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Exploring the Use of Sport as a Platform for Health Promotion with Youth in Africa: A Scoping Review

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Master's Thesis submitted to the College of Physical Activity and Sport Sciences at West
Virginia University in partial fulfillment of the requirements for the degree of Masters of Science
in Sport and Exercise Psychology

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intervention

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ABSTRACT

Exploring the Use of Sport as a Platform for Health Promotion with Youth in Africa: A Scoping Review

Adam H. Hansell

According to the World Health Organization, Africa has the highest rates of disease and child mortality in the world. Previous research suggests that sport may be an effective vehicle to enhance health knowledge and behaviors among at-risk youth. The primary purpose of this review was to analyze and synthesize published interventions exploring the use of sport or physical activity for health promotion with children and youth in Africa. A total of 916 articles were retrieved from ten electronic bibliographic databases with 28 meeting inclusion criteria. Targeted health outcomes in sport-based interventions included HIV-related knowledge and behaviors, essential health practices, physical and mental health, physical activity, and overall fitness levels. Statistically significant improvements in targeted health outcomes were observed in 23 of the 28 interventions included. However, the authors conducted risk of bias ratings for each study, and 23 articles were rated as having a “serious” or “critical” risk of bias. Our findings suggest that the use of sport- and physical activity as a health promotion intervention may be an effective with children and youth in Africa. However, future researchers must incorporate more rigorous methodological approaches, such as randomized controlled trials with wait-list control or crossover design.

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Exploring the Use of Sport as a Platform for Health Promotion: A Scoping Review

Infectious diseases such as pneumonia, diarrhea, and malaria are the primary cause of child mortality in Africa (Black et al., 2010; Liu et al., 2015). It has been estimated that more than ten million children under the age of five die every year, and nearly all of these deaths occur in poor, developing countries (Black, Morris, & Bryce, 2003). In 2000, 36 of the 42 countries with the highest global rates of under-five child mortality were in Africa (Black et al., 2003). Since the 1990s, many countries in sub-Saharan Africa have experienced increases in child mortality rates, while others have experienced stalled or slowed progress in this domain (Fotso, Ezeh, Madise, & Ciera, 2007). Another recent report highlighted sub-Saharan Africa as having the world's highest child mortality rate with over three million deaths of children under the age of five, meaning that one child out of every 12 dies before their fifth birthday (United Nations, 2015). Since 2000, 64.3% of deaths in children under five were attributed to infectious diseases, reflecting nearly five million premature deaths (Liu et al., 2015). Infectious diseases were also a leading cause of death for older children and adolescents in Africa, with pneumonia (14.7%), diarrhea (9.9%), and malaria (7.4%) serving as the three biggest culprits (Liu et al., 2015).

The World Health Organization reported that Africa has the highest incidence rates of infectious diseases in the world, which include HIV and AIDS, tuberculosis, and malaria (World Health Organization, 2016). Compared to other global regions, HIV incidence rates were over seven times higher in the African Region in 2014 with an average of 2.6 people out of 1000 being infected (World Health Organization, 2016). Globally, of a total of 438,000 deaths caused by malaria in 2015, roughly 90% of fatalities occurred in sub-Saharan Africa, and approximately 70% of deaths were children under the age of five. Africa also had the highest incidence rates of tuberculosis in 2014, with 281 cases per 100,000 people (World Health Organization, 2016).

Therefore, Africa has the highest incidence and mortality rates of three of the world's most deadly infectious diseases, which highlights the urgent need for interventions and resources.

The World Health Organization (2016) reported that Africa also had the highest number of deaths caused by exposure to unsafe drinking water and inadequate sanitation and hygiene practices. Nearly half of an estimated total of 871,000 global deaths caused by unsafe water exposure occurred in Africa in 2012. The vast majority of these deaths were caused by infectious diseases contracted from contaminated drinking water and inadequate or non-existent hygienic facilities (World Health Organization, 2016). Another study estimated that unsanitary water was responsible for approximately 1.5 million deaths in children in 2000 (Black et al., 2003). Clearly, exposure to, and the use of, contaminated water is a risk factor for early mortality. Due to the dangers posed by exposure to and use of contaminated water, tangible and educational resources should be allocated to communities that are exposed to unsafe water.

Socioeconomic status is one of the primary risk factors for acquiring infectious diseases as individuals living in poverty are far more likely to contract these ailments (World Health Organization, 2016). In addition to being at higher risk of contracting infectious diseases, individuals living in poverty often have limited access to resources that can treat infectious diseases after they are contracted (World Health Organization, 2016). Given the disproportionate amount of people living in poverty in Africa compared to the rest of the world, interventions and resources aimed at improving these conditions should be allocated to at-risk communities. Although education and awareness initiatives may have the most long-term preventative impact, there are numerous tangible resources that could both prevent and treat different infectious diseases. These include condoms to prevent the spread of HIV and AIDS, bed nets to help

protect against malaria and other mosquito-borne illnesses, and water filtration systems to help reduce the instances of infectious diseases caused by contaminated water.

It has been noted that 63% of child deaths caused by disease could have been prevented by implementing known and effective interventions, such as vaccines (Bryce et al., 2003). However, many poor and middle-income African countries have unacceptably low accessibility to these essential health resources (Bryce et al., 2003). Thus, it is imperative for researchers to develop feasible health promotion interventions that align with the health-system development of the countries they are aiming to help (Bryce et al., 2003). For example, initiatives could focus on collecting data at the community level to assist and inform public health planning in an attempt to promote widespread accessibility to known and effective interventions such as condoms, water filters, and vaccines (Bryce et al., 2003). Therefore, one plausible direction for future health initiatives would involve a shift in focus away from medical services in hospitals and clinics towards community-based approaches, particularly in countries where the overall access to public health services is poor or non-existent.

One example of a preventative, educational approach to health promotion that also can provide tangible resources involves the use of sport. Sport for development initiatives, which use sport as a vehicle to promote positive social change, have become increasingly popular in recent years (Schulenkorf, Sherry, & Rowe, 2016). Specifically, sport for development programs use the popularity of sport to attract large groups of individuals, and use sport-related themes to discuss and initiate positive development (Jones et al., 2017; Schulenkorf et al., 2016). Previous researchers have used sport as a platform to achieve a broad range of positive outcomes for individuals and communities, including disease management and prevention, improved physical and mental health outcomes, life skills development, gender equity, and social cohesion (Jones et

al., 2017; Schulenkorf et al., 2016). Based on this approach, sport-based programs have potential to play a significant role in helping at-risk youth navigate their environments.

Previous research suggests that participation in sport promotes the development of important life skills such as goal-setting, teamwork, discipline, decision-making, time management, and emotion regulation (Theokas et al., 2008). Life skills that are deliberately taught through sport can steer youth away from various risk-taking behaviors that may lead to lifelong consequences, such as substance abuse, sexual activity, and crime (Kulig, 2003). For instance, sport programs can help youth develop essential life skills such as self-efficacy, confidence to withstand peer pressure, and the ability to develop healthy coping strategies, all of which can significantly reduce the chances of contracting an infectious disease (Balfour et al., 2013; Whitley et al., 2016). A recent review of sport for positive youth development research found that sport involvement was most commonly linked to confidence and positive identity, which may contribute to the avoidance of risk-taking behaviors among at-risk youth (Jones et al., 2017). In addition to protecting against non-communicable diseases through life skills development, previous research also suggests that sport is an advantageous platform to educate youth about common infectious diseases and essential health practices as well (Fuller et al., 2010; Kaufman, Spencer, & Ross, 2013).

Considering the inherent physical, mental, and social benefits that are associated with playing sport, sport for development initiatives have significant potential to help at-risk youth in Africa (Jones et al., 2017). Instead of physical activity, children and adolescents often engage in maladaptive and self-destructive behaviors such as substance abuse and petty crime, which are often accompanied by unemployment and poverty (Draper et al., 2010; Uys et al., 2016). Using sport as a health promotion platform could also encourage youth to engage in positive and

adaptive behaviors with their peers while also being physically active (Schulenkorf et al., 2016). For instance, individuals who are involved in a sport-based health promotion initiative may be more likely to play sport in their spare time instead of engaging in risky behaviors such as substance abuse or crime. It has also been well established that exercise and other forms of physical activity can reduce risk factors associated with obesity, diabetes, and cardiovascular disease (Booth, Gordon, Carlson, & Hamilton, 2000; Pedersen, 2006). Therefore, using a health promotion program that engages youth in physical activity can reduce the risks of developing non-communicable diseases through physical activity as well as promote the development of adaptive life skills.

Given the worrying statistics regarding infectious diseases in Africa, researchers have also explored using sport for development initiatives to provide youth with resources to protect themselves against infectious diseases such as HIV and malaria (Fuller et al., 2010). The results of a recent systematic review found strong evidence that sport-based health promotion interventions can positively influence HIV-related knowledge, attitudes, stigma, self-efficacy, and communication skills with children and youth in Africa (Kaufman et al., 2013). Although it is unclear how long these improvements are sustained beyond the intervention, it is evident that sport-based initiatives can be effective in educating youth in Africa about infectious diseases and equipping them with protective skills and resources (Kaufman et al., 2013).

Although improving national health systems should be the ultimate goal to reduce rates of child mortality, small-scale community-based interventions have been successful in improving overall and disease-specific health knowledge and awareness for children, adolescents, and adults (Balfour et al., 2013; Clark et al., 2006; Fuller et al., 2010; 2011; 2015; Maro, Roberts, & Sørensen, 2009). For instance, three studies used soccer as a platform to educate 5,128 youth

participants about various infectious diseases, the use of clean water, safe sex, basic sanitary health practices, getting vaccinated, taking prescribed medications, and nutrition (Fuller et al., 2010; 2011; 2015). Following the sport-based interventions, participants' mean health knowledge scores were 14.3% higher in South Africa, 18.4% higher in Zimbabwe, and 17.8% higher in Mauritius, which highlights the effectiveness of these programs in improving the health awareness and knowledge among children in rural, low-income communities (Fuller et al., 2010; 2011). In the study conducted by Fuller et al. (2015), participants' mean health knowledge scores following the sport-based intervention were 25.1% higher in Ghana, 10.3% higher in Malawi, 27.4% higher in Namibia, 15.1% higher in Tanzania, and 17.2% higher in Zambia. Furthermore, it has been noted that the use of sport at schools in South Africa can provide a safe place for students to learn and participate in organized activities (Struthers, 2011). The use of sport is an innovative and fun way to promote positive and sustainable health changes with potentially large numbers of youth in communities throughout Africa. Future research that targets the use of soccer and other types of sport as platforms to educate children about essential health practices warrants further exploration.

As discussed, previous research suggests that the use of sport as a platform to educate children and adolescents can be a successful vehicle for improving health and disease-specific knowledge among children and youth in many African countries. Based on the observed improvements in health knowledge among youth participants following sport-based health promotion interventions, it is worth investigating the use of sport as a platform for health promotion in a more systematic manner. As this body of research continues to expand, it is important to analyze and synthesize effective components of previous interventions to inform future efforts. A close analysis of the long-term sustainability of these types of programs,

theoretical considerations, how these interventions were delivered and by whom, and other aspects of the interventions (e.g., gender) could inform future efforts that maximize impact with limited resources. Scoping reviews are ideally suited to address these issues because they provide researchers with a descriptive analysis about the breadth and the depth of a research field and provide justification for future systematic and quantitative reviews (Levac, Colquhoun, & O'Brien, 2010).

Although there have been several attempts to promote necessary public health practices that could significantly reduce the high rates of child mortality in Africa, a structured synthesis of this literature could guide future interventions. This is particularly true for rural areas and communities where public health services are hard to access (Bryce et al., 2003). Considering the urgent need for effective interventions to improve rates of child mortality in Africa, a detailed review of the effectiveness of previous health promotion interventions using sport as a delivery mechanism would be helpful for directing future research endeavors in this domain. Specifically, the primary aim of this scoping review is to provide a detailed summary of the measured outcomes observed in previous studies that investigated the use of sport as a platform for health promotion with youth in Africa. Secondary purposes are to identify characteristics of interventions related to the length, nature, content, and methods employed in previous sport-based interventions targeting children and youth in Africa. A third purpose was to conduct a risk of bias assessment to thoroughly analyze the methodologies employed in each intervention (Sterne et al., 2016). Finally, to increase the translational utility or practical impact of this study, the major findings will be presented to practitioners in the field for their feedback.

Method

Overview

In line with recommendations by Levac et al. (2010), the steps for the current scoping review included the following: (1) identification of the research question; (2) identification of relevant studies; (3) study selection; (4) charting of the data; (5) data synthesis; and (6) consultation with practitioners (e.g., coaches and staff members of sport-based non-profit organizations in Africa). Additionally, the first author independently coded each article included in our review for Risk of Bias using the ROBINS-I tool for assessing risk of bias in non-randomized studies of interventions (Sterne et al., 2016).

Study Identification and Data Sources

Citations were retrieved from ten electronic bibliographic databases (Academic Search Complete, CINAHL, eHRAF, ERIC, Google Scholar, Physical Education Index, PsycInfo, PubMed, SportDiscus, and Web of Science). Keywords included sport, health promotion, Africa, youth, children, adolescents, youth development, disease, community, mortality, and intervention. A range of health terms and disease processes including HIV, AIDS, malaria, and clean water were included in this search, and relevant Medical Subject Headings (MeSH) terms were included. MeSH terms contain all relevant search terms identified by the United States National Library of Medicine's thesaurus (USNLM, 1999). All searches were conducted in consultation with a West Virginia University Librarian in order to identify all appropriate databases and ensure the use of relevant MeSH terms. Studies were not bound by a specific date range in order to gain a comprehensive assessment of sport-based interventions targeting health promotion outcomes among youth in Africa.

Identification and Selection of Relevant Studies

For purpose one of the scoping review, the inclusion criteria included the following: (1) the use of sport as the intervention method; (2) the study being conducted in Africa; (3) youth

participants 24 years of age or younger, or families that included individuals that were 24 years old or younger; (4) pre/post measurements conducted before and following an intervention, and (5) publications in English. Studies were selected by the first author and were reviewed in consultation with the senior investigator.

Data Charting and Synthesis

To address the second purpose of this study we focused on articles that included sport-based interventions. A codebook was developed by the first author which is shown in Appendix D. Variables included the following: (1) study author(s); (2) journal publication and year; (3) study design; (4) study outcomes; (5) country in Africa where study was conducted; (6) total sample size; (7) number of completers; (8) age range and mean age of participants; (9) participant gender; (10) setting of intervention; (11) duration of study; (12) theoretical foundation of interventions; and (13) source of funding. The first author independently coded, with input from the second author, all studies that met our review's inclusion criteria.

Study outcomes were charted and synthesized in three steps. First, the first author read each abstract and documented the outcomes being investigated from terms used in the study titles, abstracts, and key words. This process allowed the first author to observe thematic similarities in measured outcomes across studies which led to the development of a coding template. This template was used in a second round of coding by the first author to qualitatively describe the outcomes observed. A list of outcomes was developed by the first author in consultation with the senior investigator and each outcome was given a dummy code. The outcome frequencies were then calculated among all the included studies using the frequency command in IBM's Statistical Package for the Social Sciences (IBM SPSS).

Levac and colleagues (2010) suggest that scoping reviews are ideally suited to map the range, extent, and nature of previous research initiatives, and they may inform future research endeavors, including quantitative reviews. Importantly, scoping reviews differ from systematic reviews in the wider breadth of research questions that can be addressed as well as an emphasis on the narrative integration of extant research evidence (Levac et al., 2010). Given that the use of sport-based health promotion interventions with youth in Africa is a relatively new line of research with a clear scope of inquiry and a broad range of research questions, scoping reviews are ideally suited to review existing research regarding the use of sport-based interventions targeting health promotion outcomes for children and youth in Africa (Levac et al., 2010).

Risk of Bias

All articles were coded for risk of bias using the ROBINS-I tool for assessing risk of bias in non-randomized studies of interventions (Sterne et al., 2016). The ROBINS-I tool was developed over a three-year period by methodological experts and systematic review authors and editors (Sterne et al., 2016). The ROBINS-I tool allows for a comprehensive analysis of risk of bias in relation to a hypothetical randomized control trial, and the categories for risk of bias assessments are low risk, moderate risk, serious risk, and critical risk. If an article does not provide sufficient information to receive a risk of bias rating, it should be coded as no information (Sterne et al., 2016). In addition to addressing important confounding domains and co-interventions, the ROBINS-I tool asks a series of signaling questions across seven domains of bias; baseline confounding, selection of participants into the study, classification of interventions, deviations from the intended intervention, missing data, measurement of outcomes, and selection of the reported result (Sterne et al., 2016). Importantly, the judgments made for each of these seven domains of bias carry forward to an overall risk of bias for the

study. For example, if a study is deemed to have a moderate risk of bias in six domains and a high risk of bias in the seventh domain, then the article would be considered as high risk of bias. To receive a low risk rating, the risk of bias should be similar to that of a high quality randomized control trial (Sterne et al., 2016). Therefore, most non-randomized control trials are likely to earn a rating of at least a moderate risk of bias.

Consultation with Practitioners

The sixth and final step of scoping review methodologies is to incorporate consultation with relevant stakeholders to acquire additional insight beyond what is available in published literature (Levac et al., 2010). The first author contacted Grassroot Soccer, which is a non-profit organization that uses soccer to build resiliency in children and adolescents to help protect against the infection of HIV and other infectious diseases (Peacock-Villada, DeCelles, & Banda, 2007). The researchers created an anonymous survey on Qualtrics with a brief description of our preliminary findings and the following questions: (1) What is your role at Grassroot Soccer? (2) What is your gender?; (3) How many years of experience do you have working in Africa?; (4) Please share your general thoughts or observations about these research findings. What stands out to you?; (5) What steps could be taken to help sport-based health promotion?; and (6) What would you like to see in future sport-based health promotion interventions? An anonymous survey link was sent via email to staff members and coaches at Grassroot Soccer working in South Africa, Zambia, and Zimbabwe. Results from this survey were synthesized and exemplar quotations are presented to highlight the potential contributions of sport in future health promotion efforts.

Results

A total of 916 articles were collected and screened for eligibility. The initial comprehensive database search yielded 322 duplicate publications, and a total of 594 articles remained after these were identified and removed. Following the removal of duplicate articles, the first author screened 540 titles and abstracts of the remaining search results to determine if they met the inclusion criteria for our review. Full texts of the remaining 54 articles were evaluated by the first author. Following this final review process, a total of 28 articles were deemed to meet the study's eligibility criteria. If there was uncertainty about the eligibility of a specific article based on title and abstract alone, the first author obtained and evaluated a full text of the paper. A PRISMA flow diagram of this process is shown in Figure 1 that summarizes reasons for inclusion/exclusion throughout the review process.

Outcomes

Specific outcomes of each of the 28 articles that met inclusion criteria for this review are included in Table 1. Targeted outcome variables examined in these studies included HIV-related outcomes ($n = 8$); knowledge and awareness of nine essential health behaviors (physical activity, clean water use, proper sanitation practices, substance abuse, nutrition, malaria prevention, vaccinations, taking prescribed medications, HIV awareness, gender equality, and social support ($n = 3$); physical fitness ($n = 9$); physical activity levels ($n = 6$); social protective factors ($n = 3$); physical health ($n = 4$); mental health ($n = 1$); and injury prevention ($n = 2$). A total of 36 outcomes were examined in this review.

