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The Perceived Effects of the Menstruation Cycle on Female Swimmers by Coaches, Parents and Swimmers: A Case Study

A research dissertation presented to the
Faculty of Health Sciences, University of Johannesburg, in fulfilment of the degree of Master of Philosophy in Sport Sciences

by

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Date 22 February 2021
ACKNOWLEDGEMENTS

• To my mom, Bernyce Marais, your sacrifices and perfect example of work ethic have gotten me to where I am today. I am privileged to be your daughter and aspire to be every bit the fighter that you are.
• To my brothers, Vernon Marais and Michael Steenkamp, your perseverence to continuously better yourselves in studies, work, and life is a constant inspiration and reminder that growth is always possible.
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• To my participants - coaches, parents, and swimmers, without you this research would not have been possible. Thank you for your valued time.

Nadine Marais
DECLARATION

I, Nadine Marais, student number 201438919, declare that this dissertation is my own, unaided work. It is being submitted for the Degree of Masters in Philosophy in Sport Science at the University of Johannesburg. It has not been submitted before for any degree or examination in any other Technicon or University.

Signature of student: ____________________ Date: 30 October 2020
ABSTRACT

Menstruation is the term used to describe the recurring discharge of the endometrial lining of the uterus as menstrual blood and tissue. Menstruation, however, is only one of several events that occur during what is known as the menstruation cycle. The menstruation cycle affects most adolescent females and, although largely overlooked, does affect women participating in sports. Swimmers, coaches, and parents alike seem to have minimal knowledge of menstruation, its effect on training, and how to adapt to, or overcome, those effects during training or competition. In future, this knowledge could ensure the longevity of female swimmers in the sport and could also be transferred to other sporting contexts. Analysing the extent of knowledge about the menstruation cycle amongst swimmers, parents, and coaches is important. Understanding whether coaches, parents, and swimmers recognise the effect of the menstrual cycle within training and competition provides a more inclusive educational approach to ensure athlete longevity after puberty. It is about creating an understanding between the swimmer and their coach regarding the effect of menstruation during training and competition. This ensures extended and more successful participation and may also assist in dealing with the ‘taboo’ surrounding menstruation and the female athlete. The aim of this study was to determine the perceived effects and the knowledge that young competitive female swimmers have of their menstruation cycle by exploring the emotional and physical effects on training and competing during their cycles. Furthermore, the perceptions of parents and coaches regarding the effect of the menstrual cycle were examined. A case study approach was followed to determine the effect of the menstruation cycle on female swimmers as perceived by coaches, parents, and swimmers. Within the case study a partial mixed method sequential dominant status (qual ⇒ QUAN) approach was used. Data was collected in the form of questionnaires, focus group discussions, and one-on-one interviews. Adolescent female swimmers and coaches alike seem to be aware of the signs and symptoms that accompany the menstrual cycle. Coaches were aware of the effects of overtraining on female swimmers and the signs that accompany overtraining, however, their awareness of their female swimmers’ menstrual cycles were based more on observation than direct communication from the swimmer or parent. Coaches explained that they do adjust training based on their observations, but whether this is being done correctly or at the right times during the menstrual cycle requires more research.

Keywords: Adolescent, Coach, Menstrual Cycle, Parent, Swimmer
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<td>ACL</td>
<td>Anterior Cruciate Ligament</td>
</tr>
<tr>
<td>ACOG</td>
<td>American Congress of Obstetricians and Gynaecologists</td>
</tr>
<tr>
<td>BMI</td>
<td>Body Mass Index</td>
</tr>
<tr>
<td>EST</td>
<td>Ecological Systems Theory</td>
</tr>
<tr>
<td>FSH</td>
<td>Follicle Stimulating Hormone</td>
</tr>
<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
</tr>
<tr>
<td>MHM</td>
<td>Menstrual Hygiene Management</td>
</tr>
<tr>
<td>PGE2</td>
<td>Prostaglandin E2</td>
</tr>
<tr>
<td>PGF2α</td>
<td>Prostaglandin F2alpha</td>
</tr>
<tr>
<td>PMS</td>
<td>Premenstrual Syndrome</td>
</tr>
<tr>
<td>RED-S</td>
<td>Relative Energy Deficiency in Sports</td>
</tr>
<tr>
<td>RTI</td>
<td>Reproductive Tract Infections</td>
</tr>
<tr>
<td>STI</td>
<td>Sexually Transmitted Infections</td>
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<th>Definition</th>
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<tr>
<td>Adolescent</td>
<td>Young person developing from a child to an adult, between the ages of 12 and 18.</td>
</tr>
<tr>
<td>Athlete</td>
<td>Person involved actively in training and competing in a sport.</td>
</tr>
<tr>
<td>Club</td>
<td>An organisation governed by a committee that forms the umbrella over coaches and athletes all under the same name.</td>
</tr>
<tr>
<td>Coach</td>
<td>Person involved in the direction, instruction, and training of swimmers (as defined above) in South Africa.</td>
</tr>
<tr>
<td>Female specific guideline</td>
<td>Measures that can be followed by coaches and swimmers specifically around the menstrual cycle and training.</td>
</tr>
<tr>
<td>Menstrual Cycle</td>
<td>The complete 25- to 34-day cycle made up by the follicular, luteal, and ovulation phases.</td>
</tr>
<tr>
<td>Overtraining</td>
<td>When an athlete trains too hard and too much that the body is prevented from completely recovering, therefore increasing possibility of injury and decreasing the athletes ability to perform.</td>
</tr>
<tr>
<td>Parent or guardian</td>
<td>Person personally responsible for the adolescents and involved in their sporting career.</td>
</tr>
<tr>
<td>Period</td>
<td>The stage of the menstrual cycle when a female is bleeding. Also referred to as menstruation.</td>
</tr>
<tr>
<td>Swimmer</td>
<td>An athlete who is registered to a competitive swimming club and takes part in competitions.</td>
</tr>
</tbody>
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CHAPTER 1

INTRODUCTION AND PROBLEM STATEMENT

1.1 Introduction

Menstruation is the term used to describe the recurring discharge of the endometrial lining of the uterus as menstrual blood and tissue (Oertelt-Prigione, 2012). Menstruation, however, is only one of several events that occur during what is known as the menstruation cycle (Mihm, Gangooly & Muttukrishna, 2011). The menstruation cycle is the time interval (counted in days) from the start of one menstruation (period) to the start of the following menstruation (Abdollahpor, Khosravi & Zahra, 2013), and may vary in length depending on the individual. Regardless of the variability, normal cycles range from 21 to 34 days by the third year of menarche (Mihm, Gangooly & Muttukrishna, 2011), with the average length between one cycle to the next cycle being 28 days (Oertelt-Prigione, 2012).

Although, the constant change in hormone levels during the menstrual cycle cannot be seen by the naked eye, the effects of these changes can be felt by the women experiencing menstruation. The period itself may be expected to bring about the most discomfort due to the discharge of blood. It is, however, during the days prior to menstruation that women report feeling the most discomfort due to pain, heaviness, fatigue, irritability, and lack of concentration (Hofmeister & Bodden, 2016). While the constant change in hormone levels combined with Premenstrual Syndrome (PMS) may become a part of everyday life for the general female population, it has become important to examine whether these symptoms influence the female athlete during training and competition. By understanding the emotional and physical effects of the menstrual cycle it may be possible to determine at which stage training should be adjusted to optimise performance, based on the needs of the female athlete. The correct maintenance of training around the menstrual cycle could possibly assist in attaining peak performance and encourage female athletes to extend their participation in sport.

1.2 Problem statement

The menstruation cycle affects most adolescent females and, although largely overlooked, does affect women participating in sports. Swimmers, coaches, and parents alike seem to have minimal knowledge of menstruation, its effects on training, and how to adapt to, or overcome, those effects during training or competition. In future this knowledge could ensure the
longevity of female swimmers in the sport and could also be transferred to other sporting contexts.

1.3 Significance of study

Analysing the extent of knowledge of the menstruation cycle among swimmers, parents, and coaches is important. Understanding whether coaches, parents, and swimmers recognise the effects of the menstrual cycle within training and competition, provides a more inclusive educational approach to ensure athlete longevity after puberty. It is about creating an understanding between the swimmer and their coach regarding the effects of menstruation during training and competition. This ensures longer and more successful participation, which may also assist in dealing with the ‘taboo’ around menstruation and the female athlete.

1.4 Research questions

The following research questions were investigated:

1. Were young female swimmers (12 to 18 years in age) aware of their menstrual health and did they believe that there are emotional and physical changes that occur throughout their menstrual cycle?

2. Did swimming coaches believe that there are emotional and physical effects that accompany pre-menstruation or menstruation in young female adolescent swimmers?

3. Were coaches aware of their female swimmers’ menstruation, and did young female swimmers, swimming coaches, and/or the swimmers’ parents discuss anything related to menstruation?

4. Were any adjustments made to the training program by the coaches for the swimmers during times of extreme discomfort or fatigue due to menstruation?

1.5 Purpose of study

The purpose of this study is to enhance the female swimmers’, their parents’, and swimming coaches’ understanding of the menstruation cycle within the South African context. It may also provide information on identifying the knowledge ‘gaps’ and how to extend the information within the swimming community.

1.6 Aims and Objectives

The aim of this study was to determine the perceived effects and the knowledge that young competitive female swimmers have of their menstruation cycle by exploring the emotional and
physical effects on training and competition during their cycles. Furthermore, the perceptions of parents and coaches regarding the effects of the menstrual cycle were examined.

The objectives of the study were:

1. To collect descriptive data regarding the perceived effects of the menstrual cycle from swimmers, parents, and coaches.
2. To determine the level of awareness that young female swimmers and coaches have of the menstrual cycle, as well as the impact that this has on performance in training and competition.
3. To determine the extent to which coaches understand the effect of the menstrual cycle on their young female swimmers.
4. To adapt the findings into a model that could be used by coaches and parents to enhance the sporting experience of female athletes.

1.7 Outline of the dissertation

This dissertation is structured according to a traditional (chapter) format. The references for all six chapters are listed at the end of Chapter 6 and are set out according to the guidelines of the University of Johannesburg (UJ)’s reference guide for quoting sources (an adapted version of the Harvard style).

Chapter 1 introduces the study, its terminology, as well as a short overview of the current research, and identifies the research problem and corresponding research objectives.

In Chapter 2, a literature review presents various terms relevant to the study, such as menstruation cycle and PMS, and reviews the knowledge about the menstruation cycle by highlighting cultural perceptions and taboos, as well as the effects of the menstruation on sports performance.

Chapter 3 explains the methodology of the study. It details the research design, the sample size used, performance indicators, how data was collected, ethical considerations, as well as the statistical analysis.

In Chapter 4, the results are given and shown in the form of figures and tables. This data shows the knowledge and understanding that young female swimmers, their parents, and coaches have
about the menstruation cycle, as well as whether they believe that menstruation can affect sport performance and how.

In Chapter 5, each research objective is discussed and trends between questionnaires are analysed to determine whether there is an agreement, or understanding, of the menstrual cycle between swimmers, their parents, and swimming coaches.

In Chapter 6, final conclusions around the study are given by identifying the outcomes of the study, gaps are identified, and the direction for possible future research is explored.
CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, the theoretical frameworks of the study, the menstrual cycle, and premenstrual syndrome (PMS) will be explained. The taboos, perceptions, and knowledge about the menstrual cycle, with specific reference to how coaches, parents, and athletes (specifically swimmers) may view menstruation, will be highlighted. An indication on whether there is an effect on the athlete’s performance as a result of PMS will be given. Specific focus is given to the perceptions of coaches, parents, and athletes to provide context for the research highlighting the knowledge and perceptions of the menstrual cycle within the South African swimming community.

2.2 Theoretical Framework

This study will encompass the Ecological Systems Theory (EST) as its theoretical framework. The EST was developed by Urie Brofenbrenner in 1979. Even though it was developed with the focus on childhood development, the EST’s approach to how different environmental systems influence the development of an individual can be translated into the sport environment and the athlete’s development within a sport code. The EST looks at the individual and the community, and the relationships that take place between them (Duerden & Witt, 2010); these are all various systems with which the individual interacts. Although, swimming is considered an individual sport, it takes a community to run and shape the programs as coaches’ work closely with the athletes and parents alike. It can, therefore, be assumed that for the development of the athlete, each of these systems will play an important role, thus coaches are in a very influential position with their athletes.

In this study, coaches’, parents’, and swimmers’ perceptions of menstruation will be examined, highlighting if these perceptions are due to direct communication or based on individual experiences and assumptions. With menstruation being a taboo (subject that is avoided due to religious or social reasons) and often a sensitive topic, communication around menstruation can be awkward or completely absent from the coach and athlete dynamic. This is where the dynamic of the relationships around the individual athlete becomes important because they shape the athlete’s perceptions, reactions, and willingness to communicate. Figure 2.1 indicates how the structure of the study will examine the perceptions of menstruation, starting with the
society and moving inwards based on the relationship that each level holds with the athlete. The Ecological Systems Theory states that individuals exist within a variety of settings, starting with the individual and extending outwards (Duerden & Witt, 2010). With every step away from the athlete, the less likely they are to be involved directly with the athlete. The athlete is the base, the parent is the second system, the coach is the third, and then the society. The coach’s system affects both the parent and the athlete, indicating that communication between the coach and parent is just as important as between the athlete and the coach. Furthermore, it indicates that should athletes not be comfortable speaking to their coach about menstrual issues, the parent can be the bridge of communication with the coach.

![Ecological Systems Theory Diagram](image)

**Figure 2.1 Ecological Systems Theory (adapted from Brofenbrenner 1979)**

Relationships and their dynamics shape individuals and could influence the individual’s (in this case, the swimmer) decisions, their reactions, and their attitudes (Duerden & Witt, 2010). A coach’s goal should be to create a positive, comfortable, and trusting environment with their athletes and parents, by allowing athletes to be open about their experiences, even with things like the menstrual cycle and how it may be affecting the athlete during training, and or competition. Communication is essential to diminish the assumptions that lead to stereotypes. Due to gender in sports contributing to stereotypes, good communication between coaches and athletes will diminish unbalanced perceptions from male and female coaches (De Haan and Knoppers, 2020). Consequently, rather than adjusting training sets for swimmers based on
assumptions, changes can be made due to clear communication and be individualised for each athlete.

Due to this study’s focus being on the relationships and the perceptions of menstruation, the facts about the menstrual cycle will be examined before highlighting the views that athletes, parents, coaches, and society have of menstruation and menstrual-related issues.

2.3 Menstruation

The menstrual cycle is the natural and regular change that occurs in a 25 to 34-day cycle, once a female has reached puberty, within the female reproductive system to make pregnancy possible (Mihm, Gangooly & Muttukrishna, 2011). The menstruation cycle begins with the first day of menstruating, also known as the period, which is the discharge of uterine blood and tissue from a female’s cervix and vagina and begins again at the start of the female’s next period (Mihm, Gangooly & Muttukrishna, 2011). During the menstrual cycle, the body produces different amounts of hormones and is responsible for the production of oocytes to prepare the female body for pregnancy (Reed & Carr, 2015).

The menstrual cycle is made up of two cycles, as seen in figure 2.2, that interact and overlap – one occurs in the ovaries, while the other occurs in the uterus (Ray, 2018). The brain, ovaries, and uterus interact and communicate through hormones to keep the cycle going. An entire menstrual cycle lasts between 24 and 38 days. The length may vary from cycle to cycle and from individual to individual. It may also change over the years between menarche (a female’s very first period during puberty) to menopause (the ceasing of a female’s period permanently) (Ray, 2018).

![Figure 2.2 Interaction of the two cycles that make up the menstrual cycle (Ray, 2018)](image)

During the period, follicle stimulating hormone (FSH) is produced by the pituitary gland. Follicle stimulating hormone prepares the ovaries for ovulation by stimulating them to produce
follicles (fluid filled sacs containing an egg). Throughout the menstrual cycle, there are multiple follicles in each ovary at different stages of development (Ray, 2018). Halfway through the follicular phase, as the period is ending, one follicle in one ovary is larger than the others becoming the dominant follicle, which is the one prepared to be released at ovulation. This follicle produces oestrogen as it grows, and levels peak prior to ovulation (Ray, 2018). For most women, the follicular phase lasts 10 to 22 days but variations may occur.

While the dominant follicle continues to mature, the uterus responds to the oestrogen released by rebuilding the uterine lining that was shed during the last period (Ray, 2018). This is known as the proliferative phase because the uterine lining, also referred to as the endometrium, starts to thicken (Reed & Carr, 2015). The endometrium is thinnest during the period. It then thickens creating a place for a fertilized egg to implant and grow, which occurs throughout the proliferative phase until ovulation occurs (Reed & Carr, 2015).

The dominant follicle in the ovary produces increasing levels of oestrogen as it grows (Reed & Carr, 2015). When oestrogen levels are high enough, the brain is signalled causing an increase in luteinizing hormone to be released from the anterior pituitary gland. This spike causes ovulation, which is the release of an egg from the ovary. Ovulation occurs 13 to 15 days before the start of the next period (Ray, 2018).

Once ovulation occurs, the dominant follicle that the egg was released from transforms into the corpus luteum and begins to produce the hormones oestrogen and progesterone (Ray, 2018). About halfway through this phase, progesterone levels peak causing premenstrual symptoms such as mood changes, headaches, bloating, and breast tenderness, which many women experience (Ray, 2018).

If an egg is fertilised, progesterone from the corpus luteum supports the early pregnancy. If no fertilisation occurs, the corpus luteum begins to breakdown anywhere between 9 to 11 days after ovulation. This causes a drop in oestrogen and progesterone levels, which triggers menstruation to start. The luteal phase lasts approximately 14 days, however, anything between nine and 16 days is common.

During the secretory phase, the endometrium prepares either to support a pregnancy or to break down for menstruation. The endometrium stops thickening and starts preparing for the attachment of a potential fertilised egg due to the rising levels of progesterone. During this phase, the endometrium is secreting (producing and releasing) chemical messengers. The
prostaglandins are the most notable of these chemical messengers as they cause changes to other cells nearby.

Two prostaglandins, known as “Prostaglandin F2alpha” (PGF2α) and “Prostaglandin E2” (PGE2), cause the contraction of the uterine muscle (often referred to as cramping). The prostaglandin levels rise after ovulation and reach peak levels during menstruation. The cramping caused by the prostaglandins helps trigger the period. If pregnancy occurs, production of prostaglandