed the basis of the final framework, The aim of round 1 was to reach a consensus on a preliminary framework by brainstorming, identifying themes, and getting responses from the panel using the following process

- During the workshop round 1, brainstorming was used to generate new ideas related to developing a framework for developing guidelines.
- Probing questions were asked and responses were recorded.
- The researcher highlighted the responses and clustered responses.
- Clustering was used to develop grouping or breakaway sessions within the workshop to discuss pertinent items that surfaced during brainstorming.
- Items such as: clarifying basic concepts, commonalities in answers such as types, frequency, and duration of physical activity as a need to provide information to parents and adolescents, benefits of PA, strategies to increase PA, PA support, and Barriers to PA.
- Name and group the responses were left to the panel to categorize and name the groupings of responses.
- This process was repeated until saturation occurred. Figure 3 illustrates the Consensus workshop overview.

Round 2

In round 2**,** to ensure a broad perspective on the themes, N=20 experts from the schools, communities, and the University of the Western Cape working in the field of physical activity, adolescent health, education, physical education, research, and Sport Science as well as in community development were invited. The panel of experts consisted of n=11. Thus, participants shared relevant knowledge and expertise related to research, practical, clinical, and policy levels [38]. On the day of the workshop, eleven of the panel of experts attended workshop round 2 online due to the risk protocol in place due to COVID19. The agreement framework below spells out the participant's selection in each round of the study Figure 4**.** Thus, the panel of stakeholders that participated in round 2 consisted of expert stakeholders in the field of hearing loss. Invitations were sent via email to n=20 stakeholders to participate in this round of consensus as stipulated in figure A1. Among the stakeholders were: two (2) researchers Professors in the field, social workers working at local organizations, 5 educators and parents, and 4 Sports Scientists. One of the goals of round 2 was to generate further stakeholder opinion and feedback on the final framework developed from the draft framework in round 1. Additional goals were to 1) share with the panel of experts, 2) reach the manuscript outcomes of each stage of the research proceed ss, and 3) based on the draft recommendations in round 1 with the panel of experts, to consolidate themes and sub-themes that resonate with the findings. The panel of stakeholders was asked to respond to a set of questions corresponding with the recommendations made. These questions included: 1) what are the themes that resonate with the recommendation made in the research study? 2) how important is the recommendation made in the context of the research study – priority of topics? 3) comment on your language use in the research study, particularly adolescent-friendly language 4) Do you have any additional recommendations to add? The panel of experts agreed with the suggestion that safety, parental involvement, and sustained PA be consolidated and categories created to accommodate all parental sections and all safety sections and sustained PA items. It was further established that this recommendation would encompass the content on different parenting involvement, environmental safety, and sustained PA. The agreement was then reached that the recommendation for 6 themes. Item 11 was renamed "Resource support". The content looks at issues of guidance, information to promote knowledge on PA, information, and support that deaf role models who are powerful influences can provide parents and professionals. Table A5 indicates the consensus process with participants' comments in round 2 to attain consensus on the final framework for guidelines to increase PA participation and parent involvement.

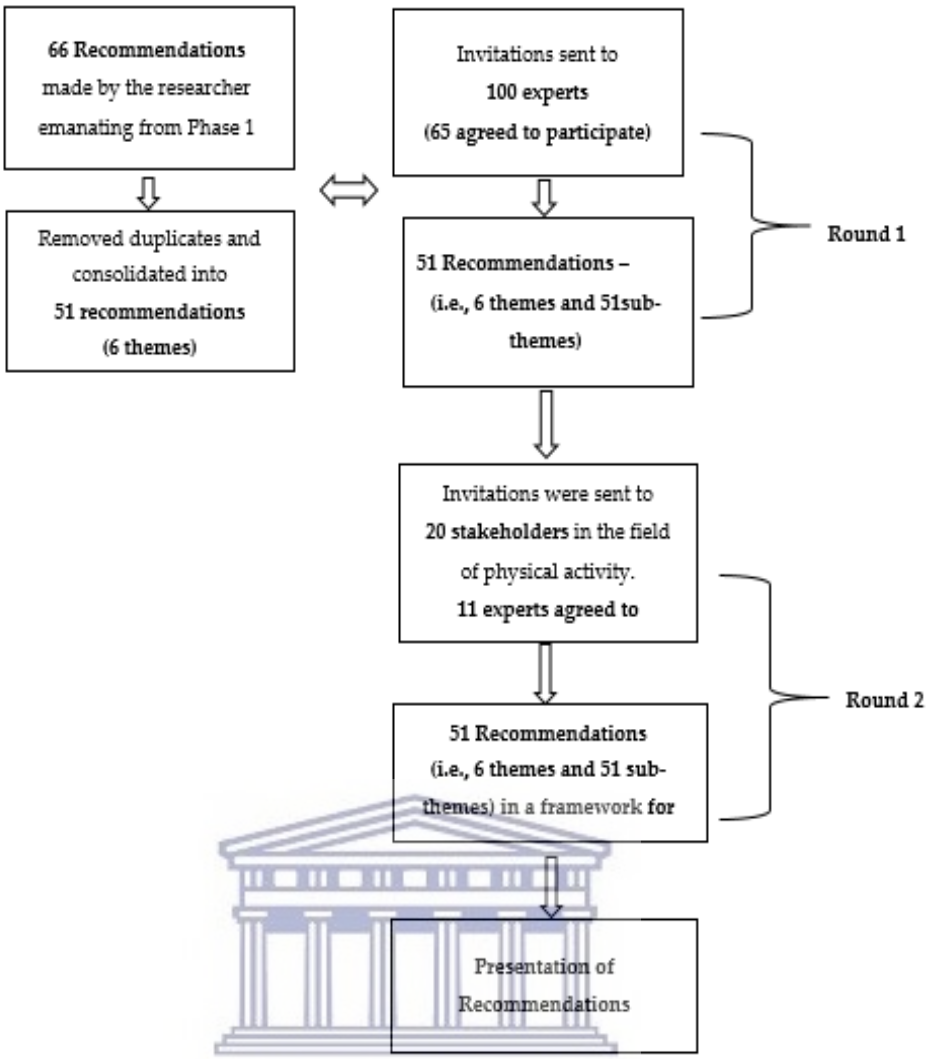

Figure 4: Agreement Framework

6. Round 1 Framework development and analysis:

Round 1 responses from participants were recorded, analysed and transcribed as preliminary responses. In the agreement process, the number of participants who agreed was tallied and converted to % levels. Items depicting a level lower than 70% were highlighted in round 1. The development of the draft framework for guidelines was established based on the preliminary responses in Round 1. The draft framework was developed in round 1 based on a process of agreement or consensus building. The draft framework was based on responses from experts (academics) in the field of physical activity in adolescents, parents, and teachers. Thus, the draft categories for the framework were identified in Table 1. Key categories of findings are linked to the broader study's findings. It must be noted that these findings were all based on a larger study which informed the rounds of the current study. Therefore, this concept map (Addendum, Table 1) consists of the key categories that formed the foundation for the framework for guideline development.

7. Consensus process and analysis round 2

In round 2 of the consensus workshop, stakeholders in the field of PA, and parenting, discussed the feasibility of the framework and the recommendations for inclusion in the final framework. In round 1 n=65 participants were selected to make preliminary input and in round two n=11 experts gave consent to consolidate the themes identified after reaching an agreement. The consensus rate was calculated and based on the number of participants and the actual who agreed and gave consensus on a given item. The panel gave consensus that

these consensus response rates would indicate the inclusion of a recommended guideline or sub-theme if the 70% or above. However, any rates below 70% would be excluded. The draft framework with percentages and participants' responses was the draft that contributed to the final version of the framework for guideline development to increase PA in adolescence in Table1 as an addendum to the manuscript.

8. Results

Round 1 Consensus process:

Based on the 12 guidelines and 66 sub-themes recommended in round 1 in table 1 (Appendix), the themes and their corresponding sub-themes were identified and agreed upon by the panel of experts. Thus, the proposed 12 guidelines were consolidated into 6 themes and 51 sub-themes are presented in summary table2, 14 items were removed and reasons are indicated in the table draft table 1 in the addendum. Items removed included: 5, 6, 13, 14, 15, 34, 42, 44, 46, 47, 51, 53, 52, 62. Thus, in building a consensus framework, a preliminary framework established the foundation of the current study. The identified themes were confirmed and agreed on by the panels and derived the themes and sub-themes for the current study. Table 2 provides the final 6 themes and 52 sub-themes after conducting thematic analysis and a consensus process in a consensus workshop in two rounds. The six themes were:

1. Key recommended Recommendations for adolescents
2. Recommendations for parents
3. Information and resource support
4. Recommendations related to increasing parental involvement
5. Recommendations related to safety and PA environment
6. Sustained PA to take-action

Table 2, illustrates the themes and sub-themes in the framework for recommendations with all the items included. The 14 items have been removed (5, 6, 13, 14, 15, 34, 42, 44, 46, 47, 51, 53, 52, 62) after stakeholder and expert input was made. The panel of stakeholders reached unanimity on 6 themes and 51 sub-themes as reflected in Table A6. The additions and adjustments made in themes 4,5 and 6 addressed the needs of parents in terms of parents and adolescents. The recommended framework for guidelines provided a PA resource table for adolescents and parents which was developed in draft form in table A4 and finalized in Table A7. Thus, theme 3 identified and focussed on resources required by parents. The sub-theme and its content included the recommendations made to incorporate information to support adolescents in enhancing PA. Table A6 indicates the second round of framework for guideline development based on rounds 1 and round 2. These themes and sub-themes are discussed and motivated with verbatim comments made by panels for inclusion in the final framework for guidelines. Table 2 below illustrates the final framework for guidelines based on the consensus-building of rounds 1 and round 2.

Table 7A 1. Framework for guidelines

Themes and Sub-Themes
Theme 1 A: Key recommendations for adolescents
Adolescents should do:
60 min of Physical Activity (PA) activity per day for 3–5 days.
Parents should participate for 150–300 min for 3–5 days per week.
20-min bouts of PA have a cumulative effect.
Theme 1 B: Key recommendations for parents
Help adolescents set realistic PA goals.
Make use of a variety of PA options.
Free-play remains a popular option.
Parents to create opportunities for social PA settings.
Get involved and set realistic goals.

Theme 3: Resource for parents: Physical activity preferences
Type, examples, duration intensity, level of PA
Theme 4 A: Parental involvement Recommendations
Be actively involved in school sports.
Be involved with planning for PA and preparation before events.
Go and watch them participate (spectator parents).
Theme 4 B: Parental involvement Recommendations
Show an interest in what adolescents do.
Respect adolescent's choices PA.
Participate in PA with your adolescent.
Allow adolescents to choose/select their activities.
Parents support adolescents with sports equipment, financial support, transport fees, and support with overcoming barriers to participation.
Personal protective gear is something worn by a person to protect a specific body part: (helmets, eyewear, goggles, shin-guards, elbow and knee pads, and mouth-guards masks).
Theme 4 C: Parental involvement Recommendations (Directing behavior)
Set realistic boundaries for PA participation.
Open communication with adolescents is needed to establish: Ground rules, Curfews, Boundaries, PA time, and Limit screen time/sedentary time.
Parents listen to their adolescents too they are savvy and knowledgeable.
Theme 4 D: Parental involvement Recommendations (Parental encouragement)
Provide positive feedback and motivate adolescents.
Good role models in parents, caregivers, and teachers should model and encourage an active lifestyle for children.
Praise, reward, and encourage adolescents to be active.
Being active as a family is a great way to model and encourage physical activity.
Theme 4 E: Parental involvement Recommendations (Parental awareness of the benefits)
Improved cognitive function.
Reduced risk of cancer.
Brain health benefits and improved cognitive function.
Reduced anxiety and depression risk.
Improved sleep and quality of life.
Both aerobic and muscle-strengthening physical activity is beneficial.
The health benefits for people with chronic health conditions.
endorphins/feel good/self-concept/self-image

Theme 5 A: Safe PA in stressed environments
PA risks must be understood by parents.
Select types of PA that are appropriate for the level of fitness.
Screen the PA environments for safety risks. know what they want to do.
Consult a health care professional before starting with PA if adolescents have health conditions (types and amounts of PA).
Theme 5 B: Safe PA in stressed environments (Personal safety)
Parents assist adolescents with sensible choices (when, where, and how to be active).
Teach adolescents to be aware of their surroundings and to be alert and avoid risky situations.
Establish a buddy system for PA.
Join a walking bus to and from school.
Theme 5 C: Safe PA in stressed environments (Personal safety)
Physical separation from motor vehicles and awareness of surroundings.
Choose places that are well lit.
Following rules and safety rules is the best way to reduce activity-related injuries.
Theme 6 A: Sustained PA (Taking-Action)
Provide time for both structured and unstructured PA
PA through break time/recess.
The use of technology and digital tools to use during PA sessions is preferred by adolescents.
Online activities yoga, games, and programs would interest adolescents
Theme 6 B: Sustained PA recommendations
Start gradually and be consistent.
Start PA at a young age and make it a lifestyle.
Everyone has a role to play: 1. Schools and Communities 2. Faith groups 3. Businesses 4. Civic organizations 5. Parent-teacher associations 6. Health groups and 7. Public safety agencies 8. Policymakers

9. Framework Findings

In round 2 of the consensus workshop, stakeholders in the field of PA, and parenting, discussed the feasibility of the framework and the recommendations for inclusion in the final framework. In round 1 n=65 participants were selected to make preliminary input and in round two n=11 experts gave consent to consolidate the themes identified after reaching an agreement. The consensus rate was calculated and based on the number of participants and the actual who agreed and gave consensus on a given item. The panel gave consensus that these consensus response rates would indicate the inclusion of a recommended guideline or sub-theme if the 70% or above. However, any rates below 70% would be excluded. The draft framework with percentages and participants' responses was the draft that contributed to the final version of the framework for guideline development to increase PA in adolescence in Table1 as an addendum to the manuscript. The 6 themes were included due to recommendations made by panels in rounds 1 and round 2. The 6 themes were:

Key recommended Guidelines for adolescents

The first guideline to be included was based on a need to include key guidelines and recommendations and based on early intervention programs for children to increase physical activity (PA). This theme, they felt, could address issues of early suggestions made to provide parents with a standard recommended guideline for how much time is deemed acceptable for adolescents to be active. Sub-themes referred to the key recommended guidelines that were based on time, duration of sessions, and bouts of activity.

Guidelines for parents

The second recommendation made by the panel of experts was to include "guidelines for parents" under the theme of parental guidelines. The recommendation stems from a need by experts and the panel to ensure that parents have the support needed to guide adolescents. The parent guideline specified the number of minutes an adult need to engage in to be deemed active. The guideline encourages parents to be active with adolescents.

Guidelines related to Physical activity preferences

The third recommendation made by the panel of experts was to include a "resource list" under the theme of "information and resources" for parents. The discussion around the theme centred on parents' need for some form of "documentation" or an "information list" that they can refer back to at any time. The common sentiment among the panels was that the resource list could be shared with extended family members to address their needs and concerns related to the increased physical activity in adolescence, thereby serving as a resource and referral list. After a brief discussion, the panels reached a consensus on including the resource list as an addendum after the guidelines were to be finalized. The activity items and explanation on the resource list were agreed upon by the panel. It was agreed that it would disseminate comprehensive, unbiased, meaningful information to help parents make informed decisions (14).

Guidelines related to increasing parental involvement

Recommendations four, five, six, seven, and eight are all related to parental involvement, guidelines parental support guidelines, parental directing behavior guidelines, parental encouragement guidelines, and parental awareness of the benefits of PA. The guidelines are related to increasing PA involvement and encouraging adolescents to be active. The 5 recommendations would be consolidated under one category as there was overlap.

Guidelines related to safety and PA environment

Recommendations nine, ten, and eleven are all related to environmental safety. This includes Safe PA in stressed environments. Personal safety, community safety. The recommendations are linked to concerns from the panel, adolescents, and parents about environmental safety. The panel was all in agreement that the recommendation must be included. The agreement was that recommendations nine to eleven must be included.

Sustained PA and taking-action

Recommendations eleven and twelve are concerned with encouraging lifelong PA in adolescents and parental involvement. Sustained PA guidelines and taking action are recommended and agreed upon by the panel. The final items will be consolidated into one section.

Consensus process

The panel of experts eventually reached a consensus on six themes and 58 sub-themes. These are listed in Table 1 in addendum 1. Theme 1 deals with guidelines for adolescents. The sub-themes focused on the key guidelines for adolescents and guided parents and adolescents in terms of time active and duration and bouts of activity. Theme 2 addressed the needs of parents to be supported by providing parents with parental guidelines. The theme focusses on them in terms of parents' time active and duration and bouts of activity. The content of this sub-theme focused on minutes and hours parents are active and encouraging parental involvement by being active with adolescents. Theme 3 identified and focussed on resources required by parents. The sub-themes and their content areas looked at issues of guidance, knowledge on physical activity preferences, PA activity resources, definitions, information and support, the provision of knowledge and skills on PA, and an understanding of PA. Theme 4 focussed on parental involvement. The sub-themes included content on issues related to parental involvement to increase PA and enhance parental involvement such as parental involvement, encouragement, directive behaviour, and support. Theme 5 focussed on the consolidated recommendations related to the safety u the environment. The sub-themes focussed on guiding parents and adolescents in terms of safety during PA, personal safety, and environmental safety. The last theme six consolidated taking action and sustained PA. The sub-themes are focused on ensuring that PA is fun, there is a variety of activities, and that PA is a lifelong activity that is not a chore. Table A2 indicates the first-round draft guidelines.

10. Findings

Responses by participants led to the 66 recommendations made in round 1 of the study based on responses by the panel. The set of questions corresponds with these recommendations from a sample of n=65. Further suggestions were received from the 11-member panel of experts in the second round after 20 were invited to the panel. Due to similar and overlapping themes, the panel of experts agreed to the merging of several of the recommendations proposed in round 1, which resulted in 12 themes consolidated and 14 sub-themes removed. The 12 themes were consolidated into 6 themes and 51 sub-themes were included. Furthermore, based on evidence from round 1, the consensus was reached to include a parental resource table A3 under the overarching theme of resource support. In essence, there was unanimous agreement by all the experts concerning these recommendations. Additional comments from the panel of experts included a request for clarification on the term "PA definitions in the resource table included. The researcher combined the feedback on the recommendations made and included it in the report. The second round elicited a further 2 recommendations from the 11member panel of stakeholders. The addition of the 2 recommendations was based on the evidence of the research undertaken in round 1. Participants felt that parents should be made aware of the benefits of PA and definitions of PA. Tables A2 and A3 illustrate the progress and recommendations made through the 2-round Consensus Workshop process leading to the final framework for guidelines.

11. Discussion

The purpose of the consensus workshop was to develop a framework for guidelines for parents to enhance and increase PA participation in adolescence. This was successfully done through a workshop methodological approach in two rounds. The consensus workshop methodology offers an alternative to knowledge development (1,2,3). It offers adolescents an opportunity to improve their PA behavior (15-17;21). Through the participation and collaboration of n=65 in round 1 and n=11-members in round 2, the emerged framework can be viewed as the first port of support for parents and stakeholders. The six themes on which participants were: 1) Key recommended guidelines for adolescents, 2) guidelines for parents, 3) information and resource support, 4) guidelines related to increasing parental involvement, 5) guidelines related to safety and PA environment, 6) sustained PA to take-action options be integrated into a framework for guidelines for parents parenting adolescents to increase PA. The findings of the consensus workshop conform to previous research on family-centred early intervention with children and their families (17-19). (2) Some of our findings have specific bearings on (14) research, such as how it relates to social and emotional support, 3) informed choices, and 5) collaboration between parents and professionals. Firstly, the consensus was reached on resource support for parents. The motivation for this inclusion as agreed upon by all panels was that parents should be provided with guidance, and information and that offer parents support with regards to increasing PA and the type of activities to be included in the resource table 3. Furthermore, panel 1 also indicated that this guideline has the potential to influence policy outcomes. These guideline framework items collaborate with the findings of (20) who put

forward 12 best practice guidelines for infusing parent-professional partnership in the best interest of the adolescent. Secondly, the consensus was reached on Theme 1 and Theme 2 on guidelines for adolescents and guidelines for parents. All the panels agreed that adolescents and parents should be provided with guidelines specific to their age and preferences. The aim of providing guidelines for parents is to encourage parents too involved to participate in PA with adolescents. Based on the specific role and parenting style that would enable or facilitate an increase in PA. This is confirmed by (23) that stated that the warmer parenting style contributes more to positive health outcomes than the stricter more authoritative style. Moreover, (22, 23, 24, 25) confirms that adolescent in a transitional stage of life is vulnerable to external factors influencing them. Thus, a need exists for support from parents, friends, teachers, and communities. shows the role of the parent and the involvement of the parent. Our findings show that parents should receive unbiased support, which includes information, guidance, and guidelines that can increase PA in adolescents. These recommended guidelines to be included in the framework concur with the findings of (2), who found a strong correlation between social support and parental life satisfaction with adolescents. Further recommendations are to include professional support targeting adolescents to increase PA. Previous studies have found that parents' health behavior influences adolescents' behavior (13). The inclusion of this recommendation in the framework of guidelines will go a long way in contributing to the development and increasing PA. In addition, panel 2 further recognized the need in the guidelines for parents to understand how parenting supports adolescents in theme 4. Several studies have suggested that raising a child requires parents to adapt their parenting styles and skills, which would affect the quality of the parent-child relationship and enhance parental involvement in PA. Our framework for guidelines, therefore, has the potential to introduce parents to different parenting styles and to inform them of their role in parenting their adolescents. Thirdly, panels 1 and 2 reached a consensus to include a resource list in the framework for guidelines. This list encompasses accurate information and is well-balanced (18). Such information allows parents to make informed choices and enables them to play an active role in their child's development. In addition, a resource list provided a detailed explanation of the activities needed to increase PA. A resource list allows for collaboration and partnerships between professionals and parents (1). The panel of experts felt that parents should be seen as partners and not mere receivers of information. In the fourth instance, the recommendations were that all safety-related guidelines be consolidated into one section. It became clear that safety was a priority to parents, and experts. A clear distinction was made between personal safety, environmental safety, and safety in the community. Our findings suggest that parents and adolescents must receive guidance and support about safety in the community. Hence, the consensus among the panel of participants highlighted the view that parents should be provided with objective information on a full range of safety options and guidance in the guidelines (1). Our findings are broadly consistent with previous literature. The development of a framework for guidelines is not intended to replace existing professional support offered to parents and adolescents. Rather, the implications of the emerged framework suggest an implementable, practical, content to assist parents in assuming the role of an expert in supporting the adolescent to be active, (17). The framework is based on the daily experiences of adolescents and parents and is aimed at increasing PA. It is envisaged that this study will provide parents and professionals in the field with clear guidelines to be integrated into program delivery and policy development. Furthermore, the study can be viewed as a contribution to the field of physical activity and increasing PA in adolescents. In this study, attempts were made to select expert and stakeholder panels who represented disciplines and constituencies relevant to PA, physical education, Sport Science, and parenting adolescents to increase PA. Parents who participated in the current study (round 2) also participated in Phase 1 of the study. Likewise, the findings of the current consensus workshop highlighted experts' and stakeholders' participation and collaboration to reach a consensus on a set of guidelines to enhance PA participation and increase activity. The participation of experts and stakeholders in the design of the research study underscores the rigor undertaken in reaching consensus in the development of a framework for guidelines. Having reached a consensus on a framework for guidelines, these findings may stimulate practical implementation, thus leading to further research opportunities. These applications include the need for providing training to parents, or the facilitation of parent to adolescent support groups, specific programs engaging fathers and mothers, connecting parents with adolescents, or programs within the domain of adolescent PA. With an understanding of the diverse needs of adolescents and parents in mind, these are but a few insightful recommendations made to facilitate and increase PA.

12. Conclusion

The research study was successfully implemented by employing a consensus workshop to achieve agreement on SIX broad recommendations (6 themes and 51 sub-themes) on specific themes to complement the research on the development of a framework for guidelines to enhance parent involvement in increasing adolescent PA using a consensus workshop. The study highlighted the processes followed in reaching consensus and developing a framework for guideline development. The framework may help to promote a better understanding of the diverse needs of adolescents and parent involvement and practices related to meeting the needs of adolescents and parents. The framework, therefore, builds on what has already been done, strengthens partnerships with adolescents, parents, and between parents and professionals, and provides a framework aimed at effective, adolescent and parent-centred, and strengths-based guidelines.

Recommendations for practitioners

Sports science and practice build on the insights generated herein and incorporate the framework for guidelines for parent involvement to increase PA participation. For instance: 1) assisting parents to adapt their parenting styles and approaches to support adolescents in increasing PA participation; 2) emphasizing and focusing on the barriers to PA and the challenges adolescents are confronted with when participating in PA, and 3) creating awareness of the benefits of PA.

- Professionals (researchers, educators, sports scientists, parents and practitioners, and community workers) working in this context obtain a deeper understanding of the unique experiences and needs of adolescents and thereby provide support to adolescents through guideline development.
- Parents obtain the prerequisite skills to provide support to adolescents through resources provided in the guidelines.
- Continued training and curriculum development take place in the field of PA, with specialized knowledge and skills in parent involvement and increasing PA in adolescence.

Recommendations for future research

It is further recommended that future research be conducted on:

- Overcoming barriers to PA and understanding the needs of adolescents to increase PA. Parenting programs targeting parents and adolescents.
- The role of the mother in PA support offers valuable and unique perspectives and insights.
- The role of the father in PA support offers valuable and unique perspectives and insights.
- The experiences of adolescents with inactive parents. Insight into their lives and growing up in a household with active or inactive parents is an important resource for parents and adolescents.
- Comparative studies comparing the experiences of adolescents in different contexts maybe provide invaluable research and insights.
- The topic in different geographical to identify trends as well as compare parents' and adolescents' challenges, experiences, perceptions, and needs.
- Using technology as a strategy to increase PA.

12. Author Contributions:

The corresponding author and co-author have read and agreed to the published version of the manuscript."

13. Funding: "This research received no external funding"

14. Institutional Review Board Statement: The study is part of a larger study approved by the Research Ethics committee of the University of the Western Cape, Cape Town South Africa.

15. Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

16. Data Availability Statement: Data supporting reported results can be found, on the University of the Western Cape repository.

17. Acknowledgments: The researchers wish to acknowledge and thank the participants and stakeholders in the current study for the contributions made towards developing a framework for guideline development.

18. Conflicts of Interest: The authors declare that no conflicts of interest exist

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CHAPTER 7

SECTION B: CONSENSUS WORKSHOP AND GUIDELINES PRESENTATION

Cozett, C; Roman, N.V. (2022). Recommendations to Enhance Parental Involvement and Adolescent Participation in Physical Activity. *International Journal of Environmental Research Public Health, 19*, 1333-1355.

7.B1 Introduction

Chapters 4, 5, and 6 presented the research that was conducted in Phase 1, comprising stages 1,2,3 of the study. In this chapter, phase 2 stage 1, a consensus workshop was conducted, completing objective 5 of the study, which was *to design guidelines to enhance parent involvement and increase physical activity participation*. The consensus workshop was conducted from the findings of the previous chapters – Chapters 1, 2, and 3. Before the consensus workshop, the researcher drafted the first set of proposed guidelines emanating from the findings of the three previous chapters. In Round 1, of phase 1 concept mapping was used to synthesize results to present in the consensus workshop for a panel of experts to reach a consensus on the recommended guidelines drafted by the researcher and to make any further recommendations. In Round 2, a consensus workshop was held with stakeholders online, to reach a consensus on the first draft of guidelines emanating from the findings of the previous chapters and conducted with the panel of experts. Once consensus was reached, the researcher drafted the final guidelines into a framework of guidelines for adolescents and parents to increase PA participation. This is presented in the current Chapter 7B.

Section B has been submitted for publication to the International Journal for Environmental Research and Public Health and written in article format according to the aim, scope, and format of the Journal of Environmental.

7.B2 Planned Papers

The article was submitted in October 2021 to a special edition of the journal International Journal for Environmental Research and Public Health reference: [IJERPH-IF2.468] Special Issue "Community and In-School Based Physical Activity in Children and Adolescent".

Title: Guidelines to Enhance Parent Involvement and Adolescent Participation in Physical Activity

Authors: Colleen Cozett and Nicollete V. Roman

Affiliation: 1Department Sports Recreation and Exercise Science, University of the Western Cape, Bellville, 7535 Cape Town, South Africa

The aims and scope of the journal are as follows: Children and their health are a pair sometimes difficult to disentangle. Many risk factors do exist, sometimes they are modifiable, like all risk factors with a behavioural component, and sometimes not, like gender. Causal pathways are not always clear, most of the time because of the design of the study.

Thus, research and practice needed at local to international scales include:

- The age of the adolescent related to their health behaviours; examine challenges and opportunities for multi-sectoral adaptation partnerships that benefit children's health;
- Identify, implement, and evaluate the effectiveness of the school's programs;
- Estimate the range of health co-benefits of mitigation policies on health behaviour.

7.B3 Publication details

Title	Recommendations to enhance parental involvement and adolescent participation in physical activity
Authors	Colleen Cozett and Nicollete V. Roman
Journal	International Journal for Environmental Research and Public Health
Journal Details	Peer-Reviewed
Status	Reviewed and final version resubmitted December 2021 for an editorial decision on publication

7.B4 International Journal for Environmental Research and Public Health

The articles in the IJERPH "yield new insight into established human development practices, evaluate new and research.

7.B5 Conclusion

The aim of the study was successfully realized by employing a consensus workshop to achieve agreement on broad recommendations based on specific themes to complement the research on presenting the final guidelines in the current chapter. The development of guidelines for adolescents and parents to increase PA participation: a consensus workshop and recommendations have the potential for partner collaboration between parents, professionals, educators, subject matter experts, and adolescents.

Published Article (IJERPH)

Recommendations to Enhance Parental Involvement and Adolescent Participation in Physical Activity

Colleen Cozett [1,*] and Nicolette V Roman [2]

Citation: Cozett, Colleen .; Roman, Nicollete. V Recommendations to Enhance Parental Involvement and Adolescent Participation in Physical Activity. *Int. J. Environ. Res. Public Health* **2022**, *19*, x. https://doi.org/10.3390/xxxxx

Academic Editor: Paul B. Tchounwou

Received: 29 October 2021
Accepted: 30 December 2021
Published: date

Publisher's Note: MDPI stays neutral about jurisdictional claims in published maps and institutional affiliations.

[1] Department Sports Recreation and Exercise Science, Faculty of Community and Health Sciences, University of the Western Cape, Bellville, 7535 Cape Town, South Africa
[2] Centre for Interdisciplinary Studies of Children, Families, and Society, Faculty of Community and Health Sciences, University of the Western Cape, Bellville, 7535 Cape Town, South Africa; nroman@uwc.ac.za
* Correspondence: colleen.cozett@northlink.co.za

Abstract: Background: Adolescents are influenced by external factors which may impact their level of physical activity. Parents require specific strategies to become involved and to increase physical activity participation in adolescence. Objective: Thus, the current study aimed to design recommendations to increase physical activity participation and parental involvement. Methods: The current study forms part of a broader mixed-method study in which the results of the phases and stages of the pre-studies informed the current study. Thus, the current study uses an agreement workshop to develop recommendations with stakeholder and expert input in two rounds. Participants were invited to participate in the current study N = 100, and n = 65 participated in round one. Round two consisted of N = 20 experts invited to an agreement workshop, with n = 11 attending and making an input on the final recommendations. Therefore, experts and parents in the field of parenting, physical activity, and physical education, were invited to participate in the study rounds. After each round, the responses from the panellists were collated, interpreted, and developed into a framework for recommendations using thematic analysis. Themes were generated and refined using an agreement format. Results: After results from the stages and phases were consolidated and refined, six themes and 51 sub-themes were identified in a framework for recommendations. The framework was further refined using expert input and the final recommendations were derived using an agreement or agreement. Thus, with input from experts input through the agreement workshop, the findings were discussed, refined, and drafted into recommendations. Agreement and agreement were achieved on six broad recommendations and fifty-one sub-themes. The final recommendations were presented in the current study to increase parental involvement and physical activity in adolescents. Discussion: Recommendations and physical activity resources were developed and are presented as a form of support to parents and adolescents. six guidelines with 52 subcategories evolved as guidelines for parental involvement to increase participation in adolescents' physical activity. The recommendations are intended as a source of unbiased information for parents to become more involved and for adolescents to increase physical activity participation.

Keywords: recommendations; adolescent; adolescence; physical activity; physical inactivity; parental involvement

1. Introduction

Adolescence is a transitional phase of growth and development between childhood and adulthood [1]. The World Health Organization defined an adolescent as any individual between the ages 10 and 24 years, and adolescence as a period of life in which adolescents have health and developmental needs [2]. Adolescence can be a time of both disorientation and discovery, a transitional period that can raise questions of independence and identity as adolescents cultivate their sense of self, during which they make choices about physical activity (PA) behavior [3]. It is a time to develop healthy behaviors, knowledge, and skills that will be important later in life. Adolescents account for just over sixteen percent of the global population [3,4]. In reaching the study outcomes, it is important to understand the adolescent phase and the factors influencing physical activity (PA). The parents and immediate family steer the adolescent's development. Furthermore, how adolescents overcome these challenges and how parents become involved in the PA experiences of adolescents are explored in the current study. All the linkages mentioned lead to the development of strategies to increase PA participation and parent involvement in adolescence. Adolescent health has become a global health concern [4]. Understanding adolescent health is vital. Yet, limited empirical evidence on adolescent health presents a gap in the research, which allows for the development of strategies to improve health among adolescents [4]. Many adolescents in both developed and developing countries do not meet the health-related recommendations of engaging in at least 60 min of moderate-to-vigorous daily [5]. Some adolescent health behaviors pose a threat to contracting non-communicable diseases [5]. The health-related behaviors that arise during adolescence can track into adulthood and have health implications [3,7]. Non-communicable diseases (NCDs) are also known as chronic diseases and tend to develop in the long term. NCDs are the result of a combination of genetic, physiological, environmental, and behavioral factors. The statistics on NCDs indicated that they account for more than a third of all deaths in South Africa [6]. Notably, there are increases in risks related to NCDs such as physical inactivity. The development of ill-health as a result of these risky health behaviors adopted throughout adolescence adds to the economic burden of government health aid.

Physical activity is defined as any bodily movement produced by skeletal muscles that require energy expenditure [2,7]. It includes activities undertaken while working, playing, carrying out household chores, traveling, and engaging in recreational pursuits. The term "physical activity" should not be confused with "exercise". Exercise is a subcategory of PA that is planned, structured, repetitive, and aims to improve or maintain one or more components of physical fitness [7, 8, 9, 10]. Globally, 23% of adults, and 81% of adolescents, do not do enough regular PA to meet the global requirements. In most countries, levels of inactivity are higher in girls compared with boys. Levels of inactivity increase with age. It has been shown that regular PA of 60 min during adolescence promotes health and wellbeing [11, 12]. Therefore, ref. [2] recommend that adolescents do at least 60 min of moderate to vigorous-intensity PA daily. Physical inactivity and resultant lower energy expenditure contribute unequivocally to cardiovascular diseases, such as coronary artery disease and stroke, which are considered major causes of disability and mortality worldwide [40]. Moreover, there is strong empirical evidence that inactivity, obesity, and insulin resistance are significant risk factors for the development of Alzheimer's Disease (AD) [41]. Whilst there is considerable evidence that aerobic training, such as running and dancing (and probably other types of aerobic training), may lower the risk of AD, notwithstanding, there is a paucity of evidence that dynamic resistance training, static resistance, and general fitness lowers the risk of AD [40, 41,42, 43]. Despite the widely acknowledged benefits of PA, adolescents engage in far less PA than is recommended [8,9,10]. Physical inactivity is defined as doing very little or no PA at work, at home, for transport, or during leisure time. In [2], it was indicated that around 23% of adolescents were

not active enough globally. In high-income countries, 26% of men and 35% of women were insufficiently physically active, as compared to 12% of men and 24% of women in low-income countries. Low or decreasing PA levels often correspond with a high or rising gross national product. The drop in PA is partly due to inaction during leisure time and sedentary behavior on the job and at home. Likewise, an increase in the use of "passive" modes of transportation also contributes to insufficient PA levels.

In Africa, the situation remains bleak: Only 8–35% of African adolescents engaged insufficient levels of PA for 60 min a day on at least 5 days per week [6,8]. Furthermore, PA has been estimated to be prevalent in 43–49% of South African adolescents. In South Africa, the PA of adolescents tends to decline with age and varies by gender, with boys reporting higher PA levels than girls [9]. While current health-related PA recommendations expect adolescents to be physically active in all domains of life, the majority of studies in Africa have focused mainly on adolescents' overall PA levels. It has been reported from other African countries that less than 50% of adolescents between 13 and 15 years of age are physically active for at least 60 min a day on at least 3 days a week [6,10]. Similarly, in Nigeria, about 72% of school-going adolescents reported engaging in PA at least once a month, 59% engaged at moderate levels, and more than 50% engaged in low levels of PA (Oyeyemi et al., 2016). Insufficient PA is increasing amongst adolescents, with many studies in high-income countries reporting a consequent increase in overweight and obesity [10]. In the South African setting, there is a combined prevalence of overweight and obesity of 15–25% among participants between the ages of 10 and 20 years, a finding that is higher than anticipated. In low and middle-income countries, urbanization and the nutrition transition are largely responsible for the decrease in PA levels. Adolescents do not meet the current PA recommendations of 60 min of moderate to vigorous PA per day. The need for more PA surveillance data from Africa was highlighted [9,10].

The involvement of the parent shapes and influences health behaviors, including PA during adolescence [1]. Thus, the conceptual framework linked to the health promotion theory and the Ecological systems theory poses that PA is a lifelong endeavour. A healthy lifestyle leads to health outcomes that can be beneficial until adolescents reach adulthood. Moreover, the role of the parent in the PA experience of adolescents must be acknowledged. Despite significant research on the broader aspects, parental involvement, parental support, influence, and engagement, the link with parental involvement remains understudied [9]. Several mechanisms through which parents can be involved in PA have been proposed [5,9,10,11]. More specifically, the parent's involvement in the adolescent's PA behavior is vital. According to [12], characteristics of parental involvement include [9,13] family cohesion, meaning how many people in the adolescent's life understand them, how much the adolescent and family have fun together, and how much their family pays attention to them; [14] parental monitoring [15] parental directive behavior related to family rules and boundaries and parental encouragement. The family is the smallest functional unit that instils values in a community. Families refer to societal groups that are related by blood (kinship), adoption, foster care, or the ties of marriage, including civil marriages, customary marriages, religious marriages, and domestic partnerships." The communities within which families exist share characteristics such as social cohesion. Social cohesion is defined as "the result of building shared values and enabling people to have a sense of engagement in a common enterprise-facing shared challenge" [16]. Thus, parents can positively or negatively influence the PA behavior of the adolescent. Adolescents' perceived sense of belonging was found to be beneficial for PA behavior. A recent systematic review highlighted the link between the parents, health behaviors, and parenting approaches. The review highlighted the gap in the literature focusing on the health behavior of adolescents as well as how parents are involved. Farooq [17] confirmed that parental involvement is vital in the PA health behavior in which adolescents engage. The influence of the parent to increase their child's participation in PA was shown to be the strongest predictor of PA [9]. The family remains the nucleus of society and adolescents model the health behaviors of their parents [17]. Thus, parents can play an important role in their child's experience of PA. Parental involvement in PA has a mutual benefit for both the adolescents and the parents. Parental involvement in sports helps with the enrichment of the parents' sports knowledge and creates a link between the parent and adolescent. It opens a platform where parents understand the adolescent more. Parental

involvement plays a role in strengthening parent-child interaction. The parent and the adolescent can talk about important issues related to the child's sporting experience during training sessions and competitions. It also creates time for parent-to-child togetherness. Since parental involvement extends far from only providing the youth with resources, parents supporting adolescents at sports events carry out roles like transporting the child to the sporting facilities and acting as coaches. This offers a space where the child and the parents can spend more time together. Despite numerous advantages that emanate from parental involvement in youth sports and PA, there are reported cases where parental involvement has led to some negative ramifications. An example of this is that parental pressure may cause an adolescent to be less active. It takes a lot of resources to be a sports parent. Therefore, the sports parents are at risk of taking actions that may have negative outcomes.

Thus, the current study placed the adolescent in the context of the phase of adolescence. The issue of physical inactivity was highlighted and its impact on adolescents. Lastly, the role of the parents and parental involvement were described. Therefore, the current study aimed to develop recommendations for enhancing parent involvement and adolescent participation in PA, based on an agreement workshop design using a two-phased approach [18–20]. The two-phased approach was used to involve the participation of [13] a panel of experts, and [14] a panel of stakeholders within the field of physical activity, physical education, parenting, and community development in sport, to assist in reaching an agreement on the recommendations [20]. The current study forms part of a larger study in which the phases and stages of the study were used to develop recommendations. The larger study refers to a full thesis in fulfilment of a PhD in Philosophy. The phases and stages of the overarching study informed the development of recommendations through the processes of data collection and data analysis. The need for parental involvement was highlighted when guiding adolescents to increase physical activity (PA) [13,14]. The role of the parents stems from the foundation and parenting style employed by parents. According to [19–21], an adolescent's well-being was measured through self-esteem (academic, social, emotional, family, and physical). The parent-child parenting style was measured through parental warmth and strictness, and the adolescents' parents were classified into one of four groups (indulgent, authoritarian, authoritative, and neglectful). Remarkably, the greatest personal well-being was found for adolescents raised with higher parental warmth and lower parental strictness (i.e., indulgent), and the greatest social well-being was found for adolescents raised with higher parental warmth. Consistently, poorer personal well-being and social well-being were associated with less parental warmth (i.e., authoritarian and neglectful [19,22]). Parental involvement is defined as parents and other adults who work with or care for adolescents, contributing to developing the recommendations. These adults should be aware that, as children become adolescents, they typically reduce their activity levels. Thus, parents play an important role in providing age-appropriate opportunities for physical activity. In doing so, they help to lay a foundation for life-long, health-promoting physical activity. This influence becomes especially decisive in adolescence since there is evidence that it is a key stage in the adoption of healthy habits [23] and the strengthening of positive PA behavior that contributes to the improvement of adolescents' current and future health [23]. These needs, which were identified and discussed in the finding's chapters, were shared with the participants in the agreement workshop [15,19,20. Through the agreement workshop, the findings were discussed, refined, and drafted into recommendations [21, 22, 23 24]. This framework informed the formulation of the recommendations presented in the current study. It is important to enlighten parents and professionals to understand parental involvement in increasing adolescent PA [25,26]. Thus, these recommendations were aimed at parents to increase involvement and adolescents to increase PA participation using an agreement workshop methodology.

2. Methods and Theoretical Framework

The current study was part of a broader study in which the stages and phases included participants as follows: Phase one, Stage one, review stage (Problem identification), Stage two: Quantitative stage (N = 1000 adolescents and n = 712 final sample), and Stage 3 Qualitative stage (N = 45 adolescents, and n = 35 final sample). Phase two, Stage one, Concept mapping and developing a framework for recommendations using an agreement workshop, Round one, N = 100 parents, stakeholders, and experts and n = 65 final sample (current study), Round two, N = 20 panel of experts and n = 11 attended the final agreement session (current study) and lastly the methodology was based on Stage two: Agreement workshop developing final recommendations. Figure 1 illustrates the broader study framework and the breakdown of the phases and stages to place the current study into context. Thus, the current study is the final manuscript linked to phase two of stage two (agreement workshop).

The current agreement workshop was based on the stages and phases depicted in Figure 1. Thus, an agreement workshop was used as the research methodology in the current study in which theory was built using the results and findings of the pre-studies as a foundation for the current study. Refs. [14,19,22], stated in recent findings on workshops that it is a research methodology that is reliable in producing valid data as it aims to achieve participants' expectancies and to provide reliable information. Therefore, this research study was concerned with including the parents and experts by sharing knowledge to define and understand a problem to find solutions [14,19,22].

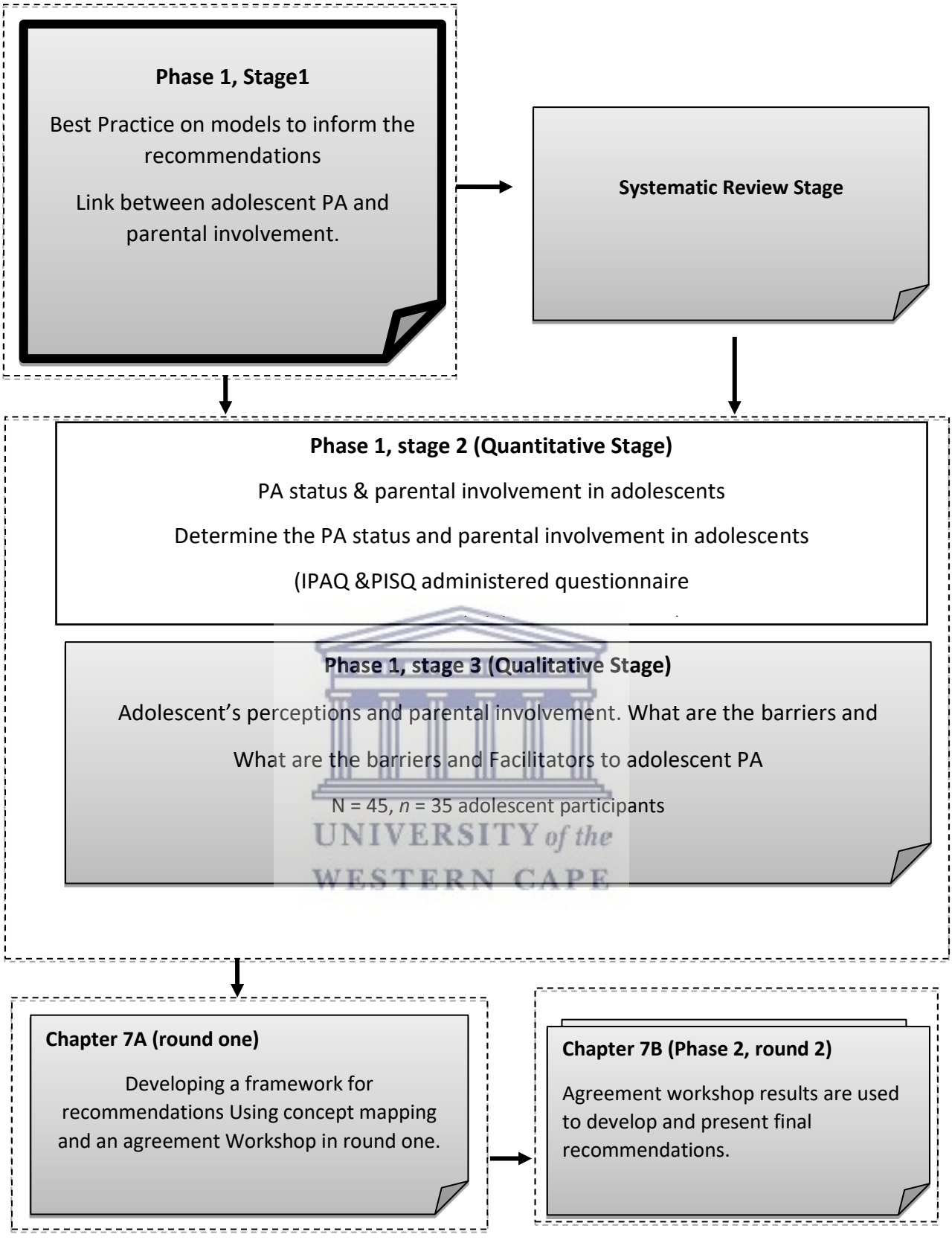

Figure 1. The pre-study plan.

3. Design

An agreement workshop design was conducted to develop recommendations to enhance parent involvement and PA participation in adolescence. The objective of the agreement workshop was to present the key findings of the pre-study with input from a panel of experts and stakeholders and work towards reaching an agreement [27]. The agreement workshop was best suited for agreement building and based on the assumption that group judgments are more convincing than individual judgments [28]. During each round, once group agreement was reached, the process was stopped. This study received ethical approval from the Research Ethics Committee at the University of the Western Cape (ethical clearance number HSS: 17/10/16). Thus, the pre-study findings were consolidated in a concept map, and themes and sub-themes were identified using the framework for recommendations to inform the development of recommendations to increase parent involvement and PA in adolescence.

Inclusion and exclusion criteria

Participants in the current study were as follows: participants who gave consent to participate in the study by completing the participant confidentiality sheet. Furthermore, participants who gave consent and attended the actual session. Participants who were experts in the field of physical activity, parenting, research family studies, and physical education were purposively selected to be in the study. The sessions were held online on Zoom due to the lock-down procedure that existed in the South African context. Participants who did not give consent and who did not attend the online sessions were excluded.

4. Round One: Participant Selection

To ensure a broad perspective on the themes, experts from the schools, communities, and the University of the Western Cape working in the field of physical activity, adolescent health, education, physical education, research, and Sport Science as well as in community development who had relevant knowledge and expertise at the research, clinical and policy level, were invited via email to participate in round one [14]. On the day of the workshop, eleven of the panel of experts attended the workshop online due to the risk protocol in place due to COVID-19. The agreement framework below spells out the participant selection in each round of the study Figure 2.

5. Data Collection

A panel of experts (experts and academics) participated in round one (n = 65), to identify the unclear or ambiguous recommendations as indicated in Figure 2 of the research study. The goals of round one was to share with the panel of experts: (1) the aim and objectives of the current study; (2) the outcomes of each stage in Phase 1 of the research process, which resulted in the 36 recommendations; and based on these, (3) identify themes and sub-themes resonating with the findings. The panel of experts was asked to reach an agreement on each recommended guideline. In round two, N = 20 experts were invited to participate to reach an agreement on the final recommendations. Only n = 11 attended the actual session as indicated in Figure 2. Data collection included participants in the field of PA, physical education, and parenting.

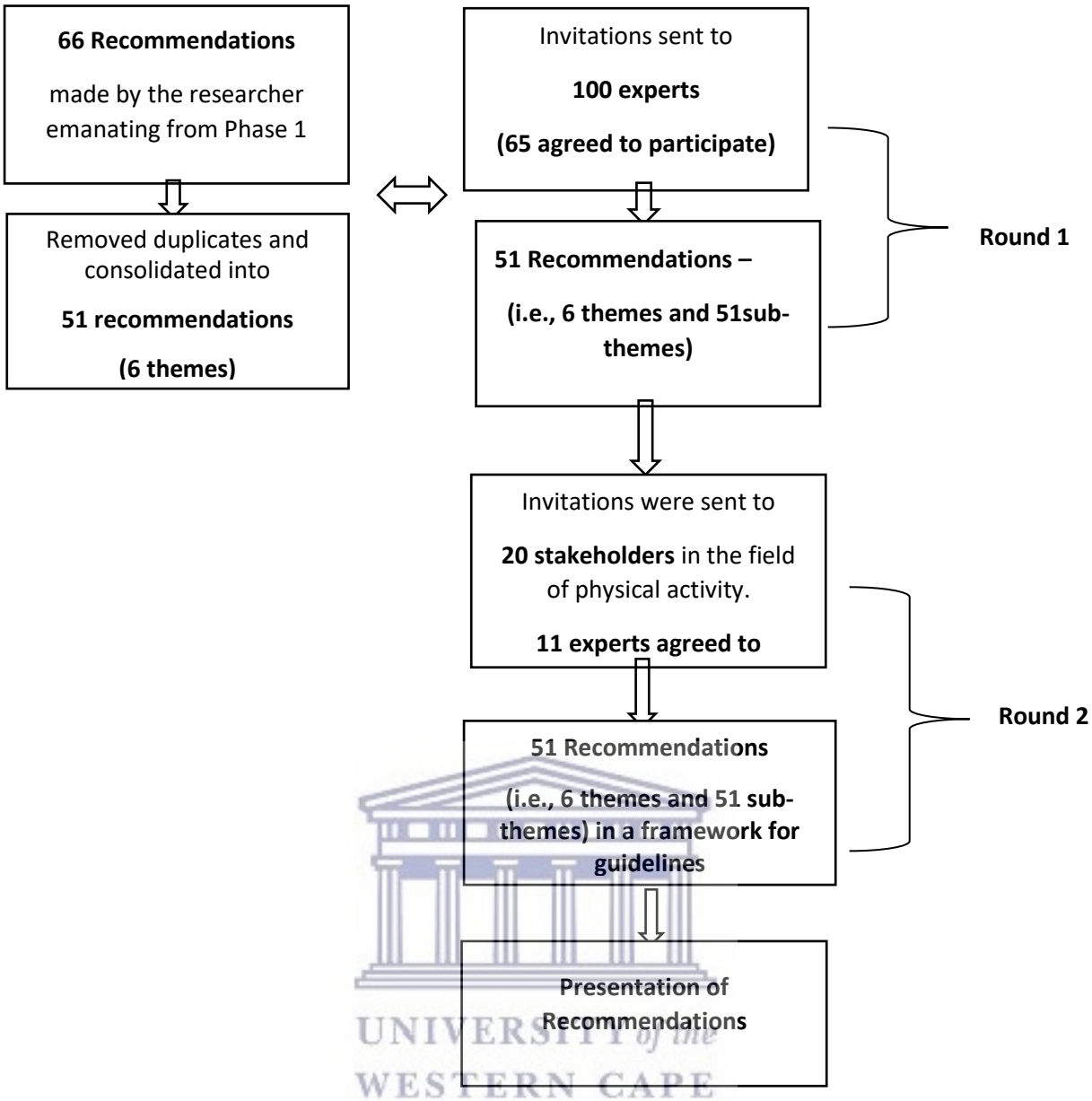

Figure 2. Agreement framework.

5.1. Recommendations from the Ecological systems theory and Health Promotion Approaches.

The current study was developed using an agreement workshop and was grounded in the Health Promotion theory and the Ecological systems theory. It is vital to view the adolescent in the context of the environment and influencing factors that may impact health and wellbeing. From a Health promotion theorist's perspective, recommendations were developed. The various phases and stages in this study informed the recommendations developed. Adolescents participating in health-enhancing PA produce health benefits [5,16–18,22,19]. In this document, the term "physical activity" generally refers to health-enhancing physical activity [6]. Brisk walking, jumping rope, dancing, lifting weights, climbing, cycling, and doing yoga are all examples of physical activity [7,18]. Lifestyle activities that encourage the increase of baseline PA to increase adolescent PA are essential for health [5–7]. Short bouts of activity are beneficial and can accumulate to the recommended number of minutes adolescents must participate in PA [8,9,28,29]. In that way, adolescents can accumulate the recommended daily minutes [8]. Therefore, the availability of infrastructure to support short bouts or episodes of activity is important [17,18]. For example, adolescents should have the option of using sidewalks and paths to walk between buildings at a worksite, rather than

having to drive [7,18]. Therefore, adolescents must be allowed to make healthy lifestyle choices by selecting alternative options [8]. Physical activity is considered an important determinant of health, quality of life, and well-being. World Health Organization [6] defines physical activity as any bodily movement produced by skeletal muscles that require energy expenditure. Physical activity can also be undertaken as a form of movement-transport or house cleaning duties and through play [7,23–26]. All forms of physical activity can provide health benefits if undertaken regularly and of sufficient duration and intensity [7,17–20]. Physical activity is further identified as an essential component of health and inactivity in adolescence may track into adulthood [7]. Health behavior decisions are when an adolescent had the option of taking the stairs instead of using an elevator [9]. Moreover, PA that is fun, social, and leads to enjoyment of the outdoors, improves their PA participation [7,8]. The proposed recommendations encourage PA for any meaningful reasons and the health promotion theory lays the foundation that PA participation should be lifelong. Therefore, the recommendations were developed with a lifespan approach and provided recommendations for adolescents and parents to encourage long-term participation. Physical Activity recommendations must be straightforward and clear while remaining consistent with complex scientific information.

5.2. The Ecological systems theory in practice:

The conceptual framework was based secondly on the Ecological Systems Theory which provided the theoretical foundation on which the recommendations were formulated [10,27]. Thus, the link with the external environmental factors is vital to understanding the case of adolescents. The Ecological Systems Theory was deemed the appropriate theory as it focused holistically on the adolescents, the parents, and the environment. Therefore, adolescents and the recommendations developed are put into practice and action. The Ecological systems theory is based on a model that looks at different levels and how it influences adolescents. The levels in practice are the individual level (Microsystem), Relationship level (Meso-system), Community level (Exo-system), and the societal level (Macro-system). The Chrono-system is linked to the specific phase of adolescence. The adolescent's developmental phase plays a role in the individual and in the context of the current study the adolescents were aged 15 years. Adolescents and parents are influenced by various factors. The factors that influence the unit enable PA or are PA barriers [8]). Thus, the recommendations in practice will provide the parents and adolescents with a resource to overcome the barriers and environmental challenges that hamper PA. In South Africa, the family is viewed as a social system because its members are interdependent and any change in the behavior of one member will affect the behavior of others [2]. The recommendations designed in the current study are intended to provide support to parents to become more involved and adolescents to increase participation. There has been an acknowledgment of the importance of strengthening and building the capacity of parents and caregivers to support adolescents [11]. In terms of the bigger picture, adolescents model the behavior of adults in their lives [8]. An agreement workshop design was used to develop recommendations for reaching an agreement on the proposed recommendations. The objective of the agreement workshop was to present the key findings of Phase 1 and engage with the panel of experts and stakeholders and work towards reaching an agreement. Building agreement was the best method to take decisions on the recommendations for inclusion and was based on group judgments which are more convincing than individual judgments [12,14,18,29]. During each round, once group agreement was reached, the process was stopped. Furthermore, Figure 3 below illustrates the adolescent and how the various systems play a role such as the Macro, Micro, and Meso systems.

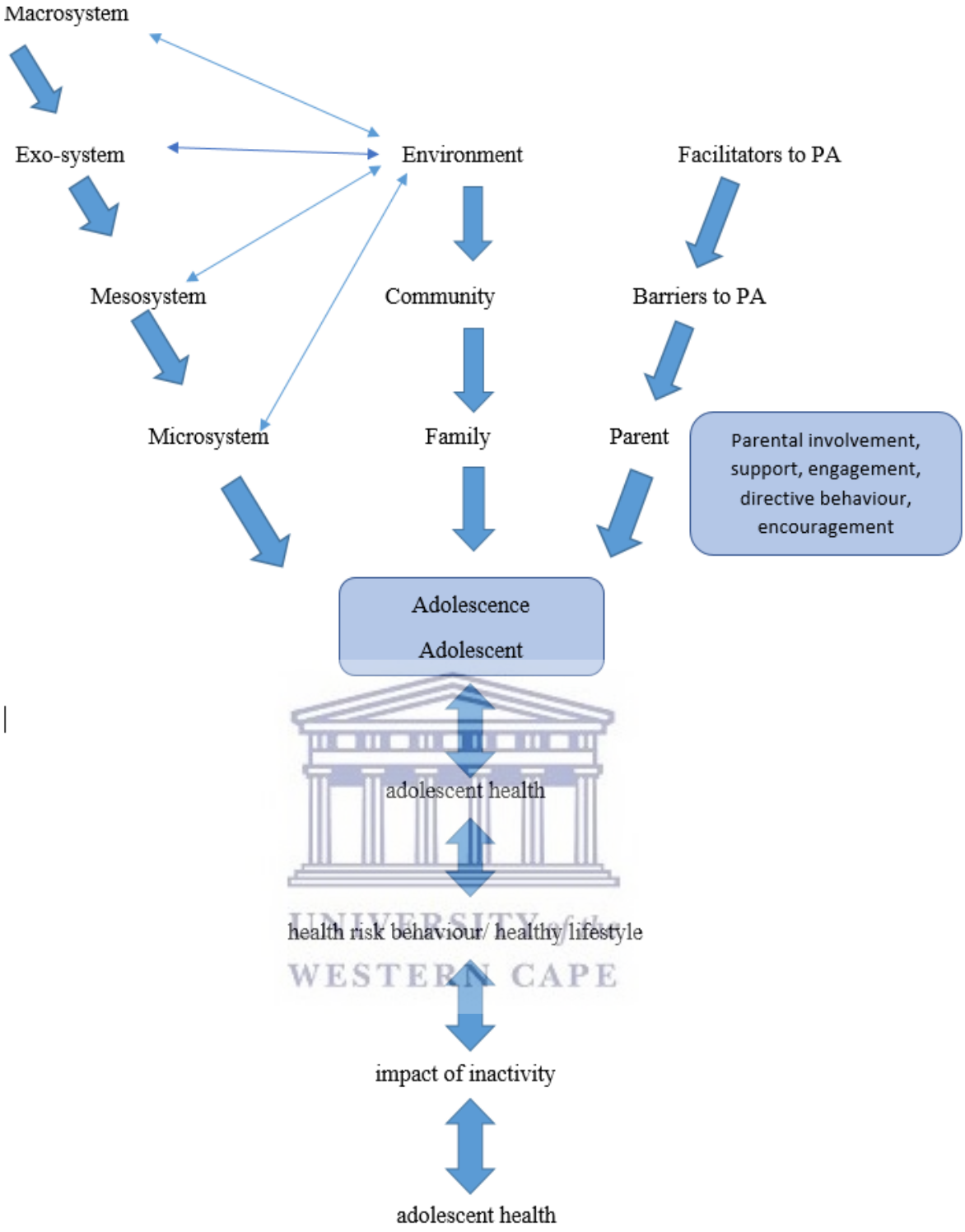

Figure 3. Environmental factors impacting adolescents.

5.3. Participant selection and data collection processes

Figure 1 illustrates the participant selection and data collection in each round. The participant selection process took place in each phase and round of the current study using purposive sampling methods. Figure 1: The agreement framework is found in the addendum for the current study. The participants in the final selection included 20 experts and parents and researchers from the University of the Western Cape working in the field of physical activity, adolescent health, education, physical education, research, and Sport Science. The panel had a wealth of knowledge in the field of community development and expertise in physical activity at the level of research, clinical, and policy level. The stakeholders were invited via email to participate in the round [29]. On the day of the workshop, eleven of the panel of experts attended the workshop online due to the risk protocol in place due to COVID-19 and n = 11 participated.

6. Results

The findings of the rounds, phases, and stages focussed on six themes which were identified: key recommended recommendations for adolescents; recommendations for parents; information and resource support; recommendations related to increasing parental involvement; recommendations related to safety and PA environment; sustained PA to act. Based on these key findings of the current study, the developed recommendations intended to increase parental involvement and PA participation in adolescents. An agreement was reached. Based on the 12 recommendations and 66 sub-themes recommended in Phase 1, the three themes and their corresponding sub-themes that were identified in Phase 1 were agreed upon by the panel of experts. However, the panel strongly argued for the inclusion of a list of recommendations specifying the actual activities for increasing physical activity and to provide parents and adolescents with specific support due to clarity needed with the terms and concepts of physical activity. Thus, the proposed 12 recommendations were consolidated into six themes and 52 sub-themes are presented in summary in Table 2, meaning 14 items were removed and reasons are indicated in the table (items removed: 5, 6, 13, 14, 15, 34, 42, 44, 46, 47, 51, 53, 52, 62). The six themes included due to recommendations made by panellists were namely:

1 Six themes were identified after stakeholder and expert input in the final round:
2 Key recommended Recommendations for adolescents
3 Recommendations for parents
4 Information and resource support
5 Recommendations related to increasing parental involvement
6 Recommendations related to safety and PA environment
7 Sustained PA to take-action

Table 1 illustrates the themes and sub-themes in the framework for recommendations with all the items included. The 14 items have already been removed (5, 6, 13, 14, 15, 34, 42, 44, 46, 47, 51, 53, 52, 62) after stakeholder and expert input was made.

Table 1. Themes and sub-themes in a framework for recommendations.

Themes and Sub-Themes
Theme 1 A: Key recommendations for adolescents
Adolescents should do:
60 min of Physical Activity (PA) activity per day for 3–5 days.
Parents should participate for 150–300 min for 3–5 days per week.
20-min bouts of PA have a cumulative effect.

Theme 1 B: Key recommendations for parents
Help adolescents set realistic PA goals.
Make use of a variety of PA options.
Free-play remains a popular option.
Parents to create opportunities for social PA settings.
Get involved and set realistic goals.

Theme 3: Resource for parents: Physical activity preferences
Type, examples, duration intensity, level of PA (Activity-Table included below)

Theme 4 A: Parental involvement Recommendations
Be actively involved in school sports.
Be involved with planning for PA and preparation before events.
Go and watch them participate (spectator parents).

Theme 4 B: Parental involvement Recommendations
Show an interest in what adolescents do.
Respect adolescent's choices PA.
Participate in PA with your adolescent.
Allow adolescents to choose/select their activities.
Parents support adolescents with sports equipment, financial support, transport fees, and support with overcoming barriers to participation.
Personal protective gear is something worn by a person to protect a specific body part: (helmets, eyewear, goggles, shin-guards, elbow and knee pads, and mouth-guards masks).

Theme 4 C: Parental involvement Recommendations (Directing behavior)
Set realistic boundaries for PA participation.
Open communication with adolescents is needed to establish: Ground rules, Curfews, Boundaries, PA time, and Limit screen time/sedentary time.
Parents listen to their adolescents too they are savvy and knowledgeable.

Theme 4 D: Parental involvement Recommendations (Parental encouragement)
Provide positive feedback and motivate adolescents.
Good role models in parents, caregivers, and teachers should model and encourage an active lifestyle for children.
Praise, reward, and encourage adolescents to be active.
Being active as a family is a great way to model and encourage physical activity.

Theme 4 E: Parental involvement Recommendations (Parental awareness of the benefits)
Improved cognitive function.
Reduced risk of cancer.
Brain health benefits and improved cognitive function.
Reduced anxiety and depression risk.
Improved sleep and quality of life.
Both aerobic and muscle-strengthening physical activity is beneficial.
The health benefits for people with chronic health conditions.
endorphins/feel good/self-concept/self-image
Theme 5 A: Safe PA in stressed environments
PA risks must be understood by parents.
Select types of PA that are appropriate for the level of fitness.
Screen the PA environments for safety risks. know what they want to do.
Consult a health care professional before starting with PA if adolescents have health conditions (types and amounts of PA).
Theme 5 B: Safe PA in stressed environments (Personal safety)
Parents assist adolescents with sensible choices (when, where, and how to be active).
Teach adolescents to be aware of their surroundings and to be alert and avoid risky situations.
Establish a buddy system for PA.
Join a walking bus to and from school.
Theme 5 C: Safe PA in stressed environments (Personal safety)
Physical separation from motor vehicles and awareness of surroundings.
Choose places that are well lit.
Following rules and safety rules is the best way to reduce activity-related injuries.
Theme 6 A: Sustained PA (Taking-Action)
Provide time for both structured and unstructured PA
PA through break time/recess.
The use of technology and digital tools to use during PA sessions is preferred by adolescents.
Online activities yoga, games, and programs would interest adolescents
Theme 6 B: Sustained PA recommendations
Start gradually and be consistent.
Start PA at a young age and make it a lifestyle.

Everyone has a role to play:

11. Schools and Communities
12. Faith groups
13. Businesses
14. Civic organizations
15. Parent-teacher associations
16. Health groups and
17. Public safety agencies
18. Policymakers

Guideline development

Responses by participants led to the 66 recommendations made in Phase 1 of the study, and responses to the set of questions corresponded with these recommendations from a sample of n = 65. Further suggestions were received from the 11-member panel of experts in the second round. Due to similar and overlapping themes, the panel of experts agreed to the merging of several of the recommendations proposed in round one, which resulted in 12 themes consolidated and 14 sub-themes being removed. The 12 main themes were consolidated into six themes and 51 sub-themes were included. Furthermore, based on evidence from round one, the agreement was reached to include a parental resource table A3 under the overarching theme of resource support. In essence, there was unanimous agreement by all the experts concerning these recommendations. Additional comments from the panel of experts included a request for clarification on the term: "PA definitions in the resource table included." The researcher combined the feedback on the recommendations made and included it in the report. The second round elicited a further two recommendations from the 11-member panel of stakeholders. The addition of the two recommendations was based on the evidence of the research undertaken in round one. Participants felt that parents should be made aware of the benefits of PA and definitions of PA. Table 1 illustrates the progress and recommendations made through the 2-round Agreement workshop process leading to the final framework for recommendations. The comments from participants and confirmations of recommendations for inclusion are included in Table 1. The recommendations below were designed for adolescents. Thus, recommendations were developed for parent's involvement and adolescents according to (1) Key recommended Recommendations for adolescents, (2) Recommendations for parents, (3) Information and resource support, (4) Recommendations related to increasing parental involvement, (5) Recommendations related to safety and PA environment, and (6) Sustained PA to act. An agreement rating below 70% was excluded.

7. Key Recommendations are Presented

7.1. Recommendations for adolescents

What parents need to know about guiding adolescents is that understanding physical activity concepts and definitions and being involved by supporting adolescents can be a daunting task. It may leave parents feeling uncertain about what the correct information is that applies to increasing physical activity in adolescents. Parents commonly ask questions and make statements such as: What can I do to help?; I need the information to help my child/adolescent. Consequently, they may have many unanswered questions. Questions asked by parents frequently include: "How long should my child be active?"; "What do you mean by recommended minutes of activity?"; "What activities are appropriate for an adolescent?" What parents need to know is that adolescents need to accumulate 60 min of activity of 20 min bout/sessions of activity to accumulate the recommended daily minutes. Regular participation in physical activity (PA) in adolescence can help reduce the risk of several chronic diseases (e.g., cardiovascular diseases, diabetes, certain cancers, hypertension, osteoporosis) and premature death in youth [31]. It can also promote healthy physical (e.g., build muscle, improve flexibility, maintain a healthy weight), psychological (e.g., reduce symptoms of stress, anxiety, and depression, enhance self-esteem), and social development (e.g., foster supportive relationships, reinforce a sense of belonging) in adolescents [32,33]. Physically active adolescents

have reduced symptoms of anxiety and depression [32,33]. Moreover, physical activity is associated with improved mental health, and improved quality of life [32,33]. Physical activity recommendations provide parents with PA guidance about time, duration, intensity, and types of activities. The involvement of parents to create opportunities for PA and supporting PA recommendations to increase PA is pivotal Centres for Disease Control and Prevention [28]. Therefore, the following six recommendations and sub-recommendations are stipulated for adolescents and parents below.

7.2. Key Recommendations for adolescents

- Recommended physical activity (PA) recommendations for adolescents include moderate- and vigorous-intensity physical activity for periods that add up to 60 min (1 h) or more each day. The concept of "informed choice" is fundamental, as parents need comprehensive, meaningful, and evidence-based information to make the appropriate choices when it comes to their child.
- Recommended physical activity (PA) recommendations for parents include moderate- and vigorous-intensity physical activity for periods that add up to 150–300 min for 3–5 days per week.
- Adolescents should do: 60 min of Physical Activity (PA) Parents should participate for 150–300 min for 3–5 days per week.

7.3. Recommendations for parents

Parental involvement in the adolescent's early years of development makes a positive difference and enhances family and communication interaction [35].

- Parents should help adolescents to set realistic goals. The goals set should assist adolescents to reach short-term, medium-term, and long-term PA goals. Goals should be realistic in that it is measurable, reachable, and attainable. Help adolescents set realistic PA goals.
- Parents are instrumental in ensuring that free play remains a popular option to select as PA. Parents can create safe opportunities and supervise activities to ensure that adolescents can play freely. In this way, parents and adolescents devise plans together and opportunities for free and social PA settings.
- It is important for parents to ensure that PA and social activities created for parents are based on a variety of options. Adolescents need fun and variety to keep them invested in being active. Changing it up and surprising adolescents by doing a variety of activities can help adolescents to have a selection of safe options to choose from to be active.

7.4. What are the activities to do with my adolescent?

The answer to the question above is in Table 2, which was developed specifically for parents to guide adolescents. The table developed by stakeholders, parents, and researchers provides specific recommendations about the following: type of activities, duration of time to participate, and the intensity of how hard the adolescent must work. Parents can be involved in the PA lives of adolescents in the following ways:

Table 2. Physical activity resource.

Type of Activity Including Definition and Example	Frequency (How Often)	Duration (How Long to Do the Activity)	Intensity (How Hard to Work)
Aerobic activities are defined: as activities that make the heart beat faster. **Example**: run, brisk-walk, walk, swim, hiking, dance, free-play, skipping, gymnastics	3 days Per week	60 min per session, or, 20 min-bouts of activity repeated 3 times.	Moderate or vigorous activity depends on your fitness level. Start slow and build up gradually.
Muscle-strengthening activities are defined: as activities linked to strengthening the muscles. **Examples**: climbing activities making use of one's body weight.	2 days Per week	20 min-bouts of activity repeated 3 times. Start slow and build up gradually.	Moderate or vigorous activity depends on your fitness level. Start slow and build up gradually.
Bone strength activities are defined as activities selected by adolescents in the findings of the study and categorized here as bone strength. **Examples:** jumping jacks, running, brisk walking, activities using one's body weight, pushing and lifting activities, moderate and vigorous housework, Tennis, hopscotch, and free-play.	2 days Per week	20 min-bouts of activity repeated 3 times. Start slow and build up gradually.	Moderate or vigorous activity
Balance and flexibility activities: activities preferred by adolescents in the current study and categorized here as balance and flexibility activities. **Examples:** movement and rhythmic movement activities, dance, gymnastics, whole-body stretching, walking the line, walking backward in free-play, balancing on one leg, proprioception, and balancing on foam.	Do these activities daily	bouts of activity, start slow and build up gradually.	Moderate or vigorous activity
Warm-up and cool-down are defined as light activities used to prepare the body for an activity session. It can take the form of active warm-up or passive warm-up activities. Example: walking on the sport, cycling slow and gradually warming the body up. The aim is that the heart rate must increase gradually. Cooling down helps to lower the heart rate. Cooling down and stretching combine to help alleviate muscle aches and pains.	Daily before and after every session	5–15 min before and after every session.	Light

7.5. Parental involvement Recommendations

- Be involved with planning for PA and preparation before events. Meaning, that if the adolescent is participating in a school or community sport or PA event, parents can assist and get involved. If the parents know the school schedule, dates, and times on a notice board or fridge, iron the uniform, pack the sports bag, a reminder of practice or game times, and prepare and buy snacks.
- Be actively involved in school sports.
- Parents can be actively involved by checking in with the coach.
- Parents can be involved by responding to school letters.
- Parents can be involved by volunteering to assist at school sports events if possible.
- Parents become spectators. Adolescents feel encouraged and supported if their parents watch their games. Go and watch them participate (spectator parents).

7.6. Parental involvement (support Recommendations)

- Adolescents feel supported if parents are involved by participating in PA with adolescents for fun. Participating in PA with adolescents can become a bonding experience for parents and adolescents. It allows for adolescents to test their boundaries in a fun way and parents can oversee but take a lesser role in a game and let adolescents lead.
- Parents can support adolescents by buying their sports equipment, fees for transport to events, taking them to events, financial support, and support with overcoming barriers to participation. Support adolescents by showing an interest in their PA.
- Parents can become more involved and show support by respecting adolescents' choices for PA. Therefore, parents could guide adolescents, but, at times allow adolescents to select their PA and make their own choice too. It will teach adolescents PA autonomy.
- Parents should show support by ensuring that adolescents wear the correct personal protective gear or masks is something worn during COVID 19. Other types of protection in sport refer to specific body parts: (helmets, eyewear, goggles, shin-guards, elbow and knee pads, and mouth-guards masks).

7.7. Parental involvement Recommendations (directing behavior)

- Adolescents are in a phase of life where they tend to test boundaries. Therefore, it is important that parents set realistic boundaries for PA participation and in terms of rules. Rules and boundaries need to extend inside and outside the family home. The reason for this is that adolescents face a multitude of factors that influence them personally, socially, and environmentally. Therefore, rules and boundaries need to be set and parents and adolescents can collaborate and take ownership of the actions taken.
- Parents need to establish open communication channels with adolescents in a collaborative spirit to develop ground rules, curfews, boundaries, PA time, and limited screen time/sedentary time. If the decisions and consequences are agreed upon by all parties the chances that it will be sustained are more likely. Parents need to be consistent when applying decisions.
- Adolescents are savvy and parents are quick to note that at the times they find out their adolescent has skills unknown to them. Parents are advised to listen to their adolescents as adolescents are aware that they are adapting to an ever-changing environment under challenging circumstances. Therefore, let us give adolescents some credit; trust them to navigate the challenges by learning to take appropriate PA decisions.

7.8. Parental involvement (encouragement)

- Adolescents model the physical activity behavior of parents. Being active parents allows the adolescent to model positive behavior and it is therefore encouraged. Good role models such as parents, caregivers, and teachers encourage an active lifestyle for children.
- Parents are a source of encouragement to adolescents and do it through praise, reward, and encouragement of positive PA behavior.

7.9. Parental involvement (awareness of physical activity benefits)

Adolescents who are physically active experience the following benefits:

- Adolescents experience aerobic (heart) and muscle-strengthening physical activity which is beneficial long-term.
- Physical activity leads to health benefits for people with chronic health conditions such as high blood pressure and diabetes and a reduced risk of cancer.
- Adolescents who participate get to feel good because of the release of endorphins.

- Improved self-concept, self-image, and reduced anxiety and depression risk. Improved sleep and quality of life.
- Physical activity creates an opportunity for positive peer interaction and social acceptance. Therefore, it helps adolescents feel like they fit in socially.

7.10. Personal and community safety

- Teach adolescents to be aware of their surroundings and to be alert and avoid risky situations. Establish a buddy system for PA.
- Join a walking bus to and from school. Parents assist adolescents with sensible choices (when, where, and how to be active).
- Choose places that are well lit. Following rules and safety rules is the best way to reduce activity-related injuries. Physical separation from motor vehicles and awareness of surroundings.

7.11. Sustained physical activity Recommendations (Taking-Action)

- Provide time for both structured (formal) and unstructured (fun) physical activity.
- Physical activity such as online activities, active digital games, yoga, games, and programs would interest adolescents.
- The use of technology and digital tools to use during sessions is preferred by adolescents.
- Parents and adolescents should remember to start any new activity gradually and be consistent. It takes approximately six weeks to truly say that a lifestyle change has happened.
- Physically active lifestyle changes must be made from a young age and stick with them.
- Everyone has a role to play: schools; communities; faith groups; businesses; civic organizations; parent-teacher associations; health groups; public safety agencies; policymakers.

7.12. Resource support and Recommendations for parents

- It is important that parents are provided with information about how to support adolescents in enhancing PA participation. This will in turn assist parents to be more confident and aware of the strategies to use to increase PA by getting more involved in the needs of the adolescents.
- Information in the form of recommendations will assist parents to cope and enable them to make more informed decisions and choices, and thereby become actively involved in all aspects of setting objects for adolescents, preparing for participation, planning, and being aware of the benefits of PA and safety precautions and how to ensure PA safety. Parents should be proactive and ask questions, as information in the form of recommendations can assist parents to become self-reliant, leading to parent confidence and exercising of own judgment in line with informed (parenting) choices.
- Parents must be informed and become the expert in the home to provide support, encourage, guide, and set realistic boundaries for PA. They should not readily accept or rely on professionals to make decisions on their behalf. Instead, the sourcing of information such as the current recommendations provides parents with an opportunity to have the information.
- In becoming the experts on their children's PA future, parents should elicit professional support that is empathetic and unbiased to adolescents**.** Often, parents become strongly influenced by the information they receive from professionals and tend to follow such information relentlessly. In the case of the adolescent, we suggest that PA should be fun and a variety of strategies are possible to achieve success.

- The current Table 2 clarifies basic activities and provides an easy-to-follow template of possible activities for parents to guide adolescents.

The resource Table 2, p.15 provides information regarding:

- frequency of activities
- duration of activities
- intensity of activity

7.13. Support Recommendations to parents

- Support to parents should be objective and unbiased information must be provided.
- The current recommendations could be provided in an article format, a poster format, a flyer format, or electronic format on WhatsApp, by sharing information in live videos to reach parents or newsletters printed and electronic versions, visual and electronic formats.
- Regardless of the modality of communication chosen, support the communication option chosen by parents.
- Adopt an open and flexible attitude that reflects a non-judgmental approach to parents' decisions on the communication options for their adolescents.
- Make every attempt to spread awareness by finding innovative ways to reach parents and share information, regardless of their socio-economic status, income, or geographic location.

8. Discussion

The purpose of the current study based on an agreement workshop was to develop recommendations for increasing parental involvement and increasing PA participation in adolescence. This was successfully done through a workshop methodological approach using principles of action research in rounds, stages, and phases. Action research offers an alternative to knowledge development. It offers marginalized groups the opportunity to improve their situation [18,20]. Through the participation and collaboration of 11-members in a panel of experts and a 65-member panel of stakeholders, the emerged framework can be viewed as the first port of initial support for parents and stakeholders. In meeting the aim of the research study, the agreement was reached that the following agreed-upon recommendations: (1) Key recommendations for adolescents, (2) recommendations for parents, (3) information and resource support, (4) Recommendations related to increasing parental involvement, (5) Recommendations related to safety and PA environment, (6) Sustained PA to take-action options be integrated into a framework for recommendations for parents parenting adolescents to increase PA. The final recommendations developed through a process of the agreement provide a parent-centred and adolescent-centred approach to guideline development. Input into the development of recommendations was made by adolescents in phase one and parents in phase 1. Some of our findings have specific bearings on [30] research, such as how it relates to social and emotional support, (3) informed choice, es and (5) collaboration between parents and professionals. Firstly, assent was reached on resource support for parents. The motivation for this inclusion as agreed upon by all panellists was that parents should be provided with guidance, and information and that offer parents support with regards to increasing PA and the type of activities to be included in the resource table 2. Furthermore, panel 1 also indicated that this guideline has the potential to influence policy outcomes. These recommendations collaborate with the findings of [18,37] who put forward 12 best practice recommendations for infusing parent-professional partnership in the best interest of the adolescent. Secondly, the agreement was reached on Theme 1 and Theme 2 on recommendations for adolescents

and recommendations for parents. All the panellists agreed that adolescents and parents should be provided with recommendations specific to their age and preferences. The aim of providing recommendations for parents is to encourage parents to be involved and participate in PA with adolescents [1–7]. Our findings show that parents should receive unbiased support, which includes, guidance and recommendations that can increase PA in adolescents. These recommended recommendations have a strong correlation between social support for parents and increasing PA in adolescence [9–13]. Further recommendations are to include support strategies targeting adolescents to increase PA. Previous studies have found that parents' health behavior influences adolescents' behavior [18,38]. The inclusion of recommendations contributed to the development and increasing PA. In addition, panel two further recognized the need in the recommendations for parents to understand their parenting support to adolescents in theme 4. Several studies have suggested that raising a child requires parents to adapt their parenting styles and skills, which would affect the quality of the parent-child relationship and enhance parental involvement in PA. Our framework for recommendations, therefore, has the potential to introduce parents to different parenting styles and to inform them of their role in parenting their adolescents. Thirdly, panels 1 and 2 reached an agreement to include a resource list in the framework for recommendations. This list encompasses accurate information and is well-balanced [18,19]. Such information allows parents to make informed choices and enables them to play an active role in their child's development. In addition, a resource list provided a detailed explanation of the activities needed to increase PA. A resource list allows for collaboration and partnerships between professionals and parents [18,20]. The panel of experts felt that parents should be seen as partners and not mere receivers of information. In the fourth instance, the recommendations were that all safety-related recommendations be consolidated into one section. It became clear that safety was a priority to parents, and experts. A clear distinction was made between personal safety, environmental safety, and safety in the community. Our findings suggest that parents and adolescents must receive guidance and support about safety in the community. Hence, the agreement among the panel of participants highlighted the view that parents should be provided with objective information on a full range of safety options and guidance in the recommendations (1). It is envisaged that this study will provide parents and professionals in the field with clear recommendations to be integrated into program delivery and policy development. Furthermore, the study can be viewed as a contribution to the field of physical activity and increasing PA in adolescents. In this study, attempts were made to select expert and stakeholder panellists who represented disciplines and constituencies relevant to PA, physical education, Sport Science, and parenting adolescents to increase PA. Parents who participated in the current study (round two) also participated in Phase 1 of the study. Likewise, the findings of the current agreement workshop highlighted experts' and stakeholders' participation and collaboration to reach an agreement on a set of recommendations to enhance PA participation and increase activity. The participation of experts and stakeholders in the design of the research study underscores the rigor undertaken in reaching an agreement on the development of a framework for recommendations. Having reached an agreement on a framework for recommendations, these findings may stimulate practical implementation, thus leading to further research opportunities. These applications include the need for providing training to parents, or the facilitation of parent to adolescent support groups, specific programs engaging fathers and mothers, connecting parents with adolescents, or programs within the domain of adolescent PA. With an understanding of the diverse needs of adolescents and parents in mind, these are but a few insightful recommendations made to facilitate and increase PA.

9. Conclusions

The research study was successfully implemented by employing an agreement workshop to develop recommendations. These recommendations have been designed to enhance parent involvement and increase adolescent participation in PA. Their purpose is to foster parents' and adolescents' understanding of the risks of an inactive lifestyle and how to find ways and strategies to get involved to support adolescents to increase PA. The 6 recommendations highlighted support for parents and adolescents, namely: (1) Key recommended Recommendations for adolescents, (2) Recommendations for parents, (3) Information and resource support, (4) Recommendations related to increasing parental involvement, (5) Recommendations related to safety and PA environment, (6) Sustained PA to take action. It is hoped that these six recommendations and specific focus areas will provide parents and adolescents with support strategies related to increasing PA and enhancing parental involvement. Furthermore, it includes parents and practitioners working collaboratively in the best interest of the adolescent, which promotes a better understanding of the diverse needs of parents and adolescents to increase PA. It allows professionals to develop an awareness of increasing PA, and parental involvement and to build upon strengths to meet adolescents' needs.

10. Recommendations for Practitioners

It is recommended that:

- Sports science and practice build on the insights generated herein and incorporate these recommendations in their practices, focusing on specific areas relevant to parent involvement to increase PA participation. For instance: (1) assisting parents to adapt their parenting approaches to support adolescents in increasing PA participation; (2) emphasizing and focusing on the barriers to PA and the challenges adolescents are confronted with when participating in PA, and (3) creating awareness of the benefits of PA.
- Professionals (researchers, educators, sports scientists, parents and practitioners, and community workers) working in this context obtain a deeper understanding of the unique experiences and needs of adolescents and thereby provide support to adolescents through guideline development.
- Parents obtain the prerequisite skills to provide support to adolescents through resources provided in recommendations.
- Continued training and curriculum development take place in the field of PA, with specialized knowledge and skills in parent involvement and increasing PA in adolescence.
- Adolescent–parent-centred support should be linked to macro systemic, meso, and micro support, such as linked to the adolescent.
- The Department of Education (WCED) uses the insights generated herein as a framework or foundation to design and develop relevant and suitable programs to meet the needs of adolescents and parents to increase PA.
- The study will be disseminated

11. Recommendations for Future Research

It is further recommended that future research be conducted on:

- Overcoming barriers to PA and understanding the needs of adolescents to increase PA.
- Parenting programs targeting parents and adolescents.
- The role of the mother in PA support offers valuable and unique perspectives and insights.
- The role of the father in PA support offers valuable and unique perspectives and insights.

- The experiences of adolescents with inactive parents. Insight into their lives and growing up in a household with active or inactive parents is an important resource for parents and adolescents.
- Comparative studies comparing the experiences of adolescents in different contexts maybe provide invaluable research and insights.
- The topic in different geographical areas in South Africa, to identify trends as well as compare parents' and adolescents' challenges, experiences, perceptions, and needs.
- The topic through collaborative research at the university level, among organizations of the PA, not only in South Africa but across the African continent.
- Using technology as a strategy to increase PA.

12. Study Limitations

The following limitations were encountered in this study:

- COVID-19 became a limitation that had to be overcome. The lockdown period occurred amid the data collection and final workshop rounds in the current study. Therefore, major rearrangements had to be made to ensure social distancing was adhered to and protocol followed. Therefore, the workshop was held on Zoom and recorded for transcription.
- The study was conducted in Cape Town, one region of South Africa. The findings may therefore not be generalizable to other regions of the country.

Author Contributions: "The corresponding author and co-author have read and agreed to the published version of the manuscript. All authors were involved in the conceptualization, and methodological development; software development; validation; formal analysis, investigation, and data curation. The original writing draft preparation; review; editing; visualization was finalized by both authors. Supervisor N.V Roman supervised the project and Colleen Cozett PhD candidate was the corresponding author. All authors have read and reviewed the final version of the manuscript."

Funding: This research received no external funding.

Institutional Review Board Statement: The study is part of a larger study approved by the Research Ethics committee of the University of the Western Cape.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data supporting reported results can be found, in the University of the Western Cape repository. including links to publicly archived datasets analysed or generated during the study.

Acknowledgments: The researchers wish to acknowledge and thank the participants and stakeholders in the current study for the contributions made towards developing a framework for guideline development.

Conflicts of Interest: The authors declare that no conflict of interest exists.

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CHAPTER 8

DISCUSSION, RECOMMENDATIONS, LIMITATIONS, AND CONCLUSION

8.1 Introduction

Chapter eight concludes the thesis. This two-phase study aimed to present a set of guidelines to increase PA and parental involvement in adolescence in two phases and 5 stages. In the two phases, a theoretical framework was the foundation that had an imperative role in addressing physical inactivity and developing guidelines to increase PA. Phase 1 consisted of three stages, (stage 1: Systematic review, stage 2: Quantitative stage, stage 3: Qualitative stage). Phase 2 consisted of two stages of guideline development (stage 1: Consensus workshop-developing a framework for guidelines using concept mapping and stage 2: Consensus workshop presenting the final guidelines). The study addressed the research question: What are the required guidelines to improve parental involvement and adolescent physical activity amongst adolescents? In chapter 8, an integrative summary of the four studies contributing to the research project is presented and discussed. The results of this study indicated that parents appear to be enablers to increase PA, (Parrish et al., 2020). The integrative summary links with the theoretical framework presented in the current study which presented the health promotion theory and the ecological systems theory (Bronfenbrenner, 1979). The integrative study outcomes are plotted in Table 8.1 and the study plan is revisited in figure 8.1.

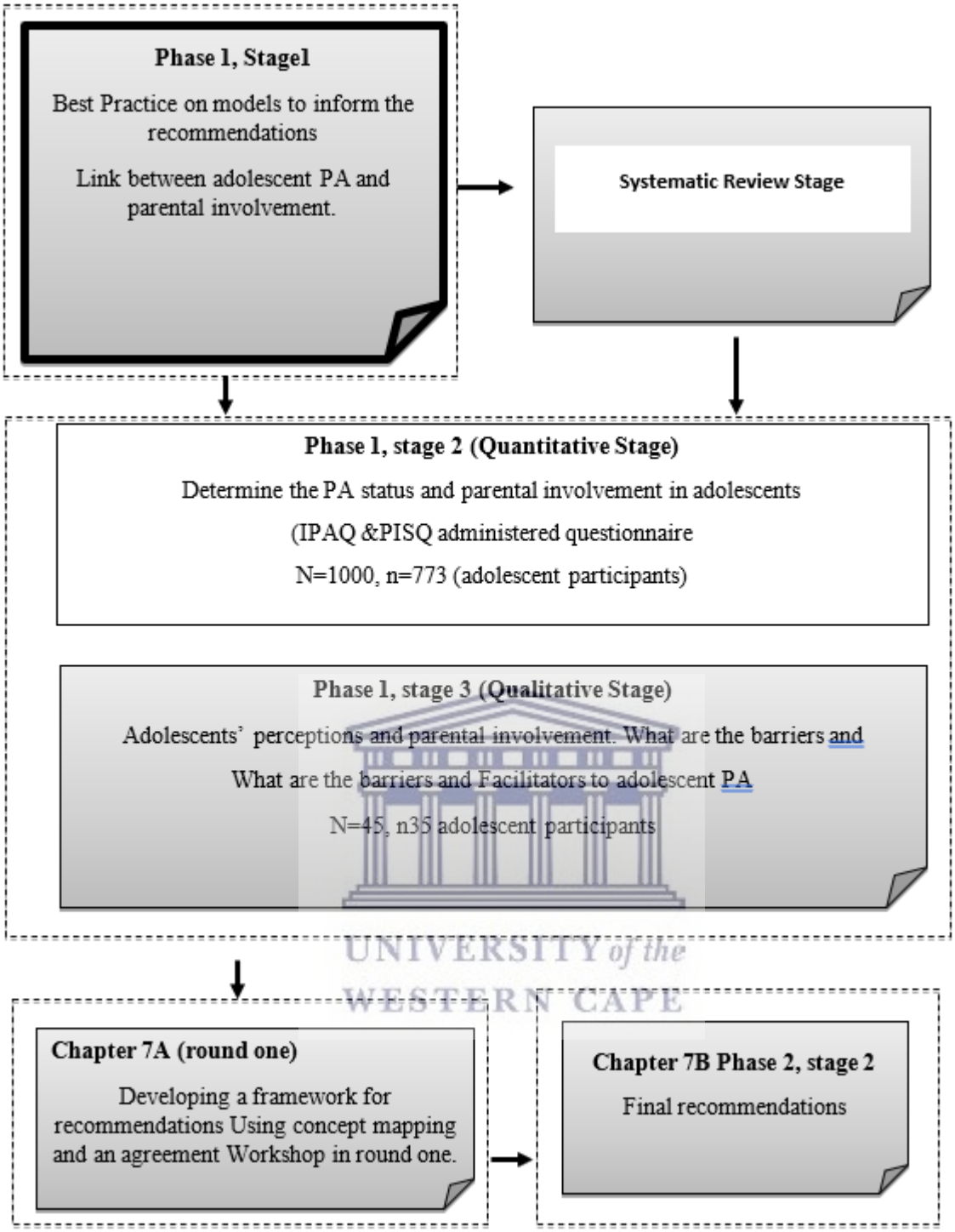

Figure 8.1

Overview of the study

Revisiting the study's research question/s, aims, and objectives to wrap up this integrative discussion.

Stage 1: Problem identification stage

To conduct a systematic review with REAIM features to determine the best practice models/interventions to inform the guidelines to increase adolescent PA and parental involvement. Phase 1, the problem identification phase, consists of three stages. Phase two, the guideline development phase, consisted of two stages. The results and findings of stage one contributed to the development of guidelines in phase two. Table 1.1 provides an overview of the phases and stages in the current study linked to the research question, aims, and objectives.

Stage 2: Quantitative stage

The objective of stage 2 was to answer the main question, the following objectives were: To determine the current PA status of adolescents; to select current activity preferences that would encourage adolescents to participate in PA; to determine the level of parental involvement in adolescent PA and the relationship between adolescent PA and parental involvement.

Stage 3: Qualitative stage

To explore the barriers and facilitators to adolescent PA participation to increase PA in adolescent and parental involvement.

PHASE 2: Development of Guidelines phase

Stage 1: Concept mapping and developing a framework for guideline planning

To develop and design a framework for guidelines to increase PA in adolescents and parental involvement using concept mapping.

Stage 2: Consensus Workshop

To conduct a workshop to reach a consensus on the final guidelines.

These objectives have been achieved and were discussed in the findings of chapters 4–7B. Chapter 8 provides an overall discussion of the findings, followed by recommendations for practice and future research along with the limitations that were encountered. The chapter concludes with some final remarks.

8.2 Discussion of the overall findings

The findings in Phase 1 and Phase 2 resulted in the development of guidelines for parental involvement to increase adolescent PA participation. Phase 1 with its three stages focused on identifying the problem by conducting 1) a systematic review, 2) a quantitative inquiry, and 3) a qualitative study exploring the factors that contributed to increasing PA in adolescents. Thus, the results of phase 1 were consolidated in a concept map leading to the development of the framework of the guidelines developed in stage 1 of phase 2. In the final consensus workshop in stage 2 of phase 2, the guidelines that emerged from the two phases of the study were developed based on the contributions from the stages and phases.

Table 8.1

Summary of Objectives and Outcomes Linked to the Study Phases and Stages

Study objective	Phase and Stage	Outcome/ Output	Manuscripts submitted	Refer to…
To conduct a systematic review to determine the best practice models/interventions/ to inform the guidelines.	chapter 4: review stage Phase 1, stage 1	Quality scored of appraised intervention and quantitative studies.	Process of systematic review using a REAIM framework was submitted to the journal: Children (December 2021)	Chapter 4
To determine the current PA status of adolescents	chapter 5: quantitative stage Phase 1 stage 2	Descriptive statistics, correlations were computed using IPAQ and were administered and analysed	Manuscript submitted to Journal AHJPHES, December 2022, reviewed, corrected and resubmitted.	Chapter 5
To explore the factors that contribute to PA participation and parent involvement 6: qualitative explorative stage.	chapter 6 qualitative explorative Phase 1 stage 3	Qualitatively explored adolescents perceptions on factors that contribute to increased PA. Three FGD were held.	Manuscript accepted in AHJPHES for publication March 2022.	Chapter 6
To develop a framework for guidelines using concept mapping and a consensus workshop with stakeholder input to increase participation in PA in adolescents	Concept mapping and consensus workshop)	Round one of the consensus workshops was conducted online during Covid lockdown measures to develop a concept map from results phase 1 and a framework for guideline development.	Manuscript submitted to IPHERP journal, reviewed, resubmitted and corrected. Submitted October 2021	Chapter 7A
To conduct a consensus workshop and develop final guidelines	consensus findings and guideline development using consensus format)	Round two a consensus workshop with expert input was held to develop the final guidelines. The guidelines were presented in chapter 7B.	Manuscript submitted to IPHERP journal, reviewed, resubmitted and corrected. Submitted October 2021	Chapter 7B

Manuscripts for chapters 6 and 7B published are published. Chapters 4 and 5 are under review currently.

a) Phase Stage 1, the systematic review

A REAIM framework addressed best practice models and interventions to inform the guideline development process. The findings in the review highlighted several important challenges and strengths that clarified the significance of intervention programs for parents of adolescents.

The impact of declining PA and increased sedentary behaviour in adolescents globally prompted the development of national and international physical activity guidelines (Bull et al., 2020; Parrish et al., 2020). The search resulted in 50 national or international guidelines being identified (Parrish et al., 2020). Results indicated that twenty-five countries had a national guideline and there were three international guidelines, namely European Union, Nordic countries (used by Iceland, Norway, and Sweden), and WHO. Nineteen countries and the European Union adopted the WHO guidelines. Guidelines varied in the date of release, targeted age group, and guideline wording, type, amount, duration, intensity, frequency, and the total amount of PA. Twenty-two countries included sedentary behaviour within the guidelines and three included sleep. Importantly, the current review revealed that there are limited data available on strategies to increase parent involvement and increase PA in South African adolescents (Cozett et al., 2016; Draper et al., 2014). Furthermore, the review highlighted the lack of data available on best practice models for increasing PA in adolescents in South African adolescents. Thus, an urgent need exists for providing parents with resources and support in the form of PA guidelines. This is supported by Brown et al. (2020), Bull et al. (2020), Chaput et al. (2020), and Parrish et al., 2020), who stated that the format of the current guidelines was developed in line with international studies and South African foundational studies (HASKSA, 2014; Parrish et al., 2020). The findings in this study followed a scientific process (community engagement) towards local and international relevance to understanding and supporting healthcare practitioners and parents. A summary of guidelines developed in 50 countries provided an overview of commonalities found in guidelines developed to increase PA (Parrish, 2020; WHO, 2014). Parrish et al. (2020) noted considerable variability between national/international PA guideline quality, development, and recommendations further highlighting the importance of rigorous and transparent guideline development methodologies in terms of appropriate guidance for population-based approaches. Where countries lack the

resources to ensure this level of quality, the adoption or development (framework to review and update guidelines) of the WHO guidelines or guidelines of similar quality is recommended. This is similar to the current study, where a framework for guidelines was developed as part of the consensus process and as the foundation of the final guidelines. Thus, in reviewing the guidelines of 50 countries, similarities and differences to the guidelines developed in the current study were identified. This study itself was explorative in that it sought to provide strategies to increase PA solutions in the form of guidelines. The need existed for the design of facilitated intervention programs to strengthen parent-adolescent activity programs (WHO, 2014). Current studies in South Africa laying the foundation for guideline development:

1) PAHLS study and South African Youth Risk Behaviour Reports provided insight into South African adolescents.
2) Movement guidelines were developed based on the Healthy Active Kids South Africa Report Card (HASKSA, 2014).
3) Physical activity and physical inactivity in South African populations were determined and presented by Professor Moss in researching human movement from the cradle to the grave.
4) Although PA and inactivity are the foundation of initial guidelines, the role of parental involvement and strategies to increase PA plays a lesser role.

In the systematic review, 28 relevant articles were extracted that advanced the argument that parental involvement encourages increased physical activity (Coakley et al., 2016; Erkelentz et al., 2014; Martin & Murtagh, 2015; Parrish et al., 2020). Further to this, parents need to understand key concepts in physical activity (Burns et al., 2019; Cozett et al., 2016). Furthermore, results showed that adolescents should accumulate 60-minute of physical activity and that bouts of activity have an accumulative effect (Dobbins, 2009; CDC, 2012; Hallal et

al., 2012; Parrish et al., 2020). Literature trends and commonalities were found in reviewing guidelines from 50 countries and comparing them to the guidelines developed in the current study in terms of the types of activities, benefits for adolescents, barriers identified, type of activities, and frequency and duration of physical activity were confirmed. Therefore, strategies available should provide support to adolescents and parents. Increasing parental involvement encourages adolescents to sustain participation (Sawyer et al., 2018). Moreover, specific findings in the current study indicated that adolescents prefer physical activity that is fun, age-appropriate, based on individual preferences, and social. This systematic review provided a framework for synthesising best practice models on strategies for increasing PA, providing guidelines as a resource to inform parents about the benefits of PA, the link between parental involvement, and how the parent's involvement, parenting style, and participation encourage PA in adolescence. Therefore, stage 1, phase 1 objective to conduct a systematic review with REAIM features to determine the best practice models/interventions to inform the guidelines to increase adolescent PA and parental involvement was reached. Thus, the objectives and research question of stage 1 of phase one were met.

b) Phase 1 Stage 2: Quantitative inquiry

In stage 2 of phase 1, a quantitative inquiry determined the PA status and parental involvement to increase PA participation. Key findings suggested that adolescents in the current study are leading sedentary lives. Participants in the current study spent the most time in 7 days, sitting which is a sedentary behaviour and this sedentary behaviour increased over weekends. This is similar to the findings of Cozett et al. (2016). Specific results indicated that females were less active than male adolescents (Cozett et al., 2016). It was established that in adolescents females tend to be less active than males. The reasons for the decline in activity levels were safety reasons and environmental barriers that made it unsafe for females to be active in safe spaces.

Results indicated that housework as a form of PA was the most prevalent indoor activity and counts as doing moderate work. Gardening and yard work were selected less often. Walking has consistently been recommended as a safe way for adolescents to increase activity levels. The current guidelines were developed to make provision for various forms of activity. Walking is featured prominently as a means of PA in adolescents (Parrish et al., 2020; Cozett et al., 2016).

In terms of maternal and paternal involvement, findings revealed that fathers are perceived as more actively involved with the actual activity and mothers were more involved in preparing for activities. Meaning that fathers were perceived to attend events, and mothers encouraged and assisted with game preparation and planning for events. Thus, parents who were involved in physical activities, encouraged, supported, and modelled positive physical activity behaviour in adolescents. This is confirmed by a study by Burns et al. (2019) in a study related to parental involvement and increasing PA. Thus, the objectives and research question of stage 2 of phase one were met which were to answer the main question, the following objectives were to determine the current PA status of adolescents; to select current activity preferences that would encourage adolescents to participate in PA; to determine the level of parental involvement in adolescent PA and the relationship between adolescent PA and parental involvement. These objectives were satisfactorily met.

c) Phase 1 stage 3

In stage 3, the qualitative stage (chapter 6), the study aimed to explore the adolescent's perceptions of factors contributing to physical activity participation, specifically the barriers and facilitators to adolescents' participation. The findings revealed that 8 themes were identified: Theme 1: Parental involvement, Theme 2: Physical activity barriers, Theme 3: Physical activity preferences, Theme 4: Physical activity parental support, Theme 5: Physical

activity facilitators, Theme 6: Physical activity encouragement, Theme 7: Parental directive behaviour, Theme 8: Increasing physical activity strategies. Furthermore, it was revealed that adolescents preferred enjoyable activities that are age-appropriate, fun, and social, which appeal most to adolescents. Adolescents suggested that parental involvement is critical to increasing physical activity and sustaining positive PA behaviour. The study evidence revealed that collaboration between adolescents and their parents enables adolescents to sustain positive PA participation that may track into adulthood. This is confirmed by Burns et al. (2019).

Therefore, the guidelines were developed for parents and adolescents: a) to support adolescents and parents on approaches to increase PA; b) support for parents specifically, information for parents to support adolescents; c) assistance in the form of information on safety and strategies to support parents and adolescents, and e) unbiased support and information in the form of guidelines. Phase 1, therefore, provided some valuable insights and awareness into the kind of guidelines needed to be developed to assist parents to increase PA in adolescents were provided by stakeholders and adolescents in the phases and stages. The results and findings of phase one were used as the foundation for phase 2. Thus, the objectives and research question of stage 3 of phase one were met by exploring the barriers and facilitators to adolescent PA participation to increase PA in adolescent and parental involvement.

d) Phase 2

Phase 2 of the study focused on the development of the guidelines by conducting a consensus workshop with a two-stage approach. The objective of the consensus workshop was to present the key findings of Phase 1 in a concept map of key findings focussing on key definitions, strategies, preferred activities, and proposed guidelines in a framework for guidelines. A panel of stakeholders and work towards reaching a consensus. Round 1 of the consensus workshops was presented to parents, university academics teachers, and community workers who are knowledgeable and have significant experience in the field of physical activity, adolescent PA

behaviour, physical inactivity, and parental involvement, and who have expertise in the research, and policy level. The panel of experts eventually reached a consensus on six themes and 52 sub-themes in Round 2 of the consensus workshops. This was presented to stakeholders in the field of physical activity, adolescent PA behaviour, physical inactivity, and parental involvement, who have expertise at the research, and policy level. All of the recommendations made in Phase 1 of the research study and Round 1 by the panel of experts were agreed upon, with the suggestion that a parental resource list needed to be compiled to guide parents. The consensus workshop provided an opportunity to engage in knowledge transfer and arrive at a deeper understanding of what was to be included in the guidelines. Phase 2 was therefore applied towards advancing the development of guidelines for parent involvement to increase PA participation in adolescents. Thus, the objectives and research questions of stages 1 and 2 of phase two were met.

8.3 Theoretical foundation

The lack of studies focusing on guidelines for parents and adolescents in South Africa limits the findings. However, this study could assist in the provision of support for parents in the form of guidelines and resources for parents to increase PA. Parent support provides support for adolescents' well-being and is likely to see a positive effect on the overall development of the adolescent-child (Cozett et al., 2016). In addition, these guidelines can be a valuable source for policymakers due to their unique nature and recommendations for support for parents and adolescents to prevent inactivity. Thus, these guidelines further allow for support to parents, regardless of the family's socioeconomic status, income, or geographic location. In addition, the guidelines had a strong aspect for safety in communities. This is confirmed by studies conducted by (Moeller et al., 2013). A move to develop guidelines tailored towards the needs of adolescents and developed by parents, stakeholders, and educators, especially with the input of adolescents is unique in the South African context. This echoes an authentic parent-

adolescent-centred approach to delivering support. Thus, the relevance of the theoretical framework provides the base for the current study. Using the health promotion theory (Nutbeam & Harris, 2002) and the ecological systems theory (Bronfrenner, 1979) as the conceptual frameworks provided the foundation to develop the guidelines. The theories provided a powerful system, placing the adolescent in context and locating the study objectives within the theories. The adolescent is linked to the family, the parents, friends, and the environment. Therefore, the development of these guidelines enhances parent involvement to support the adolescent to overcome PA barriers and environmental influences that hamper PA. The factors influencing adolescents have an impact on the PA status. Factors that influence PA may contribute to or enable PA or limit PA such as barriers to PA (Aubert et al., 2021).

8.4 Guidelines developed in comparison to the global impact

The impact of declining PA and increased sedentary behaviour in adolescents globally prompted the development of guidelines in the current study. This is confirmed by the systematic review study by Parrish et al. (2020) stating that national and international physical activity guidelines are necessary due to the increase in adolescent sedentary behaviour. This research aims to systematically identify and compare national and international physical activity guidelines for children and adolescents and appraise the quality of the guidelines to promote best practices in guideline development. The review included 50 national or international guidelines being identified. It was interesting to note that twenty-five countries had a national guideline and there were three international guidelines European Union, Nordic countries (used by Iceland, Norway, and Sweden), World Health Organization (WHO) (Parrish et al., 2020). Nineteen countries and the European Union adopted the WHO guidelines (Boulkedid et al., 2011; Bemrose, 2003; Parrish et al., 2020; Sénéchal et al., 2021). Guidelines varied in the date of release (2008 to 2019). Interestingly, the international guidelines and the guidelines in the current study had the following aspects in common for adolescents:

1) The targeted age group was adolescents
2) Guideline wording regarding the type, amount, duration, intensity, frequency, and the total amount of physical activity was used similarly in the current thesis and the 25 countries.
3) The current guidelines focus on clarifying definitions and concepts as confirmed in 25 countries indicated by Parrish et al. (2020).
4) The benefit of physical activity is a key component that is included and concepts clarified. It became clear that a misconception exists regarding certain key concepts in the current study. Therefore, the current study provided a resource table for physical activity as a resource and information document for parents.
5) The unique aspect of the current guidelines developed is that it provides the resource table to parents.
6) Furthermore, safety and concerns from parents and stakeholders in the consensus workshop prompted the inclusion of safety guidelines and strategies for parents to ensure that adolescents remain safe while doing PA.
7) In contrast to this study, 22 countries included sedentary behaviour within the guidelines, and three included sleep. Whereas the current study discussed sedentary behaviour as part of the problem identification and background to the study.
8) Thus, the rigour of guideline development is essential to ensure appropriate guidance for population-level initiatives
9) The review study confirmed that to ensure rigour in guideline development a robust method should be used in the form of a mixed methodology and a framework for guidelines should be developed using phases and stages. This confirms the current study design as an appropriate and relevant process for developing guidelines (Parrish et al., 2020).

While the guidelines are aimed at supporting parents to increase adolescent PA and it includes guidelines, resources are needed to sustain PA. Partnerships between parents and practitioners are critical, as discussed in the preceding chapters, particularly in the consensus workshop. In this case, fostering a collaborative environment allows for the development of the most effective strategies. Most importantly, educators and professionals must be aware of the dynamics of the family itself, especially when parents are offered support. The consensus workshop created a collaborative environment that facilitated and actively supported parents in the process of participation and reaching consensus with experts and stakeholders. This in itself points to parent leadership and a sense of ownership as well as adolescents' input on perceptions of parental involvement and preferred PA. The process of developing guidelines led to interdisciplinary collaborations among practitioners, educators, researchers, parents, and adolescents. Thus, the objectives of the study have been reached to develop guidelines in a consensus format with stakeholder input. It is envisaged that the carefully crafted and specifically formulated guidelines developed in this study will inform future practice and the work of professionals particularly in the field of PA in adolescence. Next, a set of recommendations are made, targeted at three groups: (1) future practice, (2) practitioners in the field, and (3) future research in the area. The first two points are combined under the first heading below.

8.5 Recommendations from the study findings

This research study was positioned within the pragmatic worldview that necessitates the identification of a problem. It attempted to find a solution that may be used to bring about change in the field of sports science and other related fields by working with adolescents and parents to increase PA. A holistic approach is necessary because children coexist within families. This research identified the scarcity of guidelines for parents and adolescents and the lack of research focusing on supporting parent involvement in the South African context. This

highlights the need for research on parents' involvement in adolescent PA in South Africa. It is envisaged that these guidelines may be used as a guide for parents to support adolescents in increasing PA. Thus, the findings and recommendations of this thesis are likely to have an impact on the life and wellbeing of adolescents and their parents in South Africa in particular and other similar countries in general.

8.5.1 Recommendations for practitioners

It is recommended that:

- Sports science and practice should build on the insights generated herein and incorporate these guidelines in their practices, focusing on specific areas relevant to parent involvement to increase PA participation. For instance: 1) assisting parents to adapt their parenting approaches to support adolescents in increasing PA participation; 2) emphasizing and focusing on the barriers to PA and the challenges adolescents are confronted with when participating in PA, and 3) creating awareness of the benefits of PA.
- Professionals (researchers, educators, sports scientists, parents and practitioners, and community workers) working in this context obtain a deeper understanding of the unique experiences and needs of adolescents and thereby provide support to adolescents through guideline development.
- Parents obtain the prerequisite skills to provide support to adolescents through resources provided in guidelines.
- Adolescent-parent-centred support should be linked to macro systemic, meso, and micro support, such as related to the adolescent.
- The Department of Education (WCED) uses the insights generated herein as a framework or foundation to design and develop relevant and suitable programs to meet the needs of adolescents and parents to increase PA.

8.5.2 Recommendations for future research

It is further recommended that future research be conducted on:

- Overcoming barriers to PA and understanding the needs of adolescents to increase PA.
- Parenting programs targeting parents and adolescents.
- The role of the mother in PA support offers valuable and unique perspectives and insights.
- The role of the father in PA support offers valuable and unique perspectives and insights.
- The topic is on different geographical areas in South Africa, to identify trends as well as compare parents' and adolescents' challenges, experiences, perceptions, and needs.
- The topic through collaborative research at the university level, among organizations of the PA, not only in South Africa but across the African continent.

8.6 Study limitations

The following limitations were encountered in this study:

- a limitation in not being able to generalise the results beyond the Western Cape, SA, where the study was conducted.
- COVID-19 became a limitation that had to be overcome during the course of this study.
    - COVID-19 presented challenges such as the fact that there was a no contact protocol during the COVID-19 levels 3-5. Thus, the workshop initially planned as a face-to-face session was held on an online platform called Zoom.
    - Therefore, the study data collection structure had to change.
    - Furthermore, an extension had to be requested from the research ethics committee to ensure that data collection occurred in the specified time frame.

8.7 Conclusion

The purpose of this study was to develop guidelines for parent involvement to increase adolescent PA participation. This was done using a mixed-methods approach with a sequential explanatory design using a two-phased approach. The research study included four studies,

comprising a systematic review, quantitative inquiry and a qualitative exploration, and a consensus workshop.

Regarding the theoretical implications of this research, the findings support that the health promotion and social-ecological theory family systems theory has a strong influence on adolescents. The study's approach and design assisted in 1) understanding the adolescents and parent involvement using the guideline framework, which lends itself to modified approaches used to increase PA; 2) determining and exploring adolescents' perceptions of the factors that influence PA, which ultimately led to the design of a framework for guidelines and finally the actual guidelines were developed in a consensus workshop.

This research study holds promising results in terms of implementation from a parent-adolescent-centred approach (Brown et al., 2020). The research study gives rise to broadening our knowledge into the challenges, experiences, and support needs of adolescents and parents to increase PA and how collaboration between parents, adolescents, researchers, educators, stakeholders, and practitioners are key in the development of guidelines to increase PA.

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APPENDICES

APPENDIX 1: ETHICS CLEARANCE UWC

UNIVERSITY of the WESTERN CAPE

OFFICE OF THE DIRECTOR: RESEARCH
RESEARCH AND INNOVATION DIVISION

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

07 December 2017

Mrs C Cozett
SRES
Faculty of Community and Health Science

Ethics Reference Number: HS17/10/16

Project Title: Development of guidelines for adolescents and parents to increase adolescent participation in physical activity.

Approval Period: 07 December 2017 – 07 December 2018

I hereby certify that the Humanities and Social Science Research Ethics Committee of the University of the Western Cape approved the methodology and ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

Please remember to submit a progress report in good time for annual renewal.

The Committee must be informed of any serious adverse event and/or termination of the study.

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

PROVISIONAL REC NUMBER - 130416-049

APPENDIX 2: DATA COLLECTION EXTENSION GRANTED

UNIVERSITY of the WESTERN CAPE

OFFICE OF THE DIRECTOR: RESEARCH
RESEARCH AND INNOVATION DIVISION

Private Bag X17, Bellville 7535
South Africa
T: +27 21 959 4111/2948
F: +27 21 959 3170
E: research-ethics@uwc.ac.za
www.uwc.ac.za

28 June 2019

Mrs C Cozett
SRES
Faculty of Community and Health Sciences

Ethics Reference Number: HS17/10/16

Project Title: Development of guidelines for adolescents and parents to increase adolescent participation in physical activity.

Approval Period: 25 June 2019 – 25 June 2020

I hereby certify that the Humanities and Social Science Research Ethics Committee of the University of the Western Cape approved the methodology and ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

Please remember to submit a progress report in good time for annual renewal.

The Committee must be informed of any serious adverse event and/or termination of the study.

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

HSSREC REGISTRATION NUMBER - 130416-049

APPENDIX 3: PERMISSION FROM WESTERN CAPE EDUCATION DEPARTMENT (WCED)

Western Cape Government
Education

Directorate: Research

Audrey.wyngaard@westerncape.gov.za
tel: +27 021 467 9272
Fax: 0865902282
Private Bag x9114, Cape Town, 8000
wced.wcape.gov.za

REFERENCE: 20180504–1778
ENQUIRIES: Dr A T Wyngaard

Mrs Colleen Cozett
97 Groenewoud Street
Sonkring
Brackenfell South
7560

Dear Mrs Colleen Cozett

RESEARCH PROPOSAL: DEVELOPMENT OF GUIDELINES FOR ADOLESCENTS AND PARENTS TO INCREASE ADOLESCENTS PARTICIPATION IN PHYSICAL ACTIVITY

Your application to conduct the above-mentioned research in schools in the Western Cape has been approved subject to the following conditions:

1. Principals, educators and learners are under no obligation to assist you in your investigation.
2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation.
3. You make all the arrangements concerning your investigation.
4. Educators' programmes are not to be interrupted.
5. The Study is to be conducted from **16 May 2018 till 28 September 2020**
6. No research can be conducted during the fourth term as schools are preparing and finalizing syllabi for examinations (October to December).
7. Should you wish to extend the period of your survey, please contact Dr A.T Wyngaard at the contact numbers above quoting the reference number?
8. A photocopy of this letter is submitted to the principal where the intended research is to be conducted.
9. Your research will be limited to the list of schools as forwarded to the Western Cape Education Department.
10. A brief summary of the content, findings and recommendations is provided to the Director: Research Services.
11. The Department receives a copy of the completed report/dissertation/thesis addressed to:

    The Director: Research Services
    Western Cape Education Department
    Private Bag X9114
    CAPE TOWN
    8000

We wish you success in your research.

Kind regards.
Signed: Dr Audrey T Wyngaard
Directorate: Research
DATE: 04 May 2018

APPENDIX 4: ADOLESCENT CONSENT FORM

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2409, Fax: 27 21-959 3688

E-mail: dobowers@uwc.ac.za

ADOLESCENT'S CONSENT FORM

Title of Research Project:

Development of guidelines for adolescents and parents to increase adolescent participation in physical activity

The study has been described to me in a language that I understand. My questions about the study have been answered. I understand what my participation will involve and I agree to participate of my own choice and free will. I understand that my identity will not be disclosed to anyone. I understand that I may withdraw from the study at any time without giving a reason and without fear of negative consequences or loss of benefits. I am aware that all discussions will be audiotaped and that my name will not be used in discussions.

Participant's reference……..

Participant's signature……..

Date……

APPENDIX 5: PARENTAL CONSENT FORM

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2409, Fax: 27 21-959 3688

E-mail: *dobowers@uwc.ac.za*

PARENTAL CONSENT FORM

Title of Research Project:

Development of guidelines for adolescents and parents to increase adolescent participation in physical activity

The study has been described to me in a language that I understand. My questions about the study have been answered. I understand what my participation will involve and I agree to participate of my own choice and free will. I am aware that all discussions in the workshop will be audiotaped and that my name will not be used in discussions. I understand that my identity will not be disclosed to anyone. I understand that I may withdraw from the study at any time without giving a reason and without fear of negative consequences or loss of benefits.

Participant's name …….....

Participant's signature……

Date……

APPENDIX 6: CONFIDENTIALITY BINDING FORM

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2409, Fax: 27 21-959 3688

E-mail: dobowers@uwc.ac.za

FOCUS GROUP CONFIDENTIALITY BINDING FORM

Title of Research Project: Development of guidelines for adolescents and parents to increase adolescent participation in physical activity

The study has been described to me in a language that I understand. My questions about the study have been answered. I understand what my participation will involve and I agree to participate of my own choice and free will. I am aware that all discussions will be audiotaped and that my name will not be used in discussions. I understand that my identity will not be disclosed to anyone by the researchers. I understand that I may withdraw from the study at any time without giving a reason and without fear of negative consequences or loss of benefits. I understand that confidentiality is dependent on participants in the Focus Group maintaining confidentiality. I understand that the discussions will be recorded and that recordings will not be made public.

I hereby agree to uphold the confidentiality of the discussions in the focus group by not disclosing the identity of other participants or any aspects of their contributions to members outside of the group.

Participant's reference number ……

Participant's signature ……...

Date……

APPENDIX 7A: INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE (IPAQ)

PART 1:

DEMOGRAPHIC INFORMATION

AGE: _____years

DATE OF BIRTH: (day) _____ (month) _____ (year) _____

GRADE: _____

GENDER: MALE _____ FEMALE _____

(Tick the correct option)

PART 2:

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** and **moderate** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

PART 1: JOB-RELATED PHYSICAL ACTIVITY

The first section is about your work. This includes paid jobs, farming, volunteer work, course work, and any other unpaid work that you did outside your home. Do not include unpaid work you might do around your home, like housework, yard work, general maintenance, and caring for your family. These are asked in Part 3.

1. Do you currently have a job or do any unpaid work outside your home?

   ☐ Yes

   ☐ No → ***Skip to PART 2: TRANSPORTATION***

The next questions are about all the physical activity you did in the **last 7 days** as part of your paid or unpaid work. This does not include traveling to and from work.

2. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, heavy construction, or climbing up stairs **as part of your work**? Think about only those physical activities that you did for at least 10 minutes at a time.

   _____ **days per week**

   ☐ No vigorous job-related physical activity → ***Skip to question 4***

3. How much time did you usually spend on one of those days doing **vigorous** physical activities as part of your work?

3. How much time did you usually spend on one of those days doing **vigorous** physical activities as part of your work?

_____ **hours per day**
_____ **minutes per day**

4. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads **as part of your work**? Please do not include walking.

_____ **days per week**

☐ No moderate job-related physical activity → ***Skip to question 6***

5. How much time did you usually spend on one of those days doing **moderate** physical activities as part of your work?

_____ **hours per day**
_____ **minutes per day**

6. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time **as part of your work**? Please do not count any walking you did to travel to or from work.

_____ **days per week**

☐ No job-related walking → ***Skip to PART 2: TRANSPORTATION***

7. How much time did you usually spend on one of those days **walking** as part of your work?

_____ **hours per day**
_____ **minutes per day**

PART 2: TRANSPORTATION PHYSICAL ACTIVITY

These questions are about how you traveled from place to place, including to places like work, stores, movies, and so on.

8. During the **last 7 days**, on how many days did you **travel in a motor vehicle** like a train, bus, car, or tram?

_____ **days per week**

☐ No traveling in a motor vehicle → ***Skip to question 10***

9. How much time did you usually spend on one of those days **traveling** in a train, bus, car, tram, or other kind of motor vehicle?

_____ **hours per day**
_____ **minutes per day**

Now think only about the **bicycling** and **walking** you might have done to travel to and from work, to do errands, or to go from place to place.

10. During the **last 7 days**, on how many days did you **bicycle** for at least 10 minutes at a time to go **from place to place**?

_____ **days per week**

☐ No bicycling from place to place → ***Skip to question 12***

11. How much time did you usually spend on one of those days to **bicycle** from place to place?

_____ **hours per day**
_____ **minutes per day**

12. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time to go **from place to place**?

_____ **days per week**

☐ No walking from place to place → ***Skip to PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY***

13. How much time did you usually spend on one of those days **walking** from place to place?

_____ **hours per day**
_____ **minutes per day**

PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY

This section is about some of the physical activities you might have done in the **last 7 days** in and around your home, like housework, gardening, yard work, general maintenance work, and caring for your family.

14. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, chopping wood, shoveling snow, or digging **in the garden or yard**?

_____ **days per week**

☐ No vigorous activity in garden or yard → ***Skip to question 16***

15. How much time did you usually spend on one of those days doing **vigorous** physical activities in the garden or yard?

_____ **hours per day**
_____ **minutes per day**

16. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, sweeping, washing windows, and raking **in the garden or yard**?

17. How much time did you usually spend on one of those days doing **moderate** physical activities in the garden or yard?

_____ **hours per day**
_____ **minutes per day**

18. Once again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, washing windows, scrubbing floors and sweeping **inside your home**?

_____ **days per week**

☐ No moderate activity inside home → ***Skip to PART 4: RECREATION, SPORT AND LEISURE-TIME PHYSICAL ACTIVITY***

19. How much time did you usually spend on one of those days doing **moderate** physical activities inside your home?

_____ **hours per day**
_____ **minutes per day**

PART 4: RECREATION, SPORT, AND LEISURE-TIME PHYSICAL ACTIVITY

This section is about all the physical activities that you did in the **last 7 days** solely for recreation, sport, exercise or leisure. Please do not include any activities you have already mentioned.

20. Not counting any walking you have already mentioned, during the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time **in your leisure time**?

_____ **days per week**

☐ No walking in leisure time → ***Skip to question 22***

21. How much time did you usually spend on one of those days **walking** in your leisure time?

_____ **hours per day**
_____ **minutes per day**

22. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like aerobics, running, fast bicycling, or fast swimming **in your leisure time**?

_____ **days per week**

☐ No vigorous activity in leisure time → ***Skip to question 24***

23. How much time did you usually spend on one of those days doing **vigorous** physical activities in your leisure time?

_____ **hours per day**
_____ **minutes per day**

24. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis **in your leisure time**?

_____ **days per week**

☐ No moderate activity in leisure time → ***Skip to PART 5: TIME SPENT SITTING***

25. How much time did you usually spend on one of those days doing **moderate** physical activities in your leisure time?

_____ **hours per day**
_____ **minutes per day**

PART 5: TIME SPENT SITTING

The last questions are about the time you spend sitting while at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television. Do not include any time spent sitting in a motor vehicle that you have already told me about.

26. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekday**?

_____ **hours per day**
_____ **minutes per day**

27. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekend day**?

_____ **hours per day**
_____ **minutes per day**

This is the end of the questionnaire, thank you for participating.

APPENDIX 7B: PARENTAL INVOLVEMENT IN SPORT QUESTIONNAIRE (PISQ)

PART B:

The questionnaire is about parental involvement in your physical activity or sport. If a parent has passed away, is divorced, is living in another area, and is not involved, indicate it once and skip questions about the parent. If you are living with a guardian, grandmother, or another person who is involved in your life and physical activity indicate it once on question 1 and continue to answer.

Read the statement and then make a clear cross (X) on your selected answer to reflect how you feel. You need to answer each question in the following way.

- ***How you perceive (see/what's your view) your mother's involvement in your physical activities. A***
- ***How you desire (would like it to be) your mother's involvement in your physical activities to be. B***
- ***How you perceive (see/what's your view) your father's involvement in your physical activities. C***
- ***How you desire (would like it to be) your father's involvement in your physical activities to be. D***

Parental active Involvement:

1. Do your parent take an active role in running your school sports activities, on committees, or helping with school social events?

	MOTHER							FATHER				
A	1	2	3	4	5	PERCEIVE	C	1	2	3	4	5
	Always	Quite often	Some times	Hardly ever	Never			Always	Quite often	Some times	Hardly ever	Never
B	1	2	3	4	5	DESIRE	D	1	2	3	4	5

2. Do your parents offer to help at school physical activity and sports events?

	MOTHER							FATHER				
A	1	2	3	4	5	PERCEIVE	C	1	2	3	4	5
	Always	Quite often	Some times	Hardly ever	Never			Always	Quite often	Some times	Hardly ever	Never
B	1	2	3	4	5	DESIRE	D	1	2	3	4	5

3. Do your parents discuss your progress with your coach?

	MOTHER							FATHER				
A	1	2	3	4	5	PERCEIVE	C	1	2	3	4	5
	Always	Quite often	Some times	Hardly ever	Never			Always	Quite often	Some times	Hardly ever	Never
B	1	2	3	4	5	DESIRE	D	1	2	3	4	5

4. Do your parents encourage you to talk to them about any problems or worries that you may have about physical activity participation?

	MOTHER							FATHER				
A	1	2	3	4	5	PERCEIVE	C	1	2	3	4	5
	Always	Quite often	Some times	Hardly ever	Never			Always	Quite often	Some times	Hardly ever	Never
B	1	2	3	4	5	DESIRE	D	1	2	3	4	5

5. Do your parents change meal times so that you can go to physical activity venues or events?

	MOTHER							FATHER				
A	1	2	3	4	5	PERCEIVE	C	1	2	3	4	5
	Always	Quite often	Some times	Hardly ever	Never			Always	Quite often	Some times	Hardly ever	Never
B	1	2	3	4	5	DESIRE	D	1	2	3	4	5

6. Do your parents provide you with physical activity equipment, transport, and clothing to participate in physical activity?

	MOTHER							FATHER				
A	1	2	3	4	5	PERCEIVE	C	1	2	3	4	5
	Always	Quite often	Some times	Hardly ever	Never			Always	Quite often	Some times	Hardly ever	Never
B	1	2	3	4	5	DESIRE	D	1	2	3	4	5

7. Do your parents attend your physical activity events in the community or at school?

	MOTHER							FATHER				
A	1	2	3	4	5	PERCEIVE	C	1	2	3	4	5
	Always	Quite often	Some times	Hardly ever	Never			Always	Quite often	Some times	Hardly ever	Never
B	1	2	3	4	5	DESIRE	D	1	2	3	4	5

Directive behaviour

8. After physical activity do your parents tell you what they think you need to work on?

	MOTHER							FATHER				
A	1	2	3	4	5	PERCEIVE	C	1	2	3	4	5
	Always	Quite often	Some times	Hardly ever	Never			Always	Quite often	Some times	Hardly ever	Never
B	1	2	3	4	5	DESIRE	D	1	2	3	4	5

9. After physical activity do your parents point out the things that they think you did badly?

	MOTHER							FATHER				
A	1	2	3	4	5	PERCEIVE	C	1	2	3	4	5
	Always	Quite often	Some times	Hardly ever	Never			Always	Quite often	Some times	Hardly ever	Never
B	1	2	3	4	5	DESIRE	D	1	2	3	4	5

10. Do your parents cheer before and after physical activity?

	MOTHER							FATHER				
A	1	2	3	4	5	PERCEIVE	C	1	2	3	4	5
	Always	Quite often	Some times	Hardly ever	Never			Always	Quite often	Some times	Hardly ever	Never
B	1	2	3	4	5	DESIRE	D	1	2	3	4	5

Encouragement

11. Even if you have a POOR physical activity or sports event do your parents praise you for the good things that you did?

	MOTHER							FATHER				
A	1	2	3	4	5	PERCEIVE	C	1	2	3	4	5
	Always	Quite often	Some times	Hardly ever	Never			Always	Quite often	Some times	Hardly ever	Never
B	1	2	3	4	5	DESIRE	D	1	2	3	4	5

12. After a physical activity or sports event, do your parents praise you for trying hard?

	MOTHER							FATHER				
A	1	2	3	4	5	PERCEIVE	C	1	2	3	4	5
	Always	Quite often	Some times	Hardly ever	Never			Always	Quite often	Some times	Hardly ever	Never
B	1	2	3	4	5	DESIRE	D	1	2	3	4	5

13. Do your parents show that they understand how you are feeling about physical activity.

		MOTHER							FATHER				
A	1	2	3	4	5	PERCEIVE	C	1	2	3	4	5
	Always	Quite often	Some times	Hardly ever	Never			Always	Quite often	Some times	Hardly ever	Never
B	1	2	3	4	5	DESIRE	D	1	2	3	4	5

14. After a physical activity do your parents praise you for where you placed (1st, 2nd, 3rd).

		MOTHER							FATHER				
A	1	2	3	4	5	PERCEIVE	C	1	2	3	4	5
	Always	Quite often	Some times	Hardly ever	Never			Always	Quite often	Some times	Hardly ever	Never
B	1	2	3	4	5	DESIRE	D	1	2	3	4	5

APPENDIX 8: APPRAISAL TOOL
WITH REAIM DIMENSIONS FOR INTERVENTIONS

RE-AIM framework evaluation (adapted from Glasgow 1999, 2001 and Blackman et al, Roman and Frantz); Quantitative tool adapted from Roman and Frantz (2013)

20 questions designed to help you make sense of the appraisal of interventions while conducting a systematic review using the RE-AIM framework.

How to use this appraisal tool:

Questions were structured according to the RE-AIM dimension to assist with appraising interventions. Dimensions considered were:

- Reach
- Effectiveness
- Adoption
- Implementation
- Maintenance

The 20 questions following on the next pages are designed to help you shift through interventions systematically for inclusion. Questions 1-3 (Reach), questions 4-6 (effectiveness), questions 7-9 (Implementation), questions 10-12 (implementation) and questions 13-14 (Maintenance). Questions 15-20 are posing questions included to determine relevance and credibility.

The questions posed allows you to screen an intervention quickly and accurately. You are given an option to answer (yes)=1 or (no)=0. The total will determine your inclusion in an article. If the final score is 10 and below. It could be considered 50% and below. Such Interventions could only be included if the researcher recommends inclusion based on valuable additional information. Interventions scored at 70% and above are recommended for inclusion (reference).

REAIM DIMENSIONS

REACH:

1. Does the study clearly state who it was intended for (Inclusion and exclusion criteria)?
   a) Yes (1)
   b) No (0)

2. Does the study report on the representativeness of the target population?
   a)Yes (1)
   b)No (0)

3. Does the article report on the participation rate?
   a)Yes (1)
   b)No (0)

EFFECTIVENESS:

4. Did the program achieve the intended objectives?

   a)Yes (1)

   b)No (0)

5. Do they report on the limitations of the interventions?
   a)Yes (1)
   b)No (0)

6. Reports on at least one outcome of the intervention?

   a)Yes (1)

   b)No (0)

ADOPTION:

7. Is the setting clearly described?

   a)Yes (1)

   b)No (0)

8. Does the intervention report on the adoption of the intervention by the participants or the organization?

   a)Yes (1)
   b)No (0)

9. Does the intervention report on who delivered the program?

a)Yes (1)

b)No (0)

IMPLEMENTATION:

10.The duration and frequency of the intervention were described?

a)Yes (1)

b)No (0)

11.Reports on the cost implications of the intervention?

a)Yes (1)

b)No (0)

12.Reports on the intended and delivered intervention?

a)Yes (1)

b)No (0)

MAINTENANCE:

13.Reports on the long-term effects of the intervention?

a)Yes (1)

b)No (0)

14.Reports on the indicators used for intervention follow-up?

a)Yes (1)

b)No (0)

15.Were participants appropriately allocated to intervention and control groups?

a)Yes (1)

b)No (0)

16. Did the study have a clear research focus (intervention given and intended outcomes)

a)Yes (1)

b) No (0)

17. Were participants staff and study personnel blind to participants in the study group?

a)Yes (1)

b)No (0)

18. Were all the participants who entered the intervention accounted for after the intervention.

a)Yes (1)

b)No (0)

19. Was the results presented clearly?

a)Yes (1)

b)No (0)

20. Were all important outcomes considered so the results can be applied?

a)Yes (1)

b)No (0)

APPENDIX 9: QUANTITATIVE APPRAISAL TOOL
APPRAISAL TOOL FOR QUANTITATIVE STUDIES

(Quantitative tool adapted from Roman & Frantz, 2013)

10 questions designed to help you make sense of the appraisal of quantitative studies.

The 10 questions following on the next pages are designed to help you appraise quantitative studies. Questions 1-3 pose questions about the validity of the sampling process and measurement tools. Question 4 is about the measurement tool. Question 5 was about the sources of data. Question 6-7 was about the ethical approval and the limitations of the study. Questions 8-10 are about the design and methods used in the studies.

The questions posed allows you to screen a study quickly and accurately. You are given an option to answer (yes)=1 or (no)=0. The total will determine your inclusion and final selection. If the score is 7-10 it will be converted from 70% to 100%. The study will be recommended for inclusion. Studies that score below 70% could be considered for inclusion based on the researcher's recommendation. The reason is based on valuable additional information found in the study.

1.Was the definition of physical activity included?

a)Yes (1)

b)No (0)

2. Is the sampling process clearly stated (Inclusion and exclusion criteria)

c) Yes (1)
d) No (0)

3. Were the non-responses addressed?
a)Yes (1)
b)No (0)

4. Was the measurement tool valid?
a)Yes (1)
b)No (0)

5. What was the source of data?
c)Primary (1)
d)Secondary (0)

6. Was ethical approval obtained?

a)Yes (1)

b)No (0)

7. Were the limitations of the study clearly explained?

a)Yes (1)

b)No (0)

8. Were the quantitative methods appropriate?

a)Yes (1)
b)No (0)

9. Was the data analysis in line with the research design?

a)Yes (1)

b)No (0)

10. Was the research design appropriate?

a)Yes (1)

b)No (0)

APPENDIX 10: CORRESPONDENCE WITH JOURNALS: AJPHES

AFRICAN JOURNAL FOR PHYSICAL ACTIVITY AND HEALTH SCIENCES (AJPHES)

Department of Sport, Rehabilitation and Dental Sciences
Tshwane University of Technology, P. Bag X680, Pretoria 0001, South Africa.
Tel: +27 12 382 5806, Fax: +27 12 382 5801; E-mail: abel.toriola2015@gmail.com

30 August 2021

Colleen Cozett, Prof. S.H. Bassett and Prof. N.V. Roman
Department of Sport Recreation & Exercise Science,
Faculty of Community & Health Sciences,
University of the Western Cape (UWC),
Bellville, South Africa.

E-mail: colleencozettconsulting@hotmail.com

Dear Ms Cozett,

RE: ACCEPTANCE OF MANUSCRIPT FOR PUBLICATION

I am pleased to inform you that your manuscript submitted to the African Journal for Physical Activity and Health Sciences (AJPHES) titled, "**Exploring adolescents' perceptions of factors contributing to increasing physical activity participation,**" has been technically reviewed, found publishable and accepted for publication in the journal. The paper will be published in AJPHES Vol. 28(1) March 2022. The galley proof of the paper will be sent to you for your approval well in advance of the scheduled publication date.

You are kindly requested to attend to the attached invoice, which is meant to defray the very high cost of publication. You are also requested to sign the enclosed authors' agreement form and e-mail it to the Editor-In-Chief at the above e-mail address.

Thank you.

Yours sincerely,

Prof. A.L. Toriola
Editor-In-Chief, AJPHES

APPENDIX 11: CORRESPONDENCE WITH JOURNALS: IJERPH

[IJERPH] Manuscript ID: ijerph-1462863 - Manuscript Resubmitted

SS

susy@mdpi.com
on behalf of
Submission System <submission@mdpi.com>
Sat 11/27/2021 6:50 PM
To:

Colleen Cozett

Cc: Nicolette Vanessa Roman <nroman@uwc.ac.za>
Dear Mrs. Cozett,

Thank you very much for resubmitting the modified version of the following manuscript:

Manuscript ID: ijerph-1462863
Type of manuscript: Article
Title: Title: Recommendations to enhance parental involvement and adolescent participation in physical activity
Authors: Colleen Cozett *, Nicolette Vanessa Roman *
Received: 29 October 2021
E-mails: colleen.cozett@northlink.co.za, nroman@uwc.ac.za
Submitted to a section: Children's Health,
https://www.mdpi.com/journal/ijerph/sections/Children_Health
Community and In-School Based Physical Activity in Children and Adolescents

https://www.mdpi.com/journal/ijerph/special_issues/physical_children_adolescent
https://susy.mdpi.com/user/manuscripts/review_info/997fdd7377d4bf84ad363aac5c07bf3d

A member of the editorial office will be in touch with you soon regarding progress of the manuscript.

Kind regards,
IJERPH Editorial Office
Postfach, CH-4020 Basel, Switzerland
Office: St. Alban-Anlage 66, CH-4052 Basel
Tel. +41 61 683 77 34 (office)
Fax +41 61 302 89 18 (office)
E-mail: ijerph@mdpi.com
https://www.mdpi.com/journal/ijerph/

APPENDIX 12: CORRESPONDENCE WITH JOURNALS: IJERPH

[IJERPH] Manuscript ID: ijerph-1460877 - Manuscript Resubmitted

susy@mdpi.com

on behalf of

Submission System <submission@mdpi.com>

Sat 11/27/2021 1:11 AM

To: Colleen Cozett

Cc: Nicolette Vanessa Roman <nroman@uwc.ac.za>

Dear Mrs. Cozett,

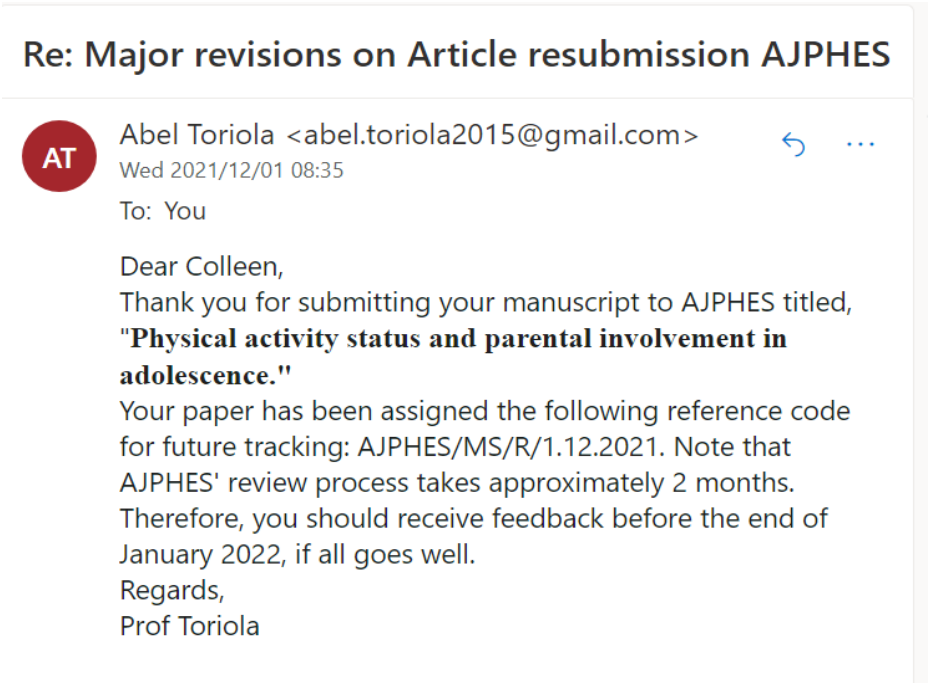
Thank you very much for resubmitting the modified version of the following manuscript:

Manuscript ID: ijerph-1460877
Type of manuscript: Article
Title: Developing a framework for guidelines for parent involvement to increase physical activity participation
Authors: Colleen Sarah Cozett *, Nicolette Vanessa Roman
Received: 28 October 2021
E-mails: colleen.cozett@northlink.co.za, nroman@uwc.ac.za
Submitted to a section: Children's Health,
https://www.mdpi.com/journal/ijerph/sections/Children_Health
Community and In-School Based Physical Activity in Children and Adolescents
https://www.mdpi.com/journal/ijerph/special_issues/physical_children_adolescent
https://susy.mdpi.com/user/manuscripts/review_info/bd207a534bbb3db355ad783b8700de75

A member of the editorial office will be in touch with you soon regarding progress of the manuscript.

Kind regards,
IJERPH Editorial Office
Postfach, CH-4020 Basel, Switzerland
Office: St. Alban-Anlage 66, CH-4052 Basel
Tel. +41 61 683 77 34 (office)
Fax +41 61 302 89 18 (office)
E-mail: ijerph@mdpi.com
https://www.mdpi.com/journal/ijerph/

APPENDIX 13: CORRESPONDENCE WITH JOURNALS: AJPHES



Re: Major revisions on Article resubmission AJPHES

AT

Abel Toriola <abel.toriola2015@gmail.com>
Wed 2021/12/01 08:35

To: You

Dear Colleen,
Thank you for submitting your manuscript to AJPHES titled, "**Physical activity status and parental involvement in adolescence.**"
Your paper has been assigned the following reference code for future tracking: AJPHES/MS/R/1.12.2021. Note that AJPHES' review process takes approximately 2 months. Therefore, you should receive feedback before the end of January 2022, if all goes well.
Regards,
Prof Toriola

APPENDIX 14: CORRESPONDENCE WITH JOURNALS: ADVANCES IN PUBLIC HEALTH

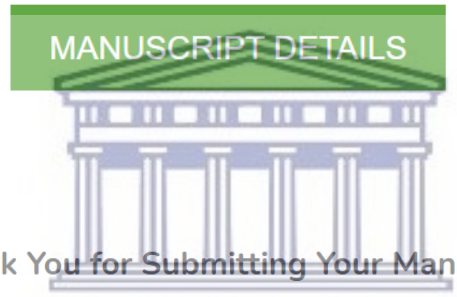
Dear Dr. Cozett,

Congratulations, the manuscript titled "INCREASING PHYSICAL ACTIVITY AND PARENT INVOLVEMENT IN ADOLESCENCE: A SYSTEMATIC REVIEW WITH REAIM FEATURES" has been successfully submitted to Advances in Public Health.

We will confirm this submission with all authors of the manuscript, but you will be the primary recipient of communications from the journal. As submitting author, you will be responsible for responding to editorial queries and making updates to the manuscript.

In order to view the status of the manuscript, please visit the manuscript details page.

Thank you for submitting your work to Advances in Public Health.



Thank You for Submitting Your Manuscript

Your manuscript has been successfully submitted to **Advances in Public Health**.

An acknowledgment email will be sent to all authors when our system has finished processing the submission - at which point a manuscript ID will be assigned, and you will be able to track the manuscript status on your dashboard.

APPENDIX 15: CORRESPONDENCE WITH JOURNALS: IJERPH

International Journal of
Environmental Research and Public Health

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CERTIFICATE OF ACCEPTANCE

Certificate of acceptance for the manuscript (**ijerph-1462863**) titled:

Title: Guidelines to enhance parental involvement and adolescent participation in physical activity

Authored by:

Colleen Cozett; Nicollette Vanessa Roman

has been accepted in *Int. J. Environ. Res. Public Health* (ISSN 1660-4601) on 30 December 2021

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Basel, January 2022