The countries where each intervention was conducted are included in Table 1. Over half of the interventions included in this review were conducted in South Africa ($n = 18$). Other African countries Mauritius ($n = 1$), Namibia ($n = 1$), Nigeria ($n = 1$), Uganda ($n = 1$),

Figure 1: PRISMA 2009 Flow Diagram

Zambia ($n = 2$), and multiple ($n = 5$). Eleven of 28 studies reported using specific theoretical frameworks to guide their efforts as shown in Table 1. These theories included Achievement Goal Theory ($n = 3$), Social Learning Theory ($n = 3$), the Social-Ecological Model ($n = 2$), Self-Determination Theory ($n = 1$), the Theory of Planned Behavior ($n = 1$), and Psychosocial Theory ($n = 1$). The authors of the remaining 17 articles did not explicitly mention incorporating a theoretical foundation into their interventions.

Contextual Considerations

Additional contextual considerations for the studies included in our review are included in Table 2. Fifteen of the 28 interventions were conducted with youth in a school setting either as part of the existing school curriculum or immediately after school (See Table 2). Twelve interventions were conducted in community settings such as gyms, sporting venues, and health centers. One intervention included both in-school and community-based components (See Table 2). The majority of interventions were delivered by individuals from the community in which the research initiative took place who were trained in the intervention protocol. Specifically, trained peer coaches ($n = 12$), trained athletic coaches ($n = 2$), trained school staff members ($n = 4$), professional soccer players ($n = 1$), university students ($n = 3$), fitness trainers ($n = 1$), untrained teachers ($n = 1$), and principal investigators ($n = 2$) delivered the intervention to program participants (See Table 2). Two articles did not report who administered the intervention to participants.

Based on the information provided in Table 2, the average sample size across all the interventions was 704 participants. There was an average of 199 dropouts across the interventions, leaving an average of 505 participants who completed the intervention. Of

Table 1.
Results in selected studies

<i>Authors</i>	<i>Outcomes Measured</i>	<i>Theoretical Foundation</i>	<i>Country</i>	<i>Results</i>
Fuller et al. (2010)	Nine essential health practices	None	South Africa	Significant improvements in knowledge of all measured outcomes
Fuller et al. (2011)	Nine essential health practices	None	Mauritius and Zimbabwe	Significant improvements in knowledge of all measured outcomes
Fuller et al. (2015)	Nine essential health practices	None	Ghana, Malawi, Namibia, Tanzania, Zambia	Significant improvements in knowledge of all measured outcomes
Clark et al. (2006)	HIV/AIDS knowledge + stigma; awareness of local resources	Social Learning Theory	Zimbabwe	Significant improvements in HIV/AIDS knowledge
Maro et al. (2009)	HIV prevention knowledge, attitudes, and awareness	Achievement Goal Theory	Tanzania	Significant improvement in HIV knowledge and awareness
Maro & Roberts (2012)	Effect of mastery motivational climate on HIV prevention, knowledge, and awareness	Achievement Goal Theory	Tanzania	No significant improvement in measured outcomes due to mastery motivational climate
Hershow et al. (2015)	HIV/AIDS knowledge, attitudes, communication skills, and HCT uptake	Social Learning Theory	South Africa	Significant Improvements in all measured outcomes
Sørensen et al. (2016)	Gender differences in HIV/AIDS prevention, knowledge, and awareness	Achievement Goal Theory	Tanzania	No significant differences in measured outcomes between boys and girls
Awotidebe et al. (2014)	HIV knowledge and communication skills	Theory of Planned Behavior	South Africa	Significant improvements in HIV knowledge and negotiation skills
Bloemhoff (2006)	Resiliency and protective factors	None	South Africa	Significant improvements in all measured outcomes
Bloemhoff (2012)	Resiliency and protective factors	None	South Africa	Significant improvements in all measured outcomes

Table 1 Cont.***Results in selected studies***

<i>Authors</i>	<i>Outcomes Measured</i>	<i>Theoretical Foundation</i>	<i>Country</i>	<i>Results</i>
Kaufman et al. (2016)	Voluntary Medical Male Circumcision (VMMC) uptake	Social Learning Theory	Zimbabwe	Significant increase in VMMC uptake among participants
Chetty & Edwards (2007)	Mental health promotion (self-esteem, depressive symptoms, behavioral problems)	Psychosocial Theory	South Africa	Significant improvements in self-esteem and physical self-perception; significant reduction behavioral problems
Ferguson et al. (2015)	Motor skills, fitness	Social Ecological Model	South Africa	Significant improvements in all measured outcomes
Lennox & Pienaar (2013)	Aerobic fitness; PA levels	None	South Africa	No significant improvements in all measured outcomes
Monyeki et al. (2012)	Body composition	None	South Africa	No significant improvements in intervention condition
Naidoo et al. (2009)	PA levels; sport participation; fitness tests; nutrition	None	South Africa	Significant improvements in health behaviors and PA at school
Naidoo & Coopoo (2012)	PA levels; sport participation; fitness tests	None	South Africa	Significant improvements in all measured outcomes
Owoeye et al. (2014)	Injuries; injuries by type of exposure; injuries to lower extremities	None	Nigeria	Significant reduction in all measured outcomes for participants' in the intervention condition
Parker et al. (2016)	Pain severity; pain interference; self-efficacy; depression; quality of life	None	South Africa	Significant reduction in pain for both conditions
Richards et al. (2014)	Physical fitness; body composition; mental health	None	Uganda	Significant improvements in cardiovascular fitness for both conditions; Significant decrease in positive mental health outcomes for boys

Table 1 Cont.***Results in selected studies***

<i>Authors</i>	<i>Outcomes Measured</i>	<i>Theoretical Foundation</i>	<i>Country</i>	<i>Results</i>
Starzak et al. (2016)	Saliva tests for mucosal immunity and SNS activation; body composition; cardiovascular fitness	None	South Africa	Significant improvements in measured salivary and fitness outcomes, significant reduction in BMI, body fat %, and waist circumference
Tian et al. (2017)	PA levels	Self-Determination Theory	South Africa	Significant improvements in MVPA
Ley et al. (2014)	Strength; cardiovascular fitness; weight; BMI	None	South Africa	Significant improvements in strength, no significant improvements in cardio fitness, BMI, weight
Kemp & Pienaar (2009)	Fitness outcomes; body composition	None	South Africa	Significant improvements in all measured outcomes
Uys et al. (2016)	PA levels; PA knowledge; fitness tests	Social Ecological Model	South Africa	Significant improvements in PA knowledge and fitness test outcomes, no significant improvement in PA levels
Walter (2014)	PA levels during school	None	South Africa	Significant improvements in MVPA levels among participants
Peacock-Villada et al. (2007)	Resiliency; Decision-making skills	None	South Africa; Zambia	Significant improvements in all measured outcomes

these 505 participants, an average of 280 participants were males and 225 were females.

Additionally, the average age of participants across the included interventions was 14.08 years.

Lastly, the average sport-based health promotion intervention included in our review lasted 21.23 weeks.

Funding

Of the 28 articles included in our review, 22 reported receiving funding for their intervention (Awotidebe et al., 2014; Chetty & Edwards, 2007; Clark et al., 2006; Ferguson et al., 2015; Fuller et al., 2010; 2011; 2015; Hershow et al., 2015; Kaufman et al., 2016; Kemp & Pienaar, 2009; Ley, Leach, Barrio, & Bassett, 2014; Maro et al., 2009; Maro & Roberts, 2012; Monyeki et al., 2012; Naidoo & Coopoo, 2012; Naidoo et al., 2009; Parker, Jelsma, & Stein, 2016; Richards Foster, Townsend, & Bauman, 2014; Sørensen et al., 2016; Starzak, Konkol, & McKune, 2016; Uys et al., 2016; Walter, 2014). Funding sources included FIFA ($n = 3$ articles), the International Development Research Center, Ottawa, Canada ($n = 1$ article), the Bill and Melinda Gates Foundation ($n = 1$ article), EMIMA Kicking AIDS Out Program ($n = 3$ articles), VLIR ($n = 1$ article), 3ie ($n = 1$ article), South African National Research Foundation ($n = 1$ article), University of Cape Town Research Committee ($n = 1$ article), Universidad Politécnica de Madrid ($n = 1$ article), the National Research Foundation ($n = 2$ articles), KwaZulu-Natal Department of Health and Education ($n = 2$ articles), the Dphil Scholarship: University of Oxford ($n = 1$ article), the Medical Research Council of South Africa ($n = 1$ article), the World Diabetes Foundation ($n = 1$ article), and the Nelson Mandela Metropolitan University ($n = 1$ article). One article mentioned receiving four sources of funding, including Imago Dei, the Elton

Table 2.
Contextual Considerations

<i>Authors</i>	<i>Setting</i>	<i>Sport</i>	<i>Personnel</i>	<i>Sample Size</i>	<i>Completed</i>	<i>Age</i>	<i>Gender</i>	<i>Duration (Weeks)</i>
Fuller et al. (2010)	School	Soccer	Trained peer coaches	492	370	13.3	M: 180 F: 190	11
Fuller et al. (2011)	School + Community	Soccer	Trained peer coaches	822	784	12.3	M: 390 F: 394	11
Fuller et al. (2015)	School	Soccer	Trained peer coaches	3,814	3,814	12.4	M:1873 F:1941	11
Clark et al. (2006)	School	Soccer	Professional soccer players	304	304	12-14	M:151 F:153	2
Maro et al. (2009)	Community	Soccer	Peer coaches	950	764	13.7	M:555 F:209	8
Maro & Roberts (2012)	Community	Soccer	Peer coaches	950	764	13.7	M:555 F:209	8
Hershow et al. (2015)	Community	Soccer	Peer coaches	4260	514	14.2	M:0 F:514	48
Sørensen et al. (2016)	Community	Soccer	Peer coaches	950	764	13.7	M:555 F:209	8
Awotidebe et al. (2014)	School	Soccer	Peer coaches	430	340	15.2	M:204 F:226	12
Bloemhoff (2006)	Ropes Course	Ropes Course	Researcher	106	106	15.7	M:106 F:0	0 (4 hours)
Bloemhoff (2012)	Ropes Course	Ropes Course	Researcher	92	67	16.8	M:0 F:67	0 (4 hours)
Kaufman et al. (2016)	School	Soccer	Trained peer coaches	1226	878	16.2	M:1226 F:0	0 (1 hour)
Chetty & Edwards (2007)	Children's Institutional Homes	Soccer and Netball	Unknown	33	33	10.7	M: 14 F: 19	12
Ferguson et al. (2015)	School	Playground games	Undergraduate students	41	41	7.8	M: 18 F: 23	9
Lennox & Pienaar (2013)	School	Aerobic, strength, flexibility, sports (soccer and netball)	Postgraduate students	318	279	14.5	M: 137 F: 181	26

Table 2 Cont.
Contextual Considerations

<i>Authors</i>	<i>Setting</i>	<i>Sport</i>	<i>Personnel</i>	<i>Sample Size</i>	<i>Completed</i>	<i>Age</i>	<i>Gender</i>	<i>Duration (Weeks)</i>
Monyeki et al. (2012)	School	Strength, speed, balance, stretching	PE teacher	322	322	10.7	M: 322 F:0	43
Naidoo et al. (2009)	School	Active learning during school	Trained teachers	256	185	Not reported	M: 81 F: 104	26
Naidoo & Coopoo (2012)	School	Active learning during school	Trained teachers	798	270	Not reported	M: 147 F: 123	78
Owoeye et al. (2014)	Sports' field	Warm-up activities	Trained soccer coaches	416	385	17.7	M: 385 F:0	26
Parker et al. (2016)	Community health center	Aerobic and strength exercises	Trained peer-leaders	27	27	30.8	M: 0 F: 27	6
Richards et al. (2014)	Community sports' fields	Soccer	Trained peer coaches	1462	1447	12.9	M: 618 F:844	11
Starzak et al. (2016)	Community sports' fields	Soccer	Trained soccer coaches	50	34	12.2	M: 34 F:0	12
Tian et al. (2017)	School	Aerobic exercise (including soccer), strength training	Trained PE teachers	110	Not reported	Not reported	M: 33 F: 77	12
Ley et al. (2014)	Community gym	Aerobic exercise, strength training, stretching	Fitness trainers	50	23	30	M: 3 F:20	10
Kemp & Pienaar (2009)	School	Dancing, stretching	Not reported	38	38	12.5	M:0 F: 38	10
Uys et al. (2016)	School	No prescribed activities	Trained school staff	1088	997	9.9	M: 471 F: 526	156
Walter (2014)	School	Games, playground materials, sport equipment (soccer, rugby, netball)	University students	120	79	10.3	M: 38 F:41	6
Peacock-Villada et al. (2007)	School	Soccer	Trained peer coaches	670	Not reported	Not reported	Not reported	6

John AIDS Foundation, the MAC AIDS Fund, and the USAID-New Partners Initiative (Hershow et al., 2015). Lastly, one intervention stated that they used the 3rd author's own research funding to finance their intervention (Starzak et al., 2016).

Risk of Bias

Ratings of risk of bias for each article were conducted by the first author. The final risk of bias ratings for each of the 28 interventions are reported in Table 3. Ten articles were deemed to be at critical risk of bias, thirteen articles were considered serious risk of bias, four articles were rated as moderate risk of bias, and one article was rated as no information (See Table 3). Most of the ratings of serious risk and critical risk resulted from the interventions missing a significant amount of participant data due to exclusion or attrition. Other reasons for ratings of serious or critical risk of bias were due to baseline confounding, lack of blinding of participants' intervention status to researchers during the intervention, different start and follow-up times among participants, interventions not being classified appropriately, bias in the measurement of the outcome(s), and bias in terms of selecting the results that were reported. The article that received a rating of no information did not report sufficient information to make a risk of bias judgement.

Practitioner Feedback

Finally, in order to increase the translational utility and practical impact of the major findings presented above, five coaches and staff members employed by Grassroot Soccer responded to our survey and offered feedback on our findings. The five survey respondents included three females and two males with an average of 3.75 years of experience working with the organization. When asked to provide feedback on our results regarding the use of sport for health promotion with children and youth in Africa participants provided the following

responses: “I would confirm the outcomes are quite true, it’s something that’s on the ground. To me what stands out is ‘improving social protective factors such as resiliency and ability to cope with peer pressure.’” Another participant discussed how sport can be an effective teaching tool, stating “sport is a good tool for learning if you use it for demonstration of activities...What stands out is educating young people on matters that affect them using the power of soccer...Young people find it fun, exciting, and interactive.” Lastly, one Grassroot Soccer staff member highlighted the impact of sport-based interventions with regards to HIV and AIDS

Table 3.
Risk of bias

<i>Article</i>	<i>ROB1</i>	<i>ROB2</i>	<i>ROB3</i>	<i>ROB4</i>	<i>ROB5</i>	<i>ROB6</i>	<i>ROB7</i>	<i>ROBOverall</i>
Awotidebe et al. (2014)	Serious	Mod	Mod	Serious	Mod	Mod	Serious	Serious
Bloemhoff (2006)	Serious	Mod	Mod	NI	Mod	Serious	Mod	Serious
Bloemhoff (2012)	Mod	Mod	Mod	NI	Serious	Serious	Mod	Serious
Chetty & Edwards (2007)	Mod	Mod	Mod	NI	Mod	Mod	Mod	Mod
Clark et al. (2006)	Serious	Mod	Mod	NI	Mod	Serious	Mod	Serious
Ferguson et al. (2015)	Mod	Mod	Mod	NI	Serious	Mod	Mod	Serious
Fuller et al. (2010)	Serious	Serious	Mod	NI	Critical	Mod	NI	Critical
Fuller et al. (2011)	Serious	Serious	Mod	Mod	Serious	Mod	Mod	Serious
Fuller et al. (2015)	Serious	Serious	Mod	Mod	Serious	Mod	Mod	Serious
Hershow et al. (2015)	Serious	Serious	Serious	Mod	NI	Serious	Mod	Serious
Kaufman et al. (2016)	Mod	Mod	Mod	NI	Mod	Mod	Mod	Mod
Kemp & Pienaar (2009)	Mod	Mod	Serious	NI	Low	Serious	Mod	Serious
Lennox & Pienaar (2013)	Serious	Mod	Serious	Critical	Serious	Serious	Mod	Critical
Ley et al. (2014)	Serious	Mod	Serious	NI	Mod	Mod	Serious	Serious
Maro et al. (2009)	Low	Mod	Mod	NI	Critical	Mod	Serious	Critical
Maro & Roberts (2012)	Low	Mod	Mod	NI	Critical	Mod	Critical	Critical
Monyeki et al. (2012)	Serious	Mod	Mod	NI	NI	Serious	Mod	Serious
Naidoo & Coopoo (2012)	Serious	Mod	Mod	Serious	Critical	Serious	Mod	Critical
Naidoo et al. (2009)	Serious	Mod	Mod	NI	Critical	Serious	Mod	Critical
Owoeye et al. (2014)	Mod	Mod	Mod	NI	Low	Serious	Mod	Serious
Parker et al. (2016)	Low	Low	Low	NI	Low	Mod	Mod	Mod
Peacock-Villada et al. (2007)	NI	NI	NI	NI	NI	NI	NI	NI
Richards et al. (2014)	Low	Low	Mod	NI	Mod	Mod	Mod	Mod
Sorensen et al. (2016)	Low	Mod	Mod	NI	Critical	Mod	Critical	Critical
Starzak et al. (2016)	Serious	Mod	Critical	NI	Critical	Serious	Mod	Critical
Tian et al. (2017)	Serious	Mod	Mod	NI	Low	Critical	Mod	Critical
Uys et al. (2016)	Mod	Serious	Mod	NI	Mod	Serious	Mod	Serious
Walter (2014)	Serious	Mod	Serious	NI	Critical	Serious	Mod	Critical

Note: ROB1) Bias due to confounding; ROB2) Bias in selection of participants; ROB3) Bias in classification of interventions; ROB4) Bias due to deviations from intended interventions; ROB5) Bias due to missing data; ROB6) Bias in measurement of outcomes; ROB7) Bias in selection of reported result

prevention with youth, stating “HIV-related outcomes...stand out because sport is playing a huge role in reducing new HIV infections and also changing attitudes and knowledge of beneficiaries. This [suggests] that sport-based education involves everyone even in the hard to reach areas.”

When asked what steps could be taken to help sport-based health promotion, one participant reported: “increase its buy-in in all societies by engaging all communities. Engage key stakeholders and ministries. Make sport education an ongoing process not a once off event in societies.” A second participant discussed the potential role that sport can have in strengthening communities: “Support the role of sports in strengthening communities where young people come from—use sport as a vehicle to communicate about priority health matters.” Additionally, a participant stated that they wanted to “advocate for health services through sport-based health activities.”

Lastly, participants provided the following responses when asked what they would like to see in future sport-based health promotion initiatives: “A more inclusive way of addressing harmful gender norms that have a large effect on the development of young aspiring female sports players and females in general.” Other participants stated that they would like to see “more stakeholders to come on board and support sport-based health” and “more free health services with sport-based health.” Lastly, one participant shared that they would like to see “increased participation in sport especially for females—increased social connections—increased healthy eating habits—reduce smoking and alcohol intake in young people.”

Discussion

The results of the present study suggest that sport can be an effective platform for health promotion with children and youth in Africa pending improvements in the methodology of future studies. Statistically significant improvements in health-related outcomes were observed in 23 of the 28 articles that met our study’s inclusion criteria. Targeted health outcomes included HIV-

related knowledge and behaviors, essential health practices, physical activity, physical and mental health outcomes, and overall fitness levels. Considering the broad range of health outcomes in interventions included in this review, our results suggest that sport-based interventions may improve multiple physical and mental health outcomes with youth in Africa.

We conducted risk of bias assessments for the included articles to enhance the quality of our review. The results of our risk of bias ratings for the 28 studies included in our review report that ten articles were deemed to be at critical risk of bias, 13 were at serious risk of bias, four were at moderate risk of bias, none of the articles were rated as low risk of bias, and one article was coded as no information. These findings are similar to those of a meta-analysis of sport-based HIV prevention interventions, which found that only two of the 21 studies included in their analyses could be considered “good quality” (Kaufman et al., 2013). However, it is important to note that the ROBINS-I tool rating protocol involves comparing each intervention to a hypothetical randomized control trial (Sterne et al., 2016). Considering that many of these interventions were conducted with at-risk youth in low socio-economic communities, strictly adhering to a randomized control trial procedure would have been difficult. Furthermore, it could be argued that using a true control group in health promotion interventions with at-risk children is not ethical, as it requires researchers to not administer a potentially life-saving program to a group of youths. Ethical issues notwithstanding, future researchers should target conducting more scientifically rigorous studies to gain a more comprehensive understanding of how, why, and under what circumstances sport-based health promotion interventions are successful to maximize and sustain impact with limited resources.

Bearing in mind the above methodological considerations in the reviewed studies, participants in this review demonstrated statistically significant improvements in HIV-related

outcomes (Awotidebe et al., 2014; Clark et al., 2006; Hershow et al., 2015; Kaufman et al., 2016; Maro & Roberts, 2012; Maro et al., 2009; Peacock-Villada et al., 2007; Sørensen et al., 2016). Specific HIV-related outcomes included knowledge and attitudes (Awotidebe et al., 2014; Clark et al., 2006; Hershow et al., 2015; Maro & Roberts, 2012; Maro et al., 2009; Sørensen et al., 2016), communication skills (Awotidebe et al., 2014; Hershow et al., 2015; Peacock-Villada et al., 2007), awareness of local preventative resources and treatment facilities (Clark et al., 2006; Hershow et al., 2015; Kaufman et al., 2016), and uptake of preventative treatments (Hershow et al., 2015; Kaufman et al., 2016). Therefore, our results support the findings of a recent meta-analysis of 21 sport-based HIV-prevention initiatives that found strong evidence of positive effects with regards to HIV-related knowledge, stigma, self-efficacy, communication, and recent condom use (Kaufman et al., 2013).

To our knowledge, our review is the first to suggest that sport-based health promotion interventions can significantly improve the uptake of HIV prevention and treatment procedures. Participants in two interventions included in our review demonstrated statistically significant improvements in the uptake of HIV-related services. Specifically, one soccer-based intervention led to a significant increase in HIV counseling and testing (HCT) services among adolescent girls in South Africa (Hershow et al., 2015). Another soccer-based intervention led to a statistically significant increase in voluntary medical male circumcision (VMMC) uptake among a group of adolescent males in Zimbabwe (Kaufman et al., 2016). Taken together, the results of these studies suggest that sport-based health promotion initiatives can be effective in promoting the uptake of HIV-related prevention services among children and youth in Africa. However, additional research is warranted to provide further evidence of this relationship.

One common theme among the sport-based interventions included in our review that targeted HIV-related outcomes and essential health knowledge is that they were conducted in collaboration with existing non-profit organizations (Awotidebe et al., 2014; Clark et al., 2006; Delva & Temmerman, 2006; Fuller et al., 2010; 2011; 2015; Hershow et al., 2015; Kaufman et al., 2016; Maro et al., 2009; Peacock-Villada et al., 2007). Specifically, eight studies included in our review were administered in collaboration with Grassroot Soccer, which uses a sport-based teaching model to build resilience in children and youth to help protect themselves against HIV (Peacock-Villada et al., 2007). Based on the promising results of each intervention, partnering with existing non-profit organizations is a promising avenue for future researchers, as the organizations' knowledge and experience can enhance the development and implementation of effective sport-based health promotion interventions targeting children and youth in Africa. Furthermore, collaborating non-profit organizations can have experienced staff members conduct the intervention or provide comprehensive training sessions for the individuals who will administer the interventions to participants (Fuller et al., 2010; 2011; 2015).

As part of these partnerships, Grassroot Soccer and other non-governmental organizations have increasingly utilized peer-led interventions with HIV-prevention initiatives in Africa, and the results have been promising (Maticka-Tyndale & Barnett, 2010). This approach is based on the assumption that adolescents rely on their peers to learn from and model their behavior after, and norms and behaviors are most likely to change when those of the group change (Campbell, 2004; Maticka-Tyndale & Barnett, 2010). In our review, trained peer-leaders or peer coaches were used to deliver a sport-based intervention in eleven of the articles. Participants in each study that utilized peer-coaches to deliver the intervention demonstrated statistically significant improvements in HIV-related outcomes (Awotidebe et al., 2014; Fuller et

al., 2010; 2011; 2015; Hershow et al., 2015; Kaufman et al., 2016; Maro & Roberts, 2012; Maro et al., 2009; Peacock-Villada et al., 2007; Sørensen et al., 2016), cardiovascular fitness outcomes (Richards et al., 2014), and reductions in pain (Parker et al., 2016). Therefore, our results support the use of trained peer coaches and peer leaders in sport-based interventions with children and youth.

Our review also included three studies that used an 11-week soccer-based intervention to improve knowledge and awareness of essential health practices among children and youth from eight different African countries (Fuller et al., 2010; 2011; 2015). Participants in all eight countries demonstrated statistically significant improvements in health knowledge scores from baseline to post-intervention in outcomes related to physical activity, HIV prevention, malaria prevention, substance abuse, personal hygiene, clean water use, nutrition, vaccinations, and prescribed medication usage. These findings suggest that sport-based health promotion interventions that focus on a broad range of health behavior practices may be effective for children and youth in many different African countries. Although additional research is needed, these results speak to the potential generalizability and translational utility that sport-based interventions may have throughout Africa.

One critique of previous sport-based health promotion interventions is that there has been an over-emphasis on HIV-related outcomes (Fuller et al., 2015). In our review, 39% of the included articles targeted HIV-related outcomes. Although HIV/AIDS is a public health epidemic, research suggests that rates of HIV/AIDS are much lower in children and adolescents in sub-Saharan Africa compared to adults (Delva & Temmerman, 2006). A recent systematic analysis suggested that HIV was responsible for approximately 8% of child deaths in sub-Saharan Africa compared to 25% for neonatal disorders, 22% for malaria, 21% for pneumonia,

and 20% for diarrhea (Black et al., 2010). However, statistics relating to sub-Saharan Africa may be misleading, as health issues vary from country to country (Black et al., 2010). Therefore, one direction for future sport-based health promotion initiatives is to adapt program structures and protocols so they can address the specific needs of the countries and communities they are hoping to serve. Considering the significant amount of evidence supporting the use of sport-based health promotion interventions targeting the prevention and treatment of HIV, additional research is warranted to understand the impact of sport-based health promotion interventions with other diseases and essential health behaviors as well.

Sport- and physical activity-based interventions can be used to target other important health topics. For instance, it has been well documented that participation in physical activity and exercise is associated with improved fitness outcomes among youth (Armstrong, Tomkinson, & Ekelund, 2011). Our review included ten articles that investigated the impact of a sport- or physical-activity-based intervention on participants' fitness levels. Specifically, seven studies resulted in statistically significant improvements, including improved muscular strength and endurance (Ferguson et al., 2015; Kemp & Pienaar, 2009; Ley et al., 2014; Naidoo & Coopoo, 2012; Naidoo et al., 2009), cardiovascular fitness (Ferguson et al., 2015; Kemp & Pienaar, 2009), anaerobic fitness (Ferguson et al., 2015), flexibility (Kemp & Pienaar, 2009; Naidoo & Coopoo, 2012), and lean body mass (Starzak et al., 2016). Two interventions resulted in statistically significant improvements in participants' fitness levels in both the experimental and control conditions, but no statistically significant differences were found between the conditions at post-intervention (Richards et al., 2014; Uys et al., 2016). One study did not observe statistically significant improvements in participants' fitness levels following a sport-based intervention, but the researchers hypothesized that this was due to low program compliance from

participants in their program (Lennox & Pienaar, 2013). Therefore, the results of our review suggest support for the notion that participation in sport and physical activity can enhance multiple fitness outcomes for youth.

Additionally, participants in five studies demonstrated statistically significant improvements in physical activity levels (Lennox & Pienaar, 2013; Naidoo & Coopoo, 2012; Naidoo et al., 2009; Tian et al., 2017; Walter, 2014). Only one study found no significant improvements in participants' physical activity levels, which the researchers hypothesized was due to the structure of the physical activity portion on their intervention (Uys et al., 2016). Physical activity is an inherent component of sport-based health promotion interventions, so it is not surprising that participants in these programs demonstrated higher levels of physical activity throughout the study. However, additional research is needed to determine whether participants' increased levels of physical activity are sustained beyond the intervention.

Aside from the physical benefits derived from physical activity, previous research also suggests that youth participation in sport and exercise may enhance mental health functioning (Kulig, 2003; Theokas et al., 2008). For example, it has been suggested that there is a strong positive relationship between physical activity and positive mental health outcomes with children and adolescents, including decreased symptoms of depression and anxiety and improved levels of self-esteem and cognitive functioning (Biddle & Asare, 2011). Our findings support the notion that sport- and physical activity-based interventions can improve mental health outcomes for children and youth in Africa. Six articles investigated the impact of sport- or physical-activity-based interventions on mental health outcomes, and four studies resulted in statistically significant improvements in mental health outcomes among participants. Specifically, sport-based interventions were found to be effective in reducing participants' symptoms of depression

and anxiety (Parker et al., 2016) and behavioral problems (Chetty & Edwards, 2007). Sport-based interventions also resulted in higher levels of self-efficacy (Parker et al., 2016), self-perception (Chetty & Edwards, 2007), and coping skills (Bloemhoff, 2006; 2012; Peacock-Villada et al., 2007). Therefore, the results of our review suggest that physical activity and participation in sport can significantly improve several mental health outcomes with children and youth in Africa.

In addition to the mental health benefits associated with physical activity, it has also been suggested that youth participation in sport promotes the development of important and adaptive life skills such as discipline, confidence to withstand peer pressure, goal-setting, and the ability to develop healthy coping strategies (Theokas et al., 2008). Engaging at-risk youth in sport can foster the development of essential life skills that may help them avoid risk-taking behaviors that can lead to lifelong consequences such as substance abuse, crime, and sexual activity (Kulig, 2003). Therefore, in addition to improving levels of health knowledge and awareness, there may be significant positive life skills development for at-risk youth who participate in sport-based health promotion initiatives in Africa. Sport-based health promotion initiatives may equip at-risk youth in Africa with a balanced skillset that can significantly improve their long-term overall health outlook (Whitley, Hayden, & Gould, 2016). Our findings support the notion that participation in sport can enhance protective factors and life skills development with youth. However, future research initiatives that operationally define and monitor life skills development over the course of a sport- or physical activity-based intervention are warranted.

Interestingly, participants in one sport-based intervention included in our review experienced an increase in depressive and anxiety symptoms from baseline to post-intervention in a war torn country (Richards et al., 2014). This intervention was conducted in Uganda, where

a 20-year civil war ended eight years prior to the study. The researchers hypothesized that the competitive environment of the sport-based intervention may have elicited negative emotions tied to participants' experiences in armed conflict, which was their most recent exposure to structured physical activity prior to the study (Richards et al., 2014). Therefore, the results of the study conducted by Richards et al. (2014) underscore the importance of researchers developing a consummate understanding of the historical and cultural contexts of a population prior to initiating a targeted sport-based intervention. This recommendation aligns with the findings of a recent systematic review of peer-led health promotion initiatives, which found that effective interventions incorporate community needs assessments, involve stakeholders in the community in the intervention, and use an established program structure (Maticka-Tyndale & Barnett, 2010).

Not surprisingly, physical activity and participation in sport is associated with numerous physical health benefits for children and youth (Booth et al., 2000; Janssen & LeBlanc, 2010; Pedersen, 2006). Our review included three studies that demonstrated statistically significant improvements in targeted physical health outcomes. Specifically, participants in the soccer-based intervention conducted by Starzak et al. (2016) demonstrated statistically significant improvements in body mass index (BMI), body fat percentage, and skinfold measurements. In another study, participants experienced a statistically significant reduction in injury rates after a soccer-based warm-up intervention delivered to elite youth athletes (Owoeye, Akinbo, Tella, & Olawale, 2014). Lastly, participants in the study conducted by Parker et al. (2016) experienced significant reductions in pain following a six-week exercise intervention. Although they were not statistically significant, participants in three studies experienced reductions in body mass index (BMI), body fat percentage, and skinfold measurements (Kemp & Pienaar, 2009; Ley et al., 2014; Monyeki et al., 2012). Therefore, the results of our study support the notion that there is a

positive relationship between participation in sport and other forms of physical activity on physical health outcomes with children and youth in Africa.

Characteristics of Interventions

Due to the popularity of sport in Africa, it is not surprising that incorporating sport and other forms of physical activity into health promotion interventions targeting children and youth can be an effective approach. Participants in several interventions reported positive experiences with programs using sport as a platform to educate individuals about multiple health topics, which suggests that children and youth enjoy participating in sport while learning about essential health practices (Fuller et al., 2010; 2011; 2015). Soccer is considered the most popular sport in Africa, and over half of the interventions included in our review used soccer as a way to engage youth (Awotidebe et al., 2014; Clark et al., 2006; Fuller et al., 2010; 2011; 2015; Hershow et al., 2015; Kaufman et al., 2016; Maro et al., 2009; Maro & Roberts, 2012; Peacock-Villada et al., 2007; Richards et al., 2014; Sørensen et al., 2016; Starzak et al., 2016). Considering the popularity of soccer among children and youth in Africa, it is understandable why it can be utilized as an effective health-promotion platform. To enhance our understanding of soccer-based initiatives, future researchers should aim to better understand specific aspects of soccer that can be used to teach children about health promotion. For example, one previous research initiative utilized a penalty-kick shootout scenario to initiate discussions on sensitive health-related topics (Kaufman et al., 2016). Future research endeavors should examine other sport-related scenarios that can effectively relate to different health topics with children and youth.

The results from several studies in our review demonstrated that consistent participant attendance is a significant predictor of an intervention's effectiveness (Clark et al., 2006; Fuller et al., 2010; 2011; 2015). One way to ensure appropriate attendance levels is to conduct the

interventions at school as part of the ongoing curriculum. Due to the high number of children that can be reached, it has been suggested that schools are an ideal location for conducting health promotion interventions with children and youth in Africa (World Health Organization, 1997). It has also been noted that the use of sport at schools in South Africa can provide a safe place for students to learn and participate in organized activities (Struthers, 2011). However, existing school-based initiatives have yielded mixed results, as there are high levels of absenteeism and attrition in schools throughout Africa (Plummer et al., 2007). Of the 28 articles included in this review, 15 were conducted in school settings. Participants experienced statistically significant improvements in targeted health outcomes in 12 of the 15 interventions conducted in school settings (Awotidebe et al., 2014; Clark et al., 2006; Ferguson et al., 2015; Fuller et al., 2010; 2011; 2015; Kaufman et al., 2016; Kemp & Pienaar, 2009; Naidoo & Coopoo, 2012; Naidoo et al., 2009; Tian et al., 2017; Walter, 2014). However, only five of the interventions conducted at schools had a retention rate of 95% or higher from baseline to post-intervention (Clark et al., 2006; Ferguson et al., 2015; Fuller et al., 2015; Kemp & Pienaar, 2009; Monyeki et al., 2012). Therefore, although our results suggest that schools can be an effective setting to conduct sport-based health promotion interventions, participant retention is a significant barrier. Considering that many children and youth in Africa don't attend school on a regular basis or at all, researchers must attempt to conduct sport-based health promotion interventions in settings that are best-suited for high levels of attendance for both in-school and out-of-school children and youth in the community (Maro et al., 2009; Plummer et al., 2007).

Interventions based on theoretical frameworks use an empirical theory of human social or psychological process as a foundation of their methodological approach (Anfara Jr & Mertz, 2014). Eleven of the 28 articles in this review specified that their intervention was based on a

theoretical framework. However, a review of peer-led HIV-prevention initiatives reported similar findings, and the authors hypothesized that many of the interventions were based on leaders' previous experiences with similar interventions rather than a specific theoretical framework (Maticka-Tyndale & Barnett, 2010). Furthermore, it was suggested that the interventions that did not specifically mention using a theoretical framework would have fit under a combination of cognitive behavioral, participatory learning, and social influence theories based on their methodologies (Maticka-Tyndale & Barnett, 2010). Therefore, it can be reasonably inferred that aspects of theoretical frameworks may have been present in the 17 studies that did not explicitly mention utilizing a specific behavioral theory. However, future research endeavors should target their sport-based interventions using a theoretical framework because theory-based health promotion interventions have been shown to be more efficacious than non-theoretical approaches (Glanz, Rimer, & National Cancer Institute, 1997).

Sport is often considered a male-only activity in Africa, and girls and women face significantly more barriers to sport participation compared to boys and men (Hershow et al., 2015). However, it has been suggested that participation in sport-based health promotion interventions may have additional benefits for girls and women compared to males (Hershow et al., 2015; Mwaanga, 2010). In the present review, 19 studies included both male and female participants in their interventions (Awotidebe et al., 2014; Chetty & Edwards, 2007; Clark et al., 2006; Ferguson et al., 2015; Fuller et al., 2010; 2011; 2015; Lennox & Pienaar, 2013; Ley et al., 2014; Maro et al., 2009; Maro & Roberts, 2012; Naidoo & Coopoo, 2012; Naidoo et al., 2009; Peacock-Villada et al., 2007; Richards et al., 2014; Sørensen et al., 2016; Tian et al., 2017; Uys et al., 2016; Walter, 2014). Of the remaining nine articles, four studies used an all-female sample (Bloemhoff, 2012; Hershow et al., 2015; Kemp & Pienaar, 2009; Parker et al., 2016) and five

studies used only male participants (Bloemhoff, 2006; Kaufman et al., 2016; Monyeki et al., 2012; Owoeye et al., 2014; Starzak et al., 2016). Information regarding gender equality was included as a measured outcome in three of the interventions included in this review (Fuller et al., 2010; 2011; 2015). Participants in these interventions demonstrated statistically significant improvements from baseline to post-intervention in outcomes related to gender equality, which suggests that sport may be an effective intervention platform to promote gender equality (Fuller et al., 2010; 2011; 2015). Given that gender inequality is considered a significant contributor to the spread of infectious diseases in Africa, sport-based interventions targeting relevant social topics warrant further investigation (Szto, 2013).

It is important to note that our review included three publications that used the same intervention and the same participant data (Maro & Roberts, 2012; Maro et al., 2009; Sørensen et al., 2016). Following a close analysis of each article, ethical concerns could be raised about duplicate publications (American Psychological Association, 2010). Although the publication by (Maro et al., 2009) reported significant improvements in HIV-related outcomes following a sport-based intervention, the two later publications did not produce significant results in measured outcomes (Maro & Roberts, 2012; Sørensen et al., 2016). Specifically, one study did not find a statistically significant difference in HIV-related outcomes between participants in the two experimental conditions (Maro & Roberts, 2012), and the other did not find a statistically significant difference in measures outcomes between male and female participants (Sørensen et al., 2016).

Recommendations for Future Research

In summary, our findings support the use of sport and other forms of physical activity as a health promotion intervention for children and youth in Africa pending improved

methodological quality in future investigations. For example, it may be plausible to incorporate randomized control trials with a wait-list control or a crossover design or use qualitative analyses to examine specific components of sport-based health promotion intervention programs that are effective. However, researchers must also weigh the benefits of improving the scientific quality of their research against the unique environmental factors regarding the community they are in, as it can be considered unethical to withhold essential healthcare information from at-risk children.

Additional methodological approaches could be feasible in the future as well, although they would likely require a large amount of funding, research personnel, and community buy-in. Although Randomized Control Trials are considered the “gold standard” research design, it has been noted a significant drawback of RCTs is that they evaluate the effectiveness of overall intervention, but do not evaluate specific components of interventions (Howard & Jacobs, 2016). To address limitations of traditional Randomized Control Trial designs, a variety of complex interventions have been developed with the aim of optimizing and evaluating behavioral interventions (Hekler et al., 2018).

Two promising adaptive intervention methods that could be applied with sport-based health promotion interventions with youth in Africa include the multiphase optimization strategy (MOST) and the micro-randomization trial (MRT) (Hekler et al., 2018). The MOST framework includes an RCT to evaluate an optimized complex intervention, but it also allows for the researchers to identify which components of the intervention are particularly effective (Collins, Murphy, & Strecher, 2007). Thus, researchers can adjust components of the intervention to optimize the effects of each factor of interest (Collins et al., 2007). For example, the MOST framework would allow researchers investigating the impact of sport-based health promotion

interventions with youth in Africa to tailor the intervention to participants based on participants' baseline characteristics such as enjoyment of physical activity or previous exposure to similar initiatives. Furthermore, the MOST design would allow researchers to adjust certain variables in the level of intensity, delivery modality, intervention duration or type of activity used to optimize the impact of the intervention (Hekler et al., 2018).

Additionally, micro-randomization trials offer another promising option for optimizing adaptive interventions (Klasnja et al., 2015). Specifically, MRTs allow researchers to randomize the delivery of different components of interventions to participants at different decision points (Hekler et al., 2018). For instance, a group of researchers interested in understanding the impact of a sport-based health promotion intervention could randomize youth participants to receive either a sport-based health promotion program or another health promotion intervention involving a social component without physical activity, such as an art- or music-based health promotion intervention. This approach could allow researchers to examine whether improvements in targeted health outcomes are related to the sport-based component or a result of being in a social environment. Although they would require significant funding, research personnel, and community engagement, adaptive behavioral interventions with such as MOST and MRT could be plausible for future researchers developing sport-based health promotions for youth in Africa.

In light of these findings, the available evidence suggests that combining sport and physical activity with health promotion may be an effective approach. However, interventions with more rigorous methodological approaches are needed to provide strong evidence of this relationship. Given that ten interventions included our review were considered to have a critical risk of bias and an additional thirteen articles were deemed to have a serious risk of bias, a

significant amount of bias may have influenced our conclusions. Common sources of critical and serious levels of bias derived from the lack of randomization procedures in the majority of interventions, significant missing data due to participant drop-out, and bias in the measurement of outcomes. Therefore, the promising findings of our review of sport- and physical activity-based health promotion interventions targeting children and youth in Africa are open to skepticism.

Recommendations Based on Practitioner Feedback

The feedback provided by Grassroot Soccer staff members significantly enhances the translatability of our findings. One staff member discussed the importance of involving ministries and stakeholders in sport-based health promotion initiatives. This recommendation dovetails with a recent publication by the World Health Organization (2012) that highlighted the important role of health ministries in helping individuals in Africa utilize testing and counseling services to protect themselves against HIV. Additionally, previous research suggests that spiritual ministries can play a critical role in health promotion initiatives in religious communities (Chatters, Levin, & Ellison, 1998). Therefore, involving both national health ministries and religious ministries in future sport-based health promotion interventions should be considered.

Two Grassroot Soccer staff members highlighted the importance of including female participants in sport-based health promotion interventions. Specifically, one participant discussed the importance of using sport to break down harmful gender norms. One critique of sport-based health promotion initiatives targeting HIV-related outcomes is that they fail to account for larger societal issues, such as gender inequality, that are significant contributors to the spread of infectious diseases (Szto, 2013). Therefore, the recommendations provided by Grassroot Soccer

staff members underscore the potential role that sport can play in challenging harmful social gender norms to empower girls and women. Gender inequality and male dominance are considered two significant contributors to the HIV epidemic among young women in Africa, so sport may be an effective vehicle for both gender equality and long-term health promotion (Hershow et al., 2015). Moving forward, it is essential that researchers gain a consummate understanding of existing social and cultural norms that could affect the results prior to designing and implementing a targeted sport-based intervention.

Additionally, one Grassroot Soccer staff member commented that sport may be used as a platform to advocate for essential health services. In public health, advocacy refers to the allocation of both information and resources to create systemic health changes in communities to reduce deaths from specific causes (Christoffel, 2000). Given the worrying statistics regarding deaths caused by infectious diseases in Africa, using sport as a vehicle to advocate for essential health services is worth investigating. This is particularly true in rural, low-income communities in Africa where health services are either poor or non-existent (Bryce et al., 2003).

Limitations

An important limitation of this review and the conclusions drawn here concerns the methodological quality of the studies reviewed. With regards to risk of bias, a lack of randomization procedures does not allow for researchers to control for pre-existing differences between the experimental and control conditions, which significantly limits the external validity of the outcomes (West & Spring, 2017). In the articles included in our review, several investigators acknowledged the lack of randomization as a study limitation, but they noted that randomizing participants from different classrooms to experimental and control conditions would have created significant logistical and academic problems within the schools during the

interventions (Awotidebe et al., 2014; Fuller et al., 2010; 2011; 2015). Instead, the researchers compared individuals from separate but similar classrooms, and each classroom served as an experimental or control condition (Awotidebe et al., 2014; Fuller et al., 2010; 2011; 2015).

Future research initiatives exploring this topic should incorporate true randomization procedures when possible to strengthen the notion that sport-based health promotion interventions can be effective with children and youth in Africa.

There are two types of randomized control trial designs that could accomplish this without significant ethical problems. The first option would be a randomized control trial with a wait-list control condition, in which participants assigned to the control condition receive the intervention after the experiment is completed (West & Spring, 2017). Although withholding essential health information from at-risk youth in the control condition still presents an ethical dilemma, using a wait-list control condition would allow participants in both conditions to receive the potential benefits of the intervention while also maintaining a sound methodological procedure. Future researchers could also utilize randomized control trials with a crossover design, in which participants could serve as their own control (West & Spring, 2017). Given that all participants receive the intervention in a crossover design, this type of methodological approach would likely mitigate some ethical concerns. Therefore, future researchers should consider implementing randomized control trials with either a wait-list control design or a crossover design to reduce the potential for bias and enhance the scientific quality of sport-based health promotion interventions (West & Spring, 2017).

There are other limitations more specific to this review. First, the ten databases selected by the researchers contained only published articles, and it is possible that articles regarding the use of sport for health promotion with children and youth in Africa are available on other

research databases. Furthermore, relevant studies such as theses, dissertations, presentations, and other forms of “grey” literature that may have yielded additional insight into our review were automatically excluded. Second, it is possible that relevant articles may have been published in the time that elapsed since we conducted our literature review. Lastly, since only five practitioners provided us with feedback on our findings, more detailed information from a larger sample regarding the use of sport-based health promotion interventions with children and youth in Africa could be obtained in future research endeavors.

Another significant limitation of our review is that we did not quantitatively analyze our results. However, given the broad range of health-related outcomes included in our review, we likely would have had to focus on a specific health behavior to conduct a meta-analysis.

Although this may have resulted in more concrete conclusions, conducting a meta-analysis would also have limited the extent of our findings. The primary purpose of conducting a scoping review was to explore both the breadth and the depth of existing literature exploring the use of sport-based health promotion initiatives targeting children and youth in Africa, which would not have been possible with a metanalysis.

Nevertheless, the results of our scoping review suggest that sport-based health promotion interventions offer an effective and affordable health promotion platform for children and youth in Africa. Considering that every intervention included in this review was conducted in the past 20 years, the scientific evidence supporting the use of sport-based health promotion initiatives is still in its infancy. Although future researchers have a promising body of literature to expand upon, there are significant practical and methodological limitations that need to be addressed. Furthermore, it is important to understand more regarding the specific factors that influence the effectiveness of sport-based health promotion interventions, including targeted health outcomes,

intervention delivery, setting, duration, and type of sport or physical activity used. If sport-based health promotion interventions continue to result in statistically significant improvements in targeted health outcomes with children and youth in Africa, there may be increased advocacy for implementing sport-based interventions throughout communities in Africa.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational, Behavior and Human Decision Processes*, 50(2), 179-211.
- American Psychological Association (2010). *Publication Manual of the American Psychological Association* (6th ed.). Washington, DC: American Psychological Association.
- Anfara Jr, V. A., & Mertz, N. T. (2014). *Theoretical frameworks in qualitative research*: Sage publications.
- Armstrong, N., Tomkinson, G., & Ekelund, U. (2011). Aerobic fitness and its relationship to sport, exercise training and habitual physical activity during youth. *Br J Sports Med*, 45(11), 849.
- Awotidebe, A., Monyeki, A., Phillips, J., & Lens, W. (2014). The outcomes of a sport-based intervention on risky sexual behaviours among rural school-going adolescents. *African Journal for Physical, Health Education, Recreation & Dance*, 20(4.1), 1436-1454.
- Azubuike, S. O., & Okojie, O. H. (2009). An epidemiological study of football (soccer) injuries in Benin City, Nigeria. *Br J Sports Med*, 43(5), 382-386. doi:10.1136/bjsm.2008.051565
- Balfour, L., Farrar, T., McGilvray, M., Wilson, D., Tasca, G. A., Spaans, J. N., Mathews, C., Maziya, L., Khanyile, S., & Dalgleish, T. L. (2013). HIV prevention in action on the football field: the WhizzKids United program in South Africa. *AIDS and Behavior*, 17(6), 2045-2052.
- Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev*, 84(2), 191-215.
- Biddle, S. J. H., & Asare, M. (2011). Physical activity and mental health in children and adolescents: a review of reviews. *Br J Sports Med*. doi:10.1136/bjsports-2011-090185
- Black, R. E., Cousens, S., Johnson, H. L., Lawn, J. E., Rudan, I., Bassani, D. G., Jha, P., Campbell, H., Walker, C. F., Cibulskis, R., Eisele, T., Liu, L., & Mathers, C. (2010). Global, regional, and national causes of child mortality in 2008: a systematic analysis. *The Lancet*, 375(9730), 1969-1987. doi:https://doi.org/10.1016/S0140-6736(10)60549-1

- Black, R. E., Morris, S. S., & Bryce, J. (2003). Where and why are 10 million children dying every year? *The Lancet*, 361. doi:10.1016/S0140-6736(03)13779-8
- Bloemhoff, H. J. (2006). The effect of an adventure-based recreation programme (ropes course) on the development of resiliency in at-risk adolescent boys confined to a rehabilitation centre. *South African Journal for Research in Sport, Physical Education & Recreation (SAJR SPER)*, 28(1), 1-11.
- Bloemhoff, H. J. (2012). High-risk adolescent girls, resiliency and a ropes course. *African Journal for Physical, Health Education, Recreation & Dance*, 18, 128-139.
- Booth, F. W., Gordon, S. E., Carlson, C. J., & Hamilton, M. T. (2000). Waging war on modern chronic diseases: primary prevention through exercise biology. *Journal of Applied Physiology*, 88(2), 774.
- Bryce, J., el Arifeen, S., Pariyo, G., Lanata, C. F., Gwatkin, D., & Habicht, J.-P. (2003). Reducing child mortality: can public health deliver? *The Lancet*, 362(9378), 159-164. doi:[http://dx.doi.org/10.1016/S0140-6736\(03\)13870-6](http://dx.doi.org/10.1016/S0140-6736(03)13870-6)
- Campbell, C. (2004). Creating environments that support peer education: experiences from HIV/AIDS-prevention in South Africa. *Health Education*, 104(4), 197-200.
- Catalano, R. F., Berglund, M. L., Ryan, J. A. M., Lonczak, H. S., & Hawkins, J. D. (2004). Positive youth development in the United States: Research findings on evaluations of positive youth development programs. *The Annals of the American Academy of Political and Social Science*, 591(1), 98-124.
- Centers for Disease Control and Prevention. (2012). Section 2: Morbidity Frequency Measures. Retrieved from <https://www.cdc.gov/opphss/csels/dsepd/ss1978/lesson3/section2.html>
- Chan, D. (2009). So why ask me? Are self-report data really that bad? In C. E. L. R. J. Vandenberg (Ed.), *Statistical and Methodological Myths and Urban Legends: Doctrine, Verity and Fable in the Organization and Social Sciences* (pp. 309-336). New York, NY: Taylor & Francis.
- Chatters, L. M., Levin, J. S., & Ellison, C. G. (1998). Public health and health education in faith communities. *Health Education & Behavior*, 25(6), 689-699.

- Chetty, J., & Edwards, S. D. (2007). An investigation into the use of exercise as a medium for mental health promotion among institutionalized children. *South African Journal for Research in Sport, Physical Education & Recreation (SAJR SPER)*, 29(2), 1-10.
- Christoffel, K. K. (2000). Public health advocacy: Process and product. *American Journal of Public Health*, 90(5), 722.
- Clark, T. S., Friedrich, G. K., Ndlovu, M., Neilands, T. B., & McFarland, W. (2006). An adolescent-targeted HIV prevention project using African professional soccer players as role models and educators in Bulawayo, Zimbabwe. *AIDS Behav*, 10(4 Suppl), S77-83. doi:10.1007/s10461-006-9140-4
- Collins, L. M., Murphy, S. A., & Strecher, V. (2007). The multiphase optimization strategy (MOST) and the sequential multiple assignment randomized trial (SMART). *American Journal of Preventative Medicine*, 32(5), S112-S118. doi:10.1016/j.amepre.2007.01.022
- Delva, W., Michielsens, K., Meulders, B., Groeninck, S., Wasonga, E., Ajwang, P., Temmerman, M., & Vanreusel, B. (2010). HIV prevention through sport: the case of the Mathare Youth Sport Association in Kenya. *AIDS Care*, 22(8), 1012-1020. doi:10.1080/09540121003758606
- Delva, W., & Temmerman, M. (2006). Determinants of the effectiveness of HIV prevention through sport. *Sport and Development*, 125-134.
- Draper, C. E., de Villiers, A., Lambert, E. V., Fourie, J., Hill, J., Dalais, L., Abrahams, Z., & Steyn, N. P. (2010). HealthKick: a nutrition and physical activity intervention for primary schools in low-income settings. *BMC Public Health*, 10(1), 398-409. doi:10.1186/1471-2458-10-398
- Ferguson, G. D., Naidoo, N., & Smits-Engelsman, B. C. (2015). Health Promotion in a Low-income Primary School: Children with and Without DCD Benefit, but Differently. *Phys Occup Ther Pediatr*, 35(2), 147-162. doi:10.3109/01942638.2015.1009230
- Fotso, J.-C., Ezech, A. C., Madise, N. J., & Ciera, J. (2007). Progress towards the child mortality millennium development goal in urban sub-Saharan Africa: the dynamics of population growth, immunization, and access to clean water. *BMC Public Health*, 7(1), 218. doi:10.1186/1471-2458-7-218

- Fuller, C. W., Junge, A., DeCelles, J., Donald, J., Jankelowitz, R., & Dvorak, J. (2010). 'Football for Health'--a football-based health-promotion programme for children in South Africa: a parallel cohort study. *Br J Sports Med*, 44(8), 546-554. doi:10.1136/bjsm.2010.072223
- Fuller, C. W., Junge, A., Dorasami, C., DeCelles, J., & Dvorak, J. (2011). '11 for Health', a football-based health education programme for children: a two-cohort study in Mauritius and Zimbabwe. *Br J Sports Med*, 45(8), 612-618. doi:10.1136/bjsm.2011.084905
- Fuller, C., Junge, A., Amaning, J., Kaijage, R. R., Kaputa, J., Magwende, G., Pambo, P., & Dvorak, J. (2015). FIFA 11 for Health Programme: Implementation in Five Countries in sub-Saharan Africa. *Health Education Journal*, 74(1), 103-119.
- Glanz, K., Rimer, B. K., & National Cancer Institute. (1997). *Theory at a glance: a guide for health promotion practice*. [Bethesda, Md]: U.S. Dept. of Health and Human Services, Public Health Service, National Institutes of Health, National Cancer Institute.
- Gentry, J. H., & Campbell, M. (2002). *Developing adolescents: a reference for professionals*. Washington, DC: American Psychological Association.
- Hekler, E. B., Rivera, D. E., Martin, C. A., Phatak, S. S., Freigoun, M. T., Korinek, E., Klasnja, P., Adams, M. A., & Buman, M. P. (2018). Tutorial for using control systems engineering to optimize adaptive mobile health interventions. *Journal of Medical Internet Research*, 20(6), e214. doi:10.2196/jmir.8622
- Hershow, R. B., Gannett, K., Merrill, J., Kaufman, E. B., Barkley, C., DeCelles, J., & Harrison, A. (2015). Using soccer to build confidence and increase HCT uptake among adolescent girls: a mixed-methods study of an HIV prevention programme in South Africa. *Sport in Society*, 18(8), 1009-1022.
- Howard, M. C. & Jacobs, R. R. (2016). The multiphase optimization strategy (MOST) and the sequential multilevel assessment randomized trial (SMART): Two novel evaluation methods for developing optimal training programs. *Journal of Organizational Behavior*, 37, 1246-1270. doi:10.1002/job.2102
- Janssen, I., & LeBlanc, A. G. (2010). Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *International Journal of Behavioral Nutrition and Physical Activity*, 7(1), 40. doi:10.1186/1479-5868-7-40
- Jones, G. J., Edwards, M. B., Bocarro, J. N., Bunds, K. S., & Smith, J. W. (2017). An integrative review of sport-based youth development literature. *Sport in Society*, 20(1), 161-179.

- Kaufman, Z. A., DeCelles, J., Bhauti, K., Hershow, R. B., Weiss, H. A., Chaibva, C., Moyo, N., Mantula, F., Hatzold, K., & Ross, D. A. (2016). A sport-based intervention to increase uptake of voluntary medical male circumcision among adolescent male students: Results from the MCUTS 2 cluster-randomized trial in Bulawayo, Zimbabwe. *Journal of Acquired Immune Deficiency Syndromes (1999)*, 72(Suppl 4), S297-S303. doi:10.1097/QAI.0000000000001046
- Kaufman, Z. A., Spencer, T. S., & Ross, D. A. (2013). Effectiveness of sport-based HIV prevention interventions: a systematic review of the evidence. *AIDS Behav*, 17(3), 987-1001. doi:10.1007/s10461-012-0348-1
- Kemp, C., & Pienaar, A. E. (2009). Effect of an aerobic-based physical activity programme on physical fitness of 10-15 year-old girls. *African Journal for Physical Health Education, Recreation and Dance*, 15(4), 527-542.
- Klasnja, P., Hekler, E. B., Shiffman, S., Boruvka, A., Almirall, D., Tewari, A., & Murphy, S. A. (2015). Micro-randomized trials: An experimental design for developing just-in-time adaptive interventions. *Health Psychology*, 34, 1220-1228. doi:10.1037/hea0000305
- Kulig, K. (2003). Sexual activity and substance use among adolescents by category of physical activity plus team sports participation. *Archives of Pediatrics and Adolescent Medicine*, 157(9), 905.
- Lennox, A., & Pienaar, A. E. (2013). Effects of an after-school physical activity programme on aerobic fitness and physical activity levels of adolescents from a disadvantaged community: PLAY Study. *African Journal for Physical, Health Education, Recreation & Dance*, 19(1), 154-168.
- Levac, D., Colquhoun, H., & O'Brien, K. K. (2010). Scoping studies: advancing the methodology. *Implementation Science*, 5(1), 69. doi:10.1186/1748-5908-5-69
- Ley, C., Leach, L., Barrio, M. R., & Bassett, S. (2014). Effects of an exercise programme with people living with HIV: research in a disadvantaged setting. *Afr J AIDS Res*, 13(4), 313-319. doi:10.2989/16085906.2014.961937
- Liu, L., Oza, S., Hogan, D., Perin, J., Rudan, I., Lawn, J. E., Cousens, S., Mathers, C., & Black, R. E. (2015). Global, regional, and national causes of child mortality in 2000–13, with projections to inform post-2015 priorities: an updated systematic analysis. *The Lancet*, 385(9966), 430-440. doi:http://dx.doi.org/10.1016/S0140-6736(14)61698-6

- Maro, C. N., & Roberts, G. (2012). Combating HIV/AIDS in sub-Saharan Africa: Effect of introducing a mastery motivational climate in a community-based programme. *Applied Psychology: An International Review*, 61(4), 699-722. doi:10.1111/j.1464-0597.2011.00482.x
- Maro, C. N., Roberts, G. C., & Sørensen, M. (2009). Using sport to promote HIV/AIDS education for at-risk youths: an intervention using peer coaches in football. *Scand J Med Sci Sports*, 19(1), 129-141. doi:10.1111/j.1600-0838.2007.00744.x
- Maticka-Tyndale, E., & Barnett, J. P. (2010). Peer-led interventions to reduce HIV risk of youth: a review. *Evaluation and Program Planning*, 33(2), 98-112.
- Monyeki, M. A., De Ridder, J. H., Preez, S. M. D., Toriola, A. L., & Malan, D. D. J. (2012). The effect of a ten month physical activity intervention programme on body composition of 9-13 year-old boys. *African Journal for Physical, Health Education, Recreation & Dance*, 18(2), 241-250.
- Mwaanga, O. (2010). Sport for addressing HIV/AIDS: Explaining our convictions. *Leisure Studies Association Newsletter*, 85, 61-67.
- Naidoo, R., & Coopoo, Y. (2012). The impact of a primary school physical activity intervention in KwaZulu-Natal, South Africa. *African Journal for Physical, Health Education, Recreation & Dance*, 18(1), 75-85.
- Owoeye, O. B., Akinbo, S. R., Tella, B. A., & Olawale, O. A. (2014). Efficacy of the FIFA 11+ warm-up programme in male youth football: A cluster randomised controlled trial. *J Sports Sci Med*, 13(2), 321-328.
- Parker, R., Jelsma, J., & Stein, D. J. (2016). Managing pain in women living with HIV/AIDS: A randomized controlled trial testing the effect of a six-week peer-led exercise and education intervention. *Journal of Nervous and Mental Disease*, 204(9), 665-672. doi:10.1097/NMD.0000000000000506
- Peacock-Villada, P., DeCelles, J., & Banda, P. S. (2007). Grassroot Soccer resiliency pilot program: Building resiliency through sport-based education in Zambia and South Africa. *New Dir Youth Dev*(116), 141-154, 113. doi:10.1002/yd.241
- Pedersen, B. K. (2006). Evidence for prescribing exercise as therapy in chronic disease. *Scandinavian Journal of Medicine and Science in Sports*, 16(S1), 3.

- Plummer, M. L., Wight, D., Wamoyi, J., Nyalali, K., Ingall, T., Mshana, G., Shigongo, Z. S., Obasi, A. I., & Ross, D. A. (2007). Are schools a good setting for adolescent sexual health promotion in rural Africa? A qualitative assessment from Tanzania. *Health Educ Res*, 22(4), 483-499. doi:10.1093/her/cyl099
- Richards, J., Foster, C., Townsend, N., & Bauman, A. (2014). Physical fitness and mental health impact of a sport-for-development intervention in a post-conflict setting: randomised controlled trial nested within an observational study of adolescents in Gulu, Uganda. *BMC Public Health*, 14, 619. doi:10.1186/1471-2458-14-619
- Schulenkorf, N., Sherry, E., & Rowe, K. (2016). Sport for development: An integrated literature review. *Journal of Sport Management*, 30(1), 22-39.
- Soligard, T., Nilstad, A., Steffen, K., Myklebust, G., Holme, I., Dvorak, J., Bahr, R., & Andersen, T. E. (2010). Compliance with a comprehensive warm-up programme to prevent injuries in youth football. *Br J Sports Med*, 44(11), 787-793.
- Sørensen, M., Maro, C. N., & Roberts, G. C. (2016). Gender differences in HIV related psychological variables in a Tanzanian intervention using sport. *International Journal of Sport & Exercise Psychology*, 14(2), 135-151.
- Starzak, D., Konkol, K., & McKune, A. (2016). Twelve weeks of soccer-specific training: effects on mucosal immunity, salivary alpha-amylase and body composition in male African youths. *Sport Sciences for Health*, 12(2), 269-276.
- Sterne, J. A. C., Hernán, M. A., Reeves, B. C., Savović, J., Berkman, N. D., Viswanathan, M., Henry, D., Altman, D. G., Ansari, M. T., & Boutron, I. (2016). ROBINS-I: a tool for assessing risk of bias in non-randomised studies of interventions. *BMJ*, 355, i4919.
- Struthers, P. (2011). The use of sport by a health promoting school to address community conflict. *Sport in Society*, 14(9), 1251-1264.
- Szto, C. (2013). Saving lives with soccer and shoelaces: The hyperreality of Nike (RED). *Sociology of Sport Journal*, 30(1), 41-56.
- Theokas, C., Danish, S., Hodge, K., Heke, I., & Forneris, T. (2008). Enhancing life skills through sport for children and youth. In N. L. Holt (Ed.), *Positive Youth Development Through Sport* (1st ed., pp. 71-81). New York, NY: Routledge.

- Tian, H., du Toit, D., & Toriola, A. L. (2017). The effects of an enhanced quality Physical Education programme on the physical activity levels of Grade 7 learners in Potchefstroom, South Africa. *Physical Education & Sport Pedagogy*, 22(1), 35-50.
- United Nations. (2013). *Definition of Youth*. Retrieved from <http://www.un.org/esa/socdev/documents/youth/fact-sheets/youth-definition.pdf>.
- United Nations (2015). *Levels and Trends in Child Mortality Report 2015*. New York, NY: United Nations Children's Fund Retrieved from https://www.unicef.org/publications/files/Child_Mortality_Report_2015_Web_9_Sept_15.pdf.
- United States National Library of Medicine (1999). Fact Sheet: Medical Subject Headings (MESH). Retrieved from <https://www.nlm.nih.gov/pubs/factsheets/mesh.html>
- Uys, M., Draper, C. E., Hendricks, S., de Villiers, A., Fourie, J., Steyn, N. P., & Lambert, E. V. (2016). Impact of a South African School-based Intervention, HealthKick, on Fitness Correlates. *American Journal of Health Behavior*, 40(1), 55-66.
doi:10.5993/AJHB.40.1.7
- Walter, C. M. (2014). Promoting physical activity: A low cost intervention programme for disadvantaged schools in Port Elizabeth, South Africa. *African Journal for Physical, Health Education, Recreation & Dance*, 20(2.1), 357-371.
- West, A. & Spring, B. (2017). Randomized controlled trials. Retrieved from <https://ebbp.org/training/randomizedcontrolledtrials>.
- Whitley, M. A., Hayden, L. A., & Gould, D. (2016). Growing up in the Kayamandi Township: II. Sport as a setting for the development and transfer of desirable competencies. *International Journal of Sport & Exercise Psychology*, 14(4), 305-322.
- Whitley, M. A., Wright, E. M., Gould, D., Petitpas, A., & Strachan, L. (2016). Coaches' perspectives on teaching life skills to underserved South African children and youth. *International Journal of Sports Science & Coaching*, 11(3), 312-326.
- World Health Organization. (1997). *Life Skills Education for Children and Adolescents in Schools*. Geneva, Switzerland: World Health Organization Retrieved from http://apps.who.int/iris/bitstream/10665/85321/1/9789241505727_eng.pdf?ua=1.

- World Health Organization. (2012). *Guidance on Couples HIV Testing and Counselling Including Antiretroviral Therapy for Treatment and Prevention in Serodiscordant Couples: Recommendations for a Public Health Approach*. Geneva, Switzerland: World Health Organization. Retrieved from http://apps.who.int/iris/bitstream/handle/10665/44646/9789241501972_eng.pdf;jsessionid=32BC3C0D1C7F01715984B9D80C11DA08?sequence=1.
- World Health Organization. (2013). *Consolidated Guidelines on the Use of Antiretroviral Drugs for Treating and Preventing HIV Infection*. Geneva, Switzerland: World Health Organization Retrieved from http://apps.who.int/iris/bitstream/10665/85321/1/9789241505727_eng.pdf?ua=1.
- World Health Organization. (2016). *World Health Statistics 2016: Monitoring Health for the SDGs Sustainable Development Goals*. Geneva, Switzerland: World Health Organization Retrieved from http://www.who.int/gho/publications/world_health_statistics/2016/en/.
- World Health Organization, W. (2017). Retrieved from http://www.who.int/topics/health_promotion/en/

Appendices

Appendix A: Expanded Literature Review

The World Health Organization (2016) highlighted sub-Saharan Africa as having the lowest average life expectancy, highest rates of child mortality in children under five years of age, and highest rates of infectious diseases such as malaria, tuberculosis, and pneumonia. There are only 22 countries in the world with an average life expectancy under 60 years, all of which are located in sub-Saharan Africa (World Health Organization, 2016). It has been suggested that targeting so-called preventable deaths caused by infectious and non-communicable diseases could help raise the average life expectancy in Africa (World Health Organization, 2016). Due to the fact that Africa has substantially higher rates of life-threatening infectious diseases such as malaria, tuberculosis, and HIV/AIDS, it is reasonable to hypothesize that focused prevention, treatment, awareness, and education initiatives could be effective in lowering the risk of death caused by infectious diseases (World Health Organization, 2016). These types of interventions could significantly reduce the number of preventable premature deaths, which would likely increase the average life expectancy in these countries.

Within the past 15 years, researchers have increasingly experimented with using sport as a platform to educate at-risk children and youth about infectious diseases and essential health practices (Balfour et al., 2013; Clark et al., 2006; Fuller et al., 2010; 2011; 2015; Hershow et al., 2015; Maro et al., 2009; Sørensen et al., 2016). Clark et al. (2006) conducted a two-week soccer-based intervention targeting HIV-related knowledge, attitudes, and intentions among a youth population in Bulawayo, Zimbabwe. The researchers recruited local and national professional soccer players to facilitate interactive sessions consisting of soccer and HIV-related education. Specifically, the educational topics included in the intervention were basic knowledge about HIV, ways to protect oneself from HIV, understanding risk factors for HIV, HIV stigma, and

developing ways to educate peers about HIV (Clark et al., 2006). A total of 304 students ($n = 151$ males; $n = 153$ females) between the ages of 12 and 14 participated in the study. 155 participants were assigned to the experimental condition and 149 were assigned to the control condition. The researchers collected quantitative data from participants in both conditions via self-report questionnaires at pre-intervention, post-intervention, and five months following the intervention. The questionnaires contained items examining HIV-related topics including knowledge of condom effectiveness, social support networks, HIV stigma, and knowledge of local HIV prevention services. Questionnaire items were originally written in English and were translated into Swahili, which is the national language of Tanzania. Participants' responses were then translated back to English from Swahili by experts in both languages.

Prior to the intervention, the researchers also collected qualitative data from five discussion groups that were conducted with local teachers and soccer players to help develop the intervention curriculum and to ensure that the components of the program were socially appropriate. The researchers also held discussion groups with teachers and players after the intervention to get evaluative feedback on the program. Additionally, the researchers collected qualitative data from study participants in the form of open-ended survey items (Clark et al., 2006). The qualitative data was used to gain a better understanding of the quantitative survey data collected at pre-intervention, post-intervention, and five months post-intervention (Clark et al., 2006).

Another intervention involved an 8-week soccer-based HIV education intervention using peer coaches in Dar es Salaam, Tanzania (Maro & Roberts, 2012; Maro et al., 2009). Participants ($n = 764$; Mean age = 13.6 years) were recruited from three poor communities at Elimu, Michezo Na Mazoezi (EMIMA) centers. EMIMA is a community-based non-profit organization that uses

peer coaches and sport to educate youth from poor communities in Tanzania (Maro & Roberts, 2012; Maro et al., 2009). Prior to recruiting participants for the study, the researchers recruited 100 peer coaches from the EMIMA program and divided them into two intervention conditions. The first intervention condition received the traditional EMIMA program and the second intervention condition received motivational enhancement strategies in addition to the traditional EMIMA program (Maro & Roberts, 2012; Maro et al., 2009). Peer coaches in both intervention conditions were trained by soccer coaches and EMIMA staff to teach specific soccer skills and sessions regarding HIV/AIDS prevention. Peer coaches in the intervention condition that used motivational enhancement strategies received an additional two weeks of training that covered master enhancement techniques. The researchers also chose to include two control conditions in their study; one that received Tanzania's existing classroom-based HIV education program, and one out-of-school control condition that received no HIV education at all (Maro & Roberts, 2012; Maro et al., 2009).

For the intervention condition receiving only the traditional EMIMA program, the peer coaches recruited 252 children who were divided into 18 teams with 14 participants each. For the intervention condition receiving motivational enhancement strategies in addition to the traditional EMIMA program, the peer coaches recruited 228 children who were divided into 19 teams with 12 participants each. In the first control condition receiving Tanzania's traditional classroom-based HIV education, the researchers recruited 250 participants from five local schools. For the second control condition, the researchers recruited 220 children who were not enrolled in school and who were not in the EMIMA program (Maro & Roberts, 2012; Maro et al., 2009). Participants in the intervention conditions participated in soccer training and HIV/AIDS life skills education sessions led by peer coaches over an eight-week period. To

maximize the positive social influence and foster social support among participants, the researchers encouraged children to form teams with friends and tried to arrange small-sided soccer matches after the intervention sessions (Maro & Roberts, 2012; Maro et al., 2009).

Participants in each condition were administered questionnaires with questions pertaining to HIV-related knowledge, beliefs, and intentions at both pre- and post-intervention. Specifically, the surveys included items measuring attitudes about having an exclusive sexual partner, attitudes about condom use, general knowledge about condoms and history of condom use, abstinence, intentions to use condoms, and perceived control when using a condom. The surveys also contained items related to demographic information, including questions pertaining to history of sport participation, age, education, orphanage, and age of sexual debut. Differences and improvements in participants' knowledge were compared across conditions at both pre- and post-intervention (Maro et al., 2009). Following the intervention, participants in the experimental conditions demonstrated statistically significant improvements in HIV-related knowledge compared to participants in the control conditions.

Hershow et al. (2015) conducted a 48-week community-based intervention using soccer as a platform to improve HIV-related knowledge, self-efficacy, and awareness of local HIV testing and counselling (HCT) services among a group of adolescent girls ($n=4260$; Mean age= 12.9). The study was conducted in collaboration with a non-profit organization called Grassroot Soccer, and data was collected at Grassroot Soccer sites in four different provinces in South Africa: Alexandra, Khayelitsha, Kimberley, Port Elizabeth, and Soweto (Hershow et al., 2015). The intervention was conducted as part of the SKILLZ Street (SS) program, which was created by Grassroot soccer in an effort to combat the HIV crisis impacting young women in South Africa (Hershow et al., 2015).

The researchers recruited and trained slightly older female community members to serve as peer coaches during the intervention. Prior to the intervention, peer coaches underwent approximately 80 hours of HIV knowledge and sexual reproductive health and rights training that was conducted by local Grassroot Soccer staff. After completing the training, each peer coach was assigned a group of ten female participants to lead through a total of ten two-hour sessions that integrated life skills activities, voluntary HCT services, and soccer. When the participants played soccer, they competed in non-competitive small-sided soccer matches against other teams involved in the program. In terms of life skills, peer coaches were instructed to focus specifically on HIV-related knowledge, decision-making in relationships, body image, and sexual reproductive health and rights knowledge. Furthermore, free HIV testing and counselling services were provided during the seventh practice session if participants wanted to be tested for HIV (Hershow et al., 2015).

The researchers collected both quantitative and qualitative data over the 48-week time period to measure the impact of the SKILLZ Street Program on HIV-related knowledge, self-efficacy, and awareness and use of local HIV testing and counselling services among the participants. Specifically, the authors collected program attendance and HIV testing data to measure whether participants were consistently attending the sessions and if they were participating in the free HIV services offered as a part of the program. The authors also monitored changes in participants' levels of HIV-related knowledge by administering a random sample of participants a 16-item self-report questionnaire immediately before and immediately after the intervention. The questionnaire measured HIV-related knowledge, attitudes, and communication outcomes. Qualitative data was collected from focus group discussions, which were conducted within two weeks of the program's completion. Data was collected from a total

of 16 focus groups, which were run with participants only ($n = 11$ groups) and coaches only ($n = 5$ groups). The focus groups discussed participants' and coaches' views of both the structure and implementation of the program (Hershow et al., 2015). Following the intervention, participants demonstrated statistically significant increases in HIV-related knowledge, attitudes, and communication scores from baseline to post-intervention. Furthermore, the authors reported that 68.5% of participants were tested for HIV at HCT events (Hershow et al., 2015).

Fuller et al. (2010) conducted an 11-week soccer-based health promotion intervention with a group of 7th grade students in South Africa. The researchers targeted improving levels of knowledge scores related to nine health topics; 1) high blood pressure, cholesterol, body mass index, and physical inactivity; 2) Unsafe sex; 3) Substance use; 4) Malaria; 5) Poor sanitation and hygiene practices; 6) Use of clean water; 7) Nutrition; 8) Protective health behaviors; and 9) Family and social support. The researchers chose to focus on both unsafe sex and protective health measures for two consecutive weeks during the intervention, but all other health topics were focused on for one week. The researchers connected each health topic to a specific skill in soccer, and each intervention session consisted of a 45-minute session focusing on the soccer skill and a 45-minute education session about the health topic for that week (Fuller et al., 2010).

The researchers recruited 370 participants (Mean age = 13.3 years) from two similar schools. Students from Grade six ($n = 125$) and Grade seven ($n = 131$) of one school served as participants in two experimental conditions and students from Grade 7 ($n = 144$) were assigned to the control condition (Fuller et al., 2010). The authors did not randomize participants to the experimental and control conditions due to school constraints, but they chose similar classrooms to account for the lack of randomization. A total of 23 coaches were recruited from the local community and paired with another coach of the opposite gender. Five coaching dyads were

randomly assigned to lead groups of approximately 20 participants in both the experimental and control conditions. The three coaches who were not assigned to lead groups served as substitutes if a coach had to miss a session (Fuller et al., 2010). Coaches assigned to the intervention conditions received a five-day training course that prepared them to administer the 11-week sport-based health promotion intervention. The coaching dyads that were assigned to the control condition received a two-day training course that emphasized only the soccer aspects of the curriculum but not the health messages. The coaches in the control condition completed the remaining three days of health information training after the intervention was complete and provided this information to participants in the control condition after the study was complete (Fuller et al., 2010).

Prior to the start of the 11-week intervention, participants in both conditions were administered a 20-item health information questionnaire with two questions addressing each of the ten health topics. Coaches were also administered the 20-item health questionnaire before and after completing their training courses. The health questionnaires contained 20 Likert-type health questions with responses ranging from ‘strongly disagree’ to ‘strongly agree.’ The researchers considered ‘agree’ and ‘strongly agree’ as positive responses and ‘disagree’ and ‘strongly disagree’ as negative responses. Sample health questionnaire items included questions such as 1) playing soccer will keep me healthy; 2) HIV and AIDS are the same thing; 3) Mosquitoes spread malaria; and 4) It is OK to drink water from the local river (Fuller et al., 2010). To determine the effect of the soccer-based intervention, the authors compared participants’ baseline scores on the 20-item health questionnaire to their scores at post-intervention. Following the intervention, participants were given an additional questionnaire containing six Likert-type items ranging from ‘strongly disagree’ to ‘strongly agree’ assessing their satisfaction with the program. Sample

items included 1) Sessions were easy to understand; 2) Attitude towards health issues changed; and 3) Sessions were enjoyable. Following the intervention, participants in the intervention conditions demonstrated statistically significant improvements in nine of the ten measured outcomes (Fuller et al., 2010).

Based on the success of their initial study, Fuller et al. (2011) conducted a similar soccer-based intervention with a total 822 youth with in-school groups in Mauritius and out-of-school groups in Zimbabwe. The structure, content, and implementation of the FIFA '11 for Health intervention was similar to the study conducted by Fuller et al. (2010) with a few minor differences. Most notably, the authors did not include a control condition, as participants in both countries received the intervention. Furthermore, the researchers expanded their health questionnaire from 20 items to 30 items, with three questions devoted to ten health topics. The specific health topics covered were; 1) Cardiovascular disease, stroke, diabetes, overweight, obesity; 2) Gender violence, rape, mental abuse, HIV, sexually transmitted infections; 3) HIV, syphilis, chlamydia, gonorrhea; 4) Lung disease, kidney disease, gender violence, mental health; 5) Malaria, dengue; 6) Diarrhea, cholera, dysentery, typhoid; 7) Diarrhea, cholera, dysentery, typhoid, helminths; 8) Under-weight, over-weight, obesity, diabetes, cardiovascular disease; 9) Influenza, polio, smallpox, meningitis, tuberculosis, tetanus; and 10) Cardiovascular disease, hypertension, diabetes, and HIV (Fuller et al., 2011, 2015). Session eleven of the intervention provided participants with a summary of each of the health messages covered in the first ten sessions. Each of the health messages related to a specific soccer skill (e.g. dribbling and lung disease). Half of each intervention session was devoted to the soccer skill and the other half was spent educating participants on the health topics for that session. The structure and implementation of each session included activities related to participants' normal day-to-day

living conditions and interactions. These included interactive educational activities, group discussions, and interactions with participants' social environments (Fuller et al., 2011, 2015).

Similar to the previous study, peer coaches were recruited from local communities and paired with another coach of the opposite sex. These coaching dyads were then assigned to lead a group of approximately 20 participants (Fuller et al., 2011). In Mauritius, the intervention was conducted in collaboration with the Mauritius Football Association and had support from the Mauritius Ministries of Health and Quality of Life, Education and Human Resources and Youth and Sport (Fuller et al., 2011). Participants in Mauritius ($n = 400$; Mean age = 13.0 years) were recruited from eleven secondary schools, and the intervention was incorporated into the existing school curriculum. The researchers used teachers and qualified soccer coaches working at the Mauritius Football Association to deliver the intervention to participants. In Zimbabwe, the intervention was delivered as an out-of-school initiative to study participants ($n = 422$; Mean age = 11.5 years). The researchers recruited local community members who had no teaching experience to deliver the intervention to study participants. The researchers organized and implemented the intervention in Zimbabwe in collaboration with Grassroot Soccer, which is a non-profit organization that uses soccer as a platform for HIV and AIDS prevention (Fuller et al., 2011; Peacock-Villada et al., 2007). Following the intervention, participants in both Mauritius and Zimbabwe demonstrated statistically significant improvements in health knowledge scores for each of the ten targeted outcomes (Fuller et al., 2011).

To assess the effectiveness of their existing protocol, Fuller et al. (2015) implemented the FIFA '11 for Health protocol to youth participants in Ghana, Malawi, Namibia, Tanzania, and Zambia. The interventions were conducted at schools as part of the school curriculum in the largest cities in each of the five African countries. The schools included in the intervention were

selected by the countries' Ministries of Education to be representative of their country's schools and educational standards (Fuller et al., 2015). All students in the selected classrooms were included as participants in the intervention. A total of 3814 participants were included in the study, including participants from Ghana ($n = 906$; Mean age = 13.5 years), Malawi ($n = 1098$; Mean age = 13.1 years), Namibia ($n = 439$; Mean age = 11.4 years), Tanzania ($n = 720$; Mean age = 11.3 years), and Zambia ($n = 651$; Mean age = 11.7 years).

Depending on the number of students in each classroom, each school received an equipment bag with soccer balls (10-15), soccer nets (1-2), ball pumps (one), bibs (25-50), cones (30), stopwatches (2), activity cards (2 sets), course manuals (2), whistles (2), and malaria bed nets (4-5). Prior to conducting the intervention, representatives of FIFA's Medical and Research Center (F-MARC) conducted meetings with members of each country's soccer federation, ministry of education, ministry of health, and ministry of sport to provide an overview of the intervention. Following these meetings, a senior member of each country's national soccer federation was recruited to serve as a National Project Leader throughout the intervention. Each National Project Leader served as a representative of F-MARC when meeting with their country's Ministry of Education and principals at the schools (Fuller et al., 2015).

Two F-MARC master instructors conducted a five-day training course in each country to familiarize local teachers and coaches with the intervention protocol. Specifically, the training course provided instruction on the philosophy, content, and delivery mode of the FIFA '11 for Health program as well as the implementation of data collection instruments (Fuller et al., 2011; 2015). These instruments included a demographic survey collecting information regarding participants' gender, age, preferred sport, school attended, and home accommodations as well as the FIFA '11 for Health 30-item health knowledge questionnaire Items on the questionnaire

contained three positively or negatively worded statements with response options of “true,” “false,” and “I don’t know.” Participants were administered the 30-item health knowledge questionnaire at pre- and post-intervention to determine participants’ improvements in health knowledge over the course of the intervention (Fuller et al., 2015). Following the intervention, participants in Ghana, Namibia, Tanzania, and Zambia demonstrated statistically significant improvements in health knowledge scores across each of the ten targeted outcomes. Statistically significant improvements in health knowledge scores were also observed in nine of the ten targeted outcomes for participants in Malawi (Fuller et al., 2015).

Awotidebe et al. (2014) conducted a 12-week soccer-based intervention with a group of adolescents in South Africa. The researchers sought to examine the impact of their intervention on HIV-related risk behaviors among program participants. The intervention was an eleven-week English version of Grassroot Soccer’s “Generation Skillz” curriculum, and it was delivered by peer educators to program participants after the school day (Awotidebe et al., 2014). The intervention was grounded in both Social Cognitive Theory (Bandura, 1977) and the Theory of Planned Behavior (Ajzen, 1991), which emphasize life skills development to promote positive behavioral outcomes (Awotidebe et al., 2014). The intervention consisted of eleven practice sessions that used interactive soccer-related activities to initiate discussions regarding HIV prevention and life skills development to promote positive behavior changes.

Participants were recruited from two schools situated approximately ten kilometers apart who volunteered to participate in the study. The total combined population between grade eight and grade ten between the two schools was approximately 1,200 students. Learners in grade 11 and grade 12 were unable to participate, as school policy did not allow students in these grades to take part in research initiatives (Awotidebe et al., 2014). The researchers selected the school that

had more availability to necessary resources for the intervention to serve as the experimental condition, and the other school served as the control. A total sample of 430 participants (Mean age = 15.21 years) was selected from the two schools, with 252 participants ($n = 127$ females; $n = 125$ males) from the intervention school and 178 ($n = 99$ females; $n = 79$ males) from the control school. Participants' baseline data was collected two weeks prior to the start of the intervention, and six peer educators delivered a total of 66 intervention sessions to six groups of students from the intervention school over the course of 12 weeks (Awotidebe et al., 2014). Participants in the control school only received the traditional school-based Life Orientation subject that is required in all South African schools.

Follow-up assessments were completed by participants in both the control condition and the experimental condition four weeks after the intervention was completed. Another follow-up assessment was conducted with only participants in the experimental condition 16 weeks after the intervention because participants in the control condition declined to participate due to upcoming school exams (Awotidebe et al., 2014). The adolescents completed self-report questionnaires with Likert-type responses to question assessing participants' sexual behaviors, HIV knowledge, self-efficacy to refuse sex, peer influence, sexual communication and negotiation skills, and time perspective (Awotidebe et al., 2014).

The researchers found that participants in the intervention demonstrated statistically significant increases in HIV-related knowledge across all time points, significant increases in self-efficacy to refuse sex from baseline to post-test one and baseline to post-test two, and significant improvements in negotiation skills from baseline to post-test two following the 12-week intervention (Awotidebe et al., 2014). However, the intervention did not have a statistically significant impact on participants' sexual behaviors, communication skills, and time perspective

at any follow-up assessment. The authors noted several challenges that occurred over the course of the intervention. The most persistent problem throughout the intervention was a lack of pre-existing structures to implement a sport-based HIV prevention intervention (Awotidebe et al., 2014). The researchers also noted that the peer educators used to administer the intervention to program participants were from a different community, and they had a hard time motivating the participants to engage in the program after school. Lastly, the researchers reported that the peer educators were often unable to finish their intervention sessions on time due to a lack of pre-existing HIV knowledge among program participants (Awotidebe et al., 2014).

Kaufman et al. (2016) conducted a soccer-based intervention with adolescent males in Bulawayo, Zimbabwe that sought to increase the uptake of voluntary male medical circumcision (VMMC) procedures among program participants. VMMC is a procedure that can reduce HIV transmission rates between males and females by up to 60% (Kaufman et al., 2016). The researchers recruited 1,226 male participants (Median age = 16.2 years) from 26 secondary schools. Each school was randomly assigned to either the intervention or control condition. Participants who were assigned to the intervention condition received the intervention at the start of a four-month period, and participants in the control condition received the intervention at the end of the four-month period (Kaufman et al., 2016).

The intervention consisted of a single 60-minute session that was delivered in schools by a coach that received intensive training from the Grassroot Soccer non-profit organization (Kaufman et al., 2016). Participants in both conditions completed a questionnaire at baseline and post-intervention assessing demographic information, socioeconomic status, VMMC-related knowledge and perceptions, reported circumcision status, and reported sexual behavior (Kaufman et al., 2016). The intervention session consisted of an interactive soccer game, a

personal story from the coach, and a large group discussion regarding HIV and male circumcision education. The intervention was rooted in Social Cognitive Theory (Bandura, 1977), and it was believed that circumcised coaches could provide VMMC education and increase participants' self-efficacy to undergo the treatment procedure through sharing stories of their own personal experiences (Kaufman et al., 2016). Following the hour-long intervention, participants who were interested in undergoing the procedure were told to contact the coach, who would provide transportation to a local clinic that provided the medical procedure. Additionally, participants in the first five schools that received the intervention were offered a non-monetary incentive if they chose to undergo VMMC, but the researchers were told to remove the incentives for participants because they were deemed to be unethical (Kaufman et al., 2016).

To identify participants, the researchers used probabilistic matching between the demographic information collected from participants at baseline and the registers at local VMMC clinics. Following the intervention, the researchers found that 41 participants (7.3%) in the intervention condition underwent VMMC, and an additional 19 participants (2.9%) of participants from the control condition underwent the procedure as well (Kaufman et al., 2016). Across participants in both conditions, VMMC uptake increased by approximately 7.6%. However, participants who were offered non-monetary incentives were nearly three times more likely to undergo the procedure, which suggests that the incentives were a significant confounding variable (Kaufman et al., 2016). Furthermore, only 25% of students who were recruited for the study took part in it, so the external validity of the findings is low. Although there were significant limitations to this study, the results of this intervention are promising, as Voluntary Medical Male Circumcision is a cost-effective and practical procedure to reduce the risk of contracting and spreading HIV (Kaufman et al., 2016).

Previous research suggests that participation in sport and other types of physical activity can promote the development of positive life skills among youth (Theokas et al., 2008).

Bloemhoff (2006; 2012) examined the impact of an outdoor adventure-based recreation program on the resiliency of adolescent boys and girls living in a residential rehabilitation center. In the first study, the researcher selected male participants from two educational youth care centers in South Africa designed to provide a safe haven for at-risk youth and youth with behavioral problems (Bloemhoff, 2006). One treatment facility was randomly assigned to be the treatment condition and the other facility was assigned to be the control condition. The treatment condition consisted of 46 boys (Mean age = 16.0 years) and the control condition consisted of 60 boys (Mean age = 15.4 years).

Participants in the intervention condition took part in a four-hour long physical activity session at a ropes course. The intervention was conducted by the principle investigator, who had over nine years of experience in ropes course instruction (Bloemhoff, 2006). Prior to taking part in the intervention, participants in both conditions completed questionnaires with Likert-type response items that measured ten domains of perceived protective factors in their environment. The questionnaire had to be translated from English to Afrikaans, then back-translated to English (Bloemhoff, 2012). Participants in the intervention condition completed the same questionnaire immediately after the ropes course intervention, whereas participants in the control group were provided the questionnaire four hours after they completed it at baseline (Bloemhoff, 2006).

Following the intervention, the researcher found that there were significant differences between participants in the experimental condition and participants in the control condition in eight of the ten domains of resiliency (Bloemhoff, 2006). Specifically, participants in the intervention condition experienced a statistically significant improvement ($p < .05$) on the

outcome assessing value for achievement between baseline and post-intervention, and highly statistically significant improvements ($p < .01$) in neighborhood resources, sense of acceptance, models for conventional behavior, positive attitude towards the future, ability to work with others, ability to work out conflicts, and enjoyment of activities (Bloemhoff, 2006). Therefore, the results of this study suggest that physical activity interventions have the potential to significantly improve levels of resilience among at-risk youth. However, considering that the researcher administered the intervention and was not blinded to the intervention status of program participants, it is likely that these findings may have been biased.

Given the promising findings of their initial physical activity-based intervention, Bloemhoff (2012) conducted a second intervention with a group of adolescent females from a youth care and education center in South Africa. The author employed the same methodology used in the Bloemhoff (2006) intervention, except all of the participants were chosen from the same residential facility. The experimental condition consisted of 29 females (Mean age = 17.2 years) and the control condition consisted of 38 females (Mean age = 16.5 years). Initially, the experimental group consisted of 54 participants, but 25 chose not to participate in the ropes course intervention (Bloemhoff, 2012).

Participants completed a questionnaire with Likert-type responses measuring ten social protective factors relating to resiliency immediately before and immediately after the intervention. Participants in the experimental condition scored significantly higher than participants in the control conditions in nine of the ten domains of resiliency. Therefore, the results of the intervention suggest that participation in a ropes course intervention can significantly enhance the resiliency of at-risk adolescent females (Bloemhoff, 2012). However, given that the researcher administered the intervention and was not blinded to participants'

condition status, the results of the study are potentially biased. Furthermore, the 46.3% drop-out rate of participants who were initially assigned to the intervention condition limits the external validity of these findings (Bloemhoff, 2012).

Peacock-Villada et al. (2007) also examined the impact of a sport-based intervention on resiliency with youth in South Africa and Zambia. The researchers conducted a six-week resiliency-focused HIV/AIDS pilot study that was instituted by Grassroot Soccer. The researchers conducted the study with 520 youth participants in Lusaka, Zambia and 150 youth participants in Johannesburg, South Africa. In Zambia, the researchers used a combination of surveys administered before and after the intervention, interviews with participants, discussions with coaches, and demographic assessments to analyze the impact of their intervention (Peacock-Villada et al., 2007). In South Africa, the researchers relied on group discussions and evaluations with program coaches.

Based on participants' responses in Zambia, the researchers concluded that the resiliency-program helped girls feel comfortable asking an adult coach for help. The intervention was also effective for boys, as they reported feeling more confident in their ability to make their own decision and more comfortable with asking a trusted adult for help (Peacock-Villada et al., 2007). Both male and female participants also learned about coping with situations when things don't go their way as well as coming up with goals for the future. Participants' survey responses revealed an increased sense of agency and confidence in decision-making (Peacock-Villada et al., 2007). Program coaches also mentioned in discussions that the curriculum resulted in conversations with participants about saying no to peer pressure and avoiding risky behaviors. Taken together, the results of this pilot study suggest that it had a positive impact on participants' decision-making skills, confidence, and resiliency (Peacock-Villada et al., 2007).

Previous research also suggests that participation in sport and physical activity can result in significant positive mental health outcomes for children and youth (Jones et al., 2017; Schulenkorf et al., 2016). Chetty and Edwards (2007) investigated the impact of a 12-week physical-activity intervention on mental health outcomes among a group of institutionalized children in South Africa. Two children's homes were selected for participation, and participants were divided into an experimental group and a control condition. A total of 33 children (Mean age = 10.66 years) participated in the study, with 20 children ($n = 6$ males; $n=14$ females) assigned to the intervention condition and 13 children ($n = 8$ males; $n = 5$ females) assigned to the control condition. The authors noted that participants were not randomly assigned to either the experimental or control condition, but it is unclear how they decided to assign participants to conditions (Chetty & Edwards, 2007). Prior to the intervention, participants in both conditions completed a battery of assessments. These included a biographical questionnaire that was translated from English to the local language, a feelings profile with true/false responses, a physical self-perception questionnaire with true/false response options, a depression checklist with yes/no questions, and a pediatric symptoms checklist with three Likert-type response options.

After the pre-intervention surveys were completed, participants in the intervention condition performed one hour of structured physical activity twice per week for 12 weeks. The exercise sessions included soccer games for boys and netball matches for girls (Chetty & Edwards, 2007). Following the 12-week intervention, participants in the experimental condition participated in a focus group discussion to talk about their experiences with the intervention. Following the intervention, participants in both conditions were administered the same questionnaires that they completed at baseline. Participants in the experimental condition

demonstrated statistically significant decreases in behavioral problems. No statistically significant changes were found for participants in either condition in the other measured outcomes, but participants in the experimental condition did experience small improvements in each domain from baseline to post-intervention (Chetty & Edwards, 2007). However, given that the exercise intervention consisted of just two hours per week of structured physical activity, it is possible that a more intensive exercise intervention may have yielded more promising results.

An intervention conducted by Parker et al. (2016) investigated the impact of a six-week peer-led physical activity intervention on pain management among a sample of South African women that were HIV-positive. A total of 27 women ($n = 12$ intervention; $n = 15$ control) between the ages of 18 and 40 participated in the intervention. The physical activity intervention consisted of a 20-minute of aerobic and strengthening circuit that was increased by two minutes every week, and each session concluded with a guided relaxation activity. The intervention consisted of a two-hour exercise regimen once a week for six weeks, and each session was conducted by a trained peer leader from the local community. Participants were also provided with a workbook with problem solving activities and goal-setting to work on during the week (Parker et al., 2016). Participants in the control condition also received the workbook but did not participate in the physical activity intervention.

Following the intervention, the researchers observed that participants in both the experimental and control groups experienced statistically significant reductions in pain, but there was no statistically significant difference between the two conditions at post-intervention (Parker et al., 2016). Given that participants in both conditions experienced significant reductions in pain over the course of the intervention, the researchers hypothesized that either the goal-setting and problem solving workbook that was provided to participants in both conditions was responsible

for the decreased pain symptoms, or participating in a pain reduction intervention program in addition to usual care significantly improved their pain symptoms (Parker et al., 2016). Although the results of this study suggest that exercise alone may not alleviate pain in HIV-positive patients, it may be an effective supplementary treatment option.

Sport for development initiatives have also been used in post-conflict settings (Richards et al., 2014; Schulenkorf et al., 2016). For instance, an intervention conducted by Richards et al. (2014) investigated the impact of an 11-week sport-based program on the physical fitness and mental health of adolescents in the post-conflict city of Gulu, Uganda. Participants were selected from ten primary schools and were randomly assigned to the intervention group or a wait-list control group. The intervention was a community sports league called the Gum Marom Kids League, which consisted of 40-minute soccer games followed by peace-building activities (Richards et al., 2014). The intervention was administered by members of the local community who were trained to be peacebuilding coaches by staff members of the research team. Each coach was assigned to lead a soccer team, and league points for each team were assigned based on soccer results, on-field behavior, peacebuilding activities, and community service (Richards et al., 2014).

Prior to the intervention, participants completed a variety of assessments. For physical fitness outcomes, participants completed the multi-stage fitness test to measure cardiovascular fitness and the standing broad jump to measure muscular power. Mental health status was measured using a modified version of the Acholi Psychosocial Assessment Instrument (Richards et al., 2014). Out of a total of 1,931 students enrolled in the ten schools, 1,462 completed at least one assessment at baseline, and 1,314 participants completed at least one assessment at post-intervention. All participants were between the ages of 11 and 14, and 152 participants who took

part in the intervention completed at least one assessment both at baseline and post-intervention (Richards et al., 2014).

Following the intervention, the researchers found no significant differences in physical fitness outcomes between participants who had taken part in the intervention and those in the wait-list control group. Furthermore, participants in the experimental condition experienced a significant increase in depressive and anxiety-like symptoms, but participants in the control condition experienced significant improvements in both domains (Richards et al., 2014). The researchers hypothesized that the competitive environment of the sport-based intervention activated negative health outcomes that derived from participants' only previous exposure to competitive physical activity, which was through armed conflict (Richards et al., 2014). The results of this intervention highlight the need to view sport as a small part of a much larger social phenomenon, and the impact of sport-based interventions can vary significantly depending on the social environment (Richards et al., 2014).

Given the numerous physical and mental health benefits that accompany physical activity and exercise, several articles included in our review sought to evaluate the impact of a sport- or physical activity-based intervention on participants' physical activity levels. For instance, Naidoo et al. (2009) conducted a pilot study to examine the impact of a school-based nutrition and physical activity intervention on the physical activity levels of primary school children in South Africa. The researchers used a purposive sample of four primary schools that were within 50 kilometers of each other, and they recruited four principals, ten teachers, and 256 grade six students to participate in the intervention over a period of six months (Naidoo et al., 2009). Since the researchers were primarily interested in understanding the feasibility of their program, all participants were included in the experimental condition.

The researchers collected both qualitative and quantitative data to evaluate their program. Participants completed assessments both before and after the intervention that measured their knowledge, attitudes, and practices regarding physical activity and nutrition (Naidoo et al., 2009). Physical activity levels were monitored via self-report responses, as participants were asked to record the type, duration, and time of each type of physical activity. Student participants also underwent a physical fitness test both before and after the intervention. The fitness test included the sit-and-reach test to measure participants' flexibility, a sit-up test to measure muscular endurance, and the standing long jump test to measure muscular power. The researchers collected participants' height and weight and calculated their BMI score (Naidoo et al., 2009). Qualitative data was collected in the form of observing participants' physical activity during lunch and conducting interviews with teachers and principals.

The nutrition and physical activity intervention occurred in three stages (Naidoo et al., 2009). In the first stage, the researchers visited the schools and informed the school staff about the intervention. School staff were interviewed about their attitudes regarding physical activity and whether they encouraged their students to engage in exercise. Trainings were offered to selected school staff members to provide them with information regarding physical activity and nutrition (Naidoo et al., 2009). In the second phase, participants completed pre-intervention questionnaires and assessments two weeks prior to the start of the intervention. In the third and final stage, participants completed the same questionnaires and assessments after the six-month intervention was completed.

The primary objective of the nutrition and physical activity intervention was to provide students and faculty members with a broad range of physical activities (Naidoo et al., 2009). Faculty members were encouraged to include physical activity components during classroom

instruction, and teachers were provided with classroom-based intervention materials with an aim to make long-term sustainable changes in the school (Naidoo et al., 2009). Opportunities to learn more about nutrition and physical activity were provided to school faculty members in the form of voluntary workshops. Following the intervention, participants reported statistically significant increases in overall physical activity participation, participation in sports, fitness test scores, and nutritional habits (Naidoo et al., 2009). Therefore, the authors concluded that instituting a multi-faceted health promotion intervention into an existing school curriculum is a feasible approach to improve health behaviors among children in schools.

Based on the results of their pilot study, Naidoo and Coopoo (2012) conducted an 18-month nutrition and physical activity intervention using a convenience sample of eleven schools with 798 schoolchildren in South Africa. The researchers followed the same procedures outlined in their pilot study, with the only difference being that the schools were divided into nine intervention schools and two control schools. Staff and faculty members at the nine intervention schools were provided with the same trainings that were provided in the pilot study, and participants completed the same questionnaires and fitness assessments (Naidoo & Coopoo, 2012; Naidoo et al., 2009). Staff and students in the control schools continued with their normal day-to-day curriculum aside from taking the pre- and post-intervention assessments.

Over the course of the 18-month intervention, five participating schools were lost to follow-up. Therefore, a total of six schools ($n = 5$ intervention; $n = 1$ control) were involved throughout the entirety of the intervention (Naidoo & Coopoo, 2012). A final sample of 270 participants were included in the sample, with 172 from intervention schools and 98 from control schools. Participants from the intervention schools demonstrated a statistically significant increase in the number of sports played from baseline to post-intervention, and post-intervention

results suggested that participants were engaging in 45-215 minutes per week of moderate to vigorous physical activity during the school day. Both male and female participants in the experimental condition experienced statistically significant improvements in the sit-and-reach flexibility test, the sit-ups muscular endurance test, and the standing broad jump. The results of this study suggest that a school-based physical activity and nutrition intervention can significantly enhance the physical activity levels and nutritional habits of students (Naidoo & Coopoo, 2012).

Uys et al. (2016) also conducted a three-year school-based physical activity and nutrition intervention with a group of 16 primary schools located in South Africa. Eligibility for participation by schools in this study depended on several factors (Uys et al., 2016). First, the school principal had to express the need for a health intervention to occur at the school. The schools also needed to have at least one grass field for activities or access to a local community center, and unhealthy diet and lack of physical activity for both students and school staff members was identified as a major concern by the principal. The researchers randomized eight primary schools (four urban and four rural) to be in the experimental condition and eight primary schools (four urban and four rural) to the control condition (Uys et al., 2016).

Participants in the experimental condition received the HealthKick intervention, which was a school-based physical activity and nutrition intervention developed for primary schools in low-income communities (Draper et al., 2010; Uys et al., 2016). The HealthKick intervention is based on the social ecological model of behavior, as it emphasized intrapersonal, interpersonal, organizational, and community level resources (Uys et al., 2016). The methods employed in the intervention were similar to those employed in the school-based physical activity and nutrition intervention by Naidoo and Coopoo (2012), as the intervention was designed to be implemented

by school faculty members and staff with little oversight from the researchers. Participants in the control schools were only given a book with healthy tips but did not participate in the HealthKick intervention (Uys et al., 2016).

Given that it was a three-year intervention, the recruitment of new participants occurred at the start of each year (Uys et al., 2016). At baseline, the researchers recruited a total of 1,002 participants ($n = 503$ intervention; $n = 499$ control) from grade four. All participants completed a battery of physical fitness assessments including the sit-and-reach test of flexibility, sit-ups to test muscular endurance, a shuttle run, and the standing long jump to measure muscular power. Participants also completed a questionnaire assessing their knowledge and attitudes toward physical activity, social support, self-efficacy, perceived barriers, and enjoyment (Uys et al., 2016). All participants had their anthropometric measurements recorded as well. The same procedure was repeated at the one year timepoint with 1,072 new participants ($n = 526$ intervention; $n = 546$ control) from grade five, and again at the two year timepoint with 1,088 new participants ($n = 532$ intervention; $n = 556$ control) from grade six (Uys et al., 2016).

The only statistically significant difference observed between participants in the experimental condition and participants in the control condition was their sit-up scores from baseline to post-intervention. Results from the questionnaires suggested that participants in both conditions gained considerable knowledge, self-esteem, and perceived the environment to have less barriers to physical activity, but the difference between the conditions was not significant (Uys et al., 2016). The authors hypothesized that the hands-off structure of their intervention likely contributed to the lack of significant findings, as low-touch interventions may not be feasible in low-income school settings (Uys et al., 2016).

Walter (2014) investigated the impact of a six-week school-based physical activity intervention on physical activity levels in three low-income primary schools in South Africa. Specifically, the researcher sought to improve participants' levels of moderate to vigorous physical activity. A total of 120 participants between the ages of eight and 12 were randomly selected from the schools' registers (Walter, 2014). Initially, the intervention was designed to last 12 weeks, but a prolonged teacher strike and incomplete participant data resulted in a six-week intervention with 79 participants ($n = 38$ boys; $n = 41$ girls). Prior to the intervention, participants were given accelerometers to measure their daily levels physical activity. Participants' anthropometric measurements were also taken at both baseline and post-intervention, and the researchers conducted semi-structured interviews with selected school staff members following the intervention (Walter, 2014).

The physical activity intervention was designed as a low-cost intervention. Participants were provided with painted game markings for activities such as hop-scotch and four-square, playground stations such as monkey bars and balance beams, and sporting equipment such as balls, goals, jump ropes, and frisbees (Walter, 2014). Although the intervention sessions were structured, the researchers encouraged participants to engage in free play outside of the intervention as well, and participants were given access to all of the equipment that was provided. Following the six-week intervention, the researchers observed a statistically significant reduction in sedentary time among program participants, and a statistically significant increase in time spent performing moderate to vigorous physical activity (Walter, 2014). Therefore, the results of the study suggest that a low-cost six-week physical activity intervention can significantly reduce sedentary behaviors and significantly improve the time spent performing

moderate to vigorous physical activity among children in low-income primary schools (Walter, 2014).

A similar school-based physical activity intervention was conducted by Tian et al. (2017) with students from two low-income South African primary schools. The researchers recruited a convenience sample of 110 participants ($n = 40$ experimental; $n = 70$ control) between the ages of 12 and 13 to participate in the study. Participants in the experimental condition participated in a 12-week enhanced-quality physical education program led by specialized physical education instructors. The enhanced quality physical education classes occurred once a week for 60 minutes, and they consisted of a ten-minute warm-up, 30 minutes of moderate-to-high intensity aerobic exercise, and 20 minutes of strength and muscular endurance exercises (Tian et al., 2017). Furthermore, children in the experimental condition were given rewards such as stickers, badges, certificates, and colorful educational workbooks about the benefits of physical activity throughout the intervention. Participants in the control condition attended their usual physical education classes led by teachers who were trained by the South African government (Tian et al., 2017).

Following the 12-week intervention, participants in the experimental condition demonstrated statistically significant improvements in time spent performing both moderate and vigorous types of physical activity, but no significant improvements were observed for participants in the control group (Tian et al., 2017). There was also a statistically significant difference in time spent on moderate, vigorous, and overall physical activity between participants in the experimental and control conditions. Participants in the experimental group experienced a statistically significant decrease in sedentary time over the course of the intervention, but no significant change was observed for participants in the control group. Taken together, these

results suggest that an enhanced-quality physical education program at low-income primary schools can effectively increase the amount of time spent performing moderate-to-vigorous physical activity and decrease the amount of sedentary time for students (Tian et al., 2017).

Another physical activity intervention conducted by Lennox and Pienaar (2013) sought to improve levels of physical activity among a group of adolescents in South Africa. A total of 318 participants (Mean age = 14.5 years) were recruited to participate in the study. The intervention condition consisted of 252 students from a secondary school, and 66 students from a different secondary school formed the control condition. Participants in the experimental condition participated in a 60-minute physical activity program consisting of 30 minutes of aerobic training, 15 minutes of strength and flexibility training, and 15 minutes of sport-related ball skills activities two times per week for six months (Lennox & Pienaar, 2013). Although attendance was taken, participation in the program was considered voluntary. The researchers used accelerometers to measure participants' energy expenditure during each exercise session. Participants completed the bleep test assessment as baseline and post-intervention to measure their VO_{2max} and were also asked to record their daily physical activity (Lennox & Pienaar, 2013).

The results of the study suggested that participants in the experimental condition did not experience significant improvements in physical activity levels or fitness-related outcomes compared to participants in the control condition. However, only 33 participants (9.1%) in the experimental condition attended at least 70% of the physical activity sessions (Lennox & Pienaar, 2013). Based on the low levels of attendance among participants in the experimental condition, it is unsurprising that the researchers found no significant differences between the conditions. Given that the intervention was conducted after school and many of the children had

to walk long distances home, the authors concluded that conducting a physical activity intervention during the school day would likely have been more effective (Lennox & Pienaar, 2013).

Several interventions included in our review investigated the impact of sport-based interventions on fitness outcomes with children and adolescents in Africa. For example, Kemp and Pienaar (2009) investigated the effects of a ten-week dance-based intervention on the aerobic endurance, muscular strength, muscular endurance, flexibility, and body composition among a sample of South African girls. A total of 38 girls (Mean age = 12.5 years) from two farm schools were included in the intervention. Participants from one school ($n = 20$) were assigned to the intervention condition and participants from the second school ($n = 18$) were assigned to the control group. The school selected to be the experimental group was chosen because it was the only location where a dance-based physical activity intervention could realistically be administered (Kemp & Pienaar, 2009).

Prior to the intervention, the body measurements of participants in both conditions were taken, including skinfold measurements, body fat percentage, height, weight, and body mass index. Participants were also administered several assessments measuring fitness-related outcomes via the FITNESSGRAM, which included the Progressive Aerobic Cardiovascular Endurance (PACER) test to measure aerobic endurance, curl-ups, trunk lifts, and push-ups to measure muscular endurance, and the sit-and-reach test to measure flexibility. Participants were provided with accelerometers to measure their overall energy expenditure during physical activity (Kemp & Pienaar, 2009).

After completing the baseline assessments, participants in the intervention condition participated in a 30-minute aerobic dance program two times per week for ten weeks. The 30-

minute program consisted of a five-minute warm-up, 15 minutes of moderate-to-high intensity aerobic dances, five minutes of muscular strength and endurance exercises, and a five-minute cool down (Kemp & Pienaar, 2009). After the first six weeks of the intervention, the researchers increased the rhythm of the music to enhance the intensity of the workout. Participants in the control group completed the same assessments at baseline and post-intervention, but did not take part in any of the intervention sessions (Kemp & Pienaar, 2009).

Following the intervention, participants in the experimental condition demonstrated significant reductions in triceps thickness, as well as significant increases in muscular strength and endurance in the trunk and abdominal regions (Kemp & Pienaar, 2009). Furthermore, participants in both conditions experienced reductions in body mass and body mass index, although these reductions were not statistically significant. Participants in the intervention condition also experienced a statistically significant increase in both aerobic endurance and trunk flexibility from baseline to post-intervention (Kemp & Pienaar, 2009). Therefore, the results of the study suggest that participation in an aerobic dance intervention can improve fitness-related outcomes, including aerobic endurance, muscular strength, muscular endurance, flexibility, and body tone (Kemp & Pienaar, 2009).

Monyeki et al. (2012) investigated the impact of a ten-month physical activity intervention on the body composition of a population of South African boys. The researchers recruited 322 participants ($n = 173$ experimental; $n = 149$ control) between the ages of nine and 13 from two schools situated approximately seven kilometers apart and assigned one school to serve as the experimental condition and the other to serve as the control. Prior to the intervention, body measurements of all participants were taken, including body mass, stature, and subscapular and calf skinfolds. Participants in the intervention condition participated in 30 minutes of

physical activity twice per week for ten months (Monyeki et al., 2012). Each physical activity session included a warm-up activity, speed exercises, strength exercises, balance exercises, and a cooldown. Following the intervention, participants in the experimental condition experienced a reduction in BMI and body fat percentage, but neither reached a level of statistical significance. Therefore, the physical-activity intervention did not significantly impact the body composition of participants (Monyeki et al., 2012).

Ferguson, Naidoo, and Smits-Engelsman (2015) conducted a nine-week physical activity intervention with a sample of children with Developmental Coordination Disorder (DCD) and a control group consisting of children without DCD. The intervention was conducted at a low-income school in Cape Town, South Africa, and the researchers selected a total sample of 41 children (Mean age = 7.8 years; $n = 22$ intervention; $n = 19$ control) to participate in the study. Prior to participating in the study, all participants completed a variety of assessments relating to motor skills and fitness outcomes. These included the Movement Assessment Battery for Children-2 (MABC-2), the Functional Strength Measure, the Muscle Power Spring Test (MPST), and the 20-meter shuttle run. Participants completed the same assessments after completing the intervention (Ferguson et al., 2015). Following the nine-week intervention, participants in the intervention condition demonstrated a statistically significant improvement in the MABC-2, which measured fine motor skills. No significant change in fine motor skills was observed for participants in the control condition. However, participants in the control condition experienced statistically significant improvements in mean anaerobic power following the intervention. Therefore, the results of this study suggest that physical activity-based interventions can be targeted and adapted to fit the needs of different groups of children, including children with disabilities (Ferguson et al., 2015)

An intervention conducted by Ley et al. (2014) investigated the physical health and fitness-related effects of a ten-week physical activity intervention 23 South African participants (Mean age = 30.0 years) living with HIV. The sample consisted of 20 females and three males between the ages of 20 and 44 years old. Based on participants' preferences, the sample was divided into two groups; one that preferred to exercise alone (Group A) and one that preferred to exercise in a group setting (Group B) (Ley et al., 2014). Participants in each group exercised three times per week at a moderate intensity for at least ten weeks. Although the average duration of group sessions were 90 minutes compared to 65 minutes for individual sessions, both groups performed a similar workload over the course of their exercise sessions (Ley et al., 2014).

Prior to the intervention, participants had their blood drawn to measure HIV-related blood counts. The researchers also collected anthropometric measurements from program participants including height, weight, waist and hip circumference, and skinfold measurements (Ley et al., 2014). Participants also underwent several fitness tests prior to the intervention, including a VO_{2max} test on a treadmill to measure aerobic capacity and a leg press assessment to measure muscular strength. The researchers took attendance at each exercise session, and defined non-compliance as participating in the sessions less than once per week on average (Ley et al., 2014).

Following the intervention, participants who were compliant with the physical activity regimen demonstrated statistically significant increases in muscular strength from baseline to post-intervention. Considering that all participants in the intervention were HIV-positive, the researchers believed that these results may have had a significant positive impact on participants' physical health and mental wellbeing (Ley et al., 2014). Although the significant improvements in compliant participants' muscular strength were promising, the researchers felt that the

relatively short duration of the program, lack of focus on nutrition, and inconsistent attendance among participants played a major role. Nevertheless, the findings by Ley et al. (2014) suggest that physical-activity intervention can significantly improve the physical and mental health of HIV-positive individuals.

Two studies included in our review suggest that sport- and physical-activity based interventions can have a positive impact with highly active individuals as well. Starzak et al. (2016) conducted a 12-week soccer-specific training intervention on mucosal immunity and body composition in a sample of competitive male youth soccer players. The researchers recruited 50 participants (Mean age = 11.74 years) from a youth soccer training academy in South Africa. The players practiced five days per week, and the 40-minute speed, agility, and quickness (SAQ) intervention was incorporated into the practices three days per week (Starzak et al., 2016). The researchers collected saliva samples from program participants at baseline to assess for mucosal immunity, and participants also had their body composition (height, weight, body fat %, waist circumference, and skinfold measurements) and cardiorespiratory fitness (VO_{2max}) measured. Following the 12-week intervention, participants demonstrated statistically significant increases in mucosal immunity as well as statistically significant decreases in BMI, waist-to-hip ratio, body fat percentage, and lean body mass (Starzak et al., 2016). Therefore, the results of this study suggest that sport-based interventions can significantly enhance both physical health outcomes and fitness-related outcomes for highly active individuals.

Owoeye et al. (2014) also examined the effect of a structured physical activity program with a sample of elite youth soccer players in Lagos, Nigeria. The researchers sought to determine whether participation in the FIFA 11+ warm-up program would reduce the risk of injury among this group of athletes. The FIFA 11+ warm-up program is a structured warm-up

program consisting of various forms of physical activity aimed at reducing the risk of injury for male and female soccer players (Owoeye et al., 2014; Soligard et al., 2010). The researchers used a sample of 20 male soccer teams for the intervention, and randomly allocated ten teams to the experimental condition and ten teams to the control condition. Teams assigned to the intervention condition were told to use the complete exercise program as a warm-up at least twice per week over the course of six months, whereas teams in the control condition were instructed to continue their traditional warm-up routines (Owoeye et al., 2014).

Prior to the intervention, the researchers collected body composition measurements from participants in both conditions, including height, weight, body fat %, BMI, and injury history. The researchers also had trained physiotherapists visit each team at least once per week to monitor the number of athletes who suffered injuries (Owoeye et al., 2014). Following the six-month intervention, the researchers found that players on teams in the experimental condition demonstrated significantly lower rates of injury, including lower rates of time players lost due to an injury, injuries to lower extremities, and match injuries compared to teams in the control condition (Owoeye et al., 2014). Furthermore, the overall rate of injury for teams that performed FIFA 11+ warm-up program was reduced by 41% at post-intervention, and injuries to lower extremities were reduced by 48% (Owoeye et al., 2014).

Conclusion

Sport- and physical activity-based interventions have been used with children in Africa to improve rates of overall and disease-specific health knowledge, improve levels of physical activity, improve overall fitness levels, and improve both physical and mental health outcomes (Schulenkorf et al., 2016). Although sport-based health promotion interventions with children and youth have yielded promising results in multiple African countries, it is important to

highlight the need for caution when attempting to generalize the results of these initiatives. Several studies that resulted in significant improvements in levels of overall and disease-specific health knowledge discussed the potential of similar sport-based programs across sub-Saharan Africa and advocated for their widespread implementation (Fuller et al., 2015; Maro et al., 2009). Although it is appropriate to hypothesize that sport can be an effective platform for health promotion initiatives, it is important for researchers to gain a comprehensive understanding of the various cultures, traditions, and health issues that are prevalent in different countries and communities before introducing a focused sport-based health promotion intervention. Although Africa has significantly higher rates of HIV/AIDS, malaria, and tuberculosis compared to other areas of the world, health concerns in certain countries and communities may not reflect the status of the entire continent (World Health Organization, 2016).

Although there are several significant limitations, the body of literature regarding the use of sport for health promotion with children and youth in Africa is promising. Future researchers should seek to address the various limitations of previous research, including randomizing participants to control and experimental conditions when it is both ethical and feasible, collecting significantly more longitudinal data, collecting data with a broader array of measures beyond self-report data, targeting a larger range of at-risk African youth, proceeding with caution when aiming to generalize results to other countries in Africa, and including measurable behavior outcomes as components of the interventions. Prior to conducting sport-based health promotion initiatives, it is essential that investigators conduct thorough needs assessments to gain a consummate understanding of the health concerns and existing social and cultural norms that are prevalent in the communities of interest. Despite these limitations, previous research initiatives have established an excellent foundation for a promising line of research, and investigators

should be commended for their contributions to a body of literature that warrants significantly more attention.

Based on the positive results of previous sport-based health promotion interventions targeting children and youth in Africa, future studies have a strong foundation of research to expand upon. Moving forward, it is imperative that researchers target health behavior changes as well as knowledge improvements, as it is important to understand whether individuals can apply the health information they learn from a sport-based intervention. Given the concerning statistics regarding disease and child mortality in Africa, the use of sport as a platform to educate children about essential health practices may serve an important role to improve the overall health conditions of communities and provide access to and promote the use of necessary health services.

Appendix B: Limitations

Although previous research demonstrates the potential of conducting sport-based health promotion initiatives at schools (Awotidebe et al., 2014; Clark et al., 2006; Ferguson et al., 2015; Fuller et al., 2010; 2011; 2015; Kaufman et al., 2016; Kemp & Pienaar, 2009; Lennox & Pienaar, 2013; Naidoo & Coopoo, 2012; Naidoo et al., 2009; Tian et al., 2017; Walter, 2014), these interventions did not include children and youth who are not enrolled in school. Considering the high rates of children and youth who do not attend school in Africa, sport-based health promotion interventions that are conducted at schools do not include youth who are the most at-risk, which significantly limits the impact of these initiatives. In this sense, there is a need for future health interventions to target youth through avenues outside of traditional institutions (Maro et al., 2009). Few interventions have targeted out-of-school youth, but it has been suggested that programs can effectively recruit out-of-school youths in locations where they spend significant time and include activities that they enjoy and value (Maro et al., 2009). Additionally, previous research suggests that schools can be utilized to recruit participants for sport interventions that are conducted in community settings (Hershow et al., 2015). Based on the promising results of existing sport-based health promotion initiatives, conducting similar interventions in community settings and catering them to a broader range of at-risk youth warrants further exploration.

It should also be noted that the participants in sport-based health promotion interventions may have been familiar with the collaborating non-profit organization (Maro et al., 2009). Therefore, it is possible that participants were already familiar with sport-based program procedures, and they may have had exposure to the health messages included in the intervention (Delva et al., 2010). This could have significantly impacted the results of the study, and the interventions may have inadvertently targeted children and youth who had already been exposed

to a sport-based health promotion curriculum. Based on the fact that several studies reported high levels of participant satisfaction with the structure of the interventions, participants with previous experience with sport-based health promotion initiatives may have been more comfortable with the format of the interventions than their less experienced peers (Fuller et al., 2010; 2011; 2015; Maro et al., 2009). To address this limitation, future research initiatives should target children and adolescents who are unfamiliar with sport-based health promotion projects, as these populations can be considered at higher risk for negative health outcomes.

Another significant limitation of the existing body of literature is the use of self-report data to monitor changes in participants' levels of health knowledge. The most common methodology used to monitor changes in participants' health knowledge was through self-report questionnaires that were administered at pre- and post-intervention. There are several inherent limitations to the use of self-report data, and it has been suggested that self-report data negatively affects both the validity and the generalizability of the data (Azubuike & Okojie, 2009). Therefore, the use of self-report assessments to monitor changes in health knowledge throughout a sport-based health promotion initiative may have been influenced by multiple extraneous variables, as participant responses could have been influenced by researcher bias, social desirability, the wording of questionnaire items, and the order of items (Chan, 2009). English was not commonly spoken in several of the communities, so it is also possible that questionnaire items were not properly translated or understood (Fuller et al., 2010; 2011; 2015; Maro et al., 2009). Furthermore, assessments were administered in large group settings and contained questions regarding sensitive health topics, so it is possible that participants did not answer the questions truthfully (Fuller et al., 2010). To address these limitations, future research initiatives should incorporate more comprehensive assessment procedures. In addition to self-report data,

the use of interviews, observations, and focus groups assessing both knowledge and behavioral outcomes could increase the validity of the results and help researchers gain a more comprehensive understanding of participants' improvements resulting from the interventions.

Given the importance of long-term retention of health knowledge for at-risk children and youth, it is important for researchers to administer assessments at various timepoints following the interventions to determine the sustainability of improvements in participants' levels of health knowledge. Several studies have reported significant improvements in participants' health knowledge from pre-intervention to post-intervention, but the researchers did not administer follow-up assessments to monitor whether the knowledge was retained (Fuller et al., 2011; 2015). When studies have attempted to measure the sustainability of improvements in health knowledge, the follow-up assessments occurred less than six months after the interventions took place (Clark et al., 2006; Fuller et al., 2010; Maro et al., 2009). Although the results have been promising, it could be argued that the researchers assessed the sustainability of interventions too soon after the interventions had been conducted. Considering that participants were encouraged to share the information they had learned with friends and family members, it is possible that the information was still fresh in their minds. Future researchers should attempt to monitor participants' retention of essential health knowledge over a period of several years to get a better idea of the long-term sustainability of the impact of sport-based health promotion interventions.

Perhaps the most significant limitation of the existing body of literature examining the use of sport as a platform for health promotion among children and youth in Africa is the lack of measured behavioral outcomes resulting from the interventions. This aligns with the conclusions made by (Kaufman et al., 2013), who found that sport-based health promotion interventions overwhelmingly targeted health knowledge and attitudes rather than health behaviors. Although

the results in terms of health knowledge scores have been promising, very little is known regarding whether this information translates to actual behavior changes among children and youth in Africa. Due to the lack of basic resources in many communities in Africa, it may not be possible for children and youth to use or incorporate some of the protective resources that are endorsed in sport-based health promotion initiatives. Therefore, an important direction for future research initiatives involves incorporating methods to assess whether the improved levels of health knowledge among study participants translates to behavioral changes among participants.

Although sport-based health promotion interventions targeting children and youth have yielded promising results in multiple African countries, it is important to highlight the need for caution when attempting to generalize the results of these initiatives. Several studies that resulted in significant improvements in levels of overall and disease-specific health knowledge discussed the potential of similar sport-based programs across sub-Saharan Africa and advocated for their widespread implementation (Fuller et al., 2015; Maro et al., 2009). Although it is appropriate to hypothesize that sport can be an effective platform for health promotion initiatives, it is important for researchers to gain a comprehensive understanding of the various cultures, traditions, and health issues that are prevalent in different countries and communities before introducing a focused sport-based health promotion intervention. Although Africa has significantly higher rates of HIV/AIDS, malaria, and tuberculosis compared to other areas of the world, health concerns in certain countries and communities may not reflect the status of the entire continent (World Health Organization, 2016).

Appendix C: Definition of Terms

Children: Refers to individuals between 1 and 10 years of age (World Health Organization, 2013).

Adolescents: Refers to individuals between 10 and 18 years of age (Gentry & Campbell, 2002).

Youth: Refers to individuals between 15 and 24 years of age (United Nations, 2013).

Incidence: Refers to the occurrence of new cases of disease or injury in a population over a specific period of time (Centers for Disease Control and Prevention, 2012).

Health Promotion: Refers to the process of enabling individuals to increase control over and attempt to improve their overall health (World Health Organization, 2017).

Life Skills: Refers to psychosocial abilities that enable individuals to effectively deal with challenges encountered in everyday life. The development of life skills leads to positive and adaptive behaviors (World Health Organization, 1997).

Positive Youth Development: Refers to an attempt to develop one or more of the following skills in youth (Catalano et al., 2004):

1. Promoting bonding
2. Fostering resilience
3. Promoting social competence
4. Promoting emotional competence
5. Promoting cognitive competence
6. Promoting behavioral competence
7. Promoting moral competence
8. Fostering self-determination
9. Fostering spirituality
10. Fostering self-efficacy
11. Fostering clear and positive identity
12. Fostering belief in the future
13. Providing recognition for positive behavior
14. Providing opportunities for prosocial involvement
15. Fostering prosocial norms

Prevalence: Refers to the proportion of individuals in a population who have a particular disease or attribute at a specified time point or over a specified period of time (Centers for Disease Control and Prevention, 2012).

Scoping Review: A scoping review is a scientific review of a body of literature that aims to convey both the breadth and depth of a particular line of research. Scoping reviews differ from systematic reviews in that they do not necessarily assess the quality of studies, and they involve an analytical reinterpretation of the body of literature (Levac et al., 2010).

Appendix D: Coding Sheet

Author	Source	Year	Journal	Language	Pretest/Posttest	Design	Outcome	Other major outcomes	Country
Balfour, Far	Journal	2013	Aids Behav	English	Yes	Program ev	HIV Preven	HIV stigma,	South Afric
Fuller, Jung	Journal	2010	British Jour	English	Yes	Prospective	General he	Physical ex	South Afric

Sample Size	Completers	Age range	Mean Age	Males	Females	Setting	Duration of study	Main Outcome	Secondary Outcome
972	972	10-16		498	472	10 schools (o	12	HIV Knowle	HIV Stigma
492	370	12-13	13.3	180	190	2 schools (o	11	Health kno	Physical ex

Tertiary Outcome	Other Outcome	Theory	Funded	Funding Source	Date_code	Coder
		Social Learn	Yes	International	9/27/17	AH
clean water	respect for girls/women		Yes	FIFA	9/27/17	AH

Appendix E: IRB Approval **Acknowledgement of Not Human Subjects Research**

10/27/2017

To: Adam Hansell**From:** WVU Office of Research Integrity & Compliance**Protocol Type:** NHSR**Approval Date:** 10/27/2017**Submission Type:** Initial**Expiration Date:** 10/26/2022**Funding:** N/A**WVU Protocol #:** 1710805297**Protocol Title:** Exploring the use of sport as a platform for children and youth in Africa: A scoping review

The West Virginia University Institutional Review Board has determined that your protocol submission of protocol 1710805297 does not meet the definition of human subjects research, as provided in 45 CFR 46. This determination was based on the following:

- In order to be considered human subject research, individually identifiable private information must be obtained or used in the research. If there is no individually identifiable private information involved, the project is not human subject research and does not require being submitted to the Office of Research Integrity & Compliance. Private information must be individually identifiable (i.e., the identity of the subject is or may be readily ascertained by the investigator or someone else associated with the information) in order to constitute research involving human subjects.
- Please note for future purposes: 1) The information in the memo should have been added in the questionnaire textbox describing the study. 2) The memo should have been attached in the Notes section of Notes and Attachments.

The following documents were reviewed and acknowledged for use as part of this submission. Only the documents listed below may be used in the research. Please access and print the files in the Notes & Attachments section of your approved protocol.

Protocol #: 1710805297

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Acknowledgement of Exemption

05/14/2018

To: Peter Giacobbi

From: WVU Office of Research Integrity & Compliance

Protocol Type: Exempt

Approval Date: 05/14/2018

Submission Type: Initial

Expiration Date: 05/13/2021

Funding: N/A

WVU Protocol #: 1805105957

Protocol Title: The Use of Sport as a Platform for Health Promotion with Children and Youth in Africa: A Scoping Review Pt. 2

The West Virginia University Institutional Review Board has reviewed your submission of Exempt protocol 1805105957. Additional details regarding the review are below:

- This research study was granted an exemption because the Research involves educational tests, survey procedures, interview procedures or observation of public behavior and (i) information obtained is recorded in such a manner that human subjects cannot be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects responses outside the research could not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects financial standing, employability, or reputation [45 CFR 46.101(2)]. All exemptions are only good for three years. If this research extends more than three years beyond the approved date, then the researcher will have to request another exemption. The following documents have been acknowledged for use in this study and are available in the WVU+kc system:
- For future Reference: Note that the third item of the Description of Procedures under Design still mentions a consent form, which is not used with this study.

The following documents were reviewed and approved for use as part of this submission. Only the documents listed below may be used in the research. Please access and print the files in the Notes & Attachments section of your approved protocol.

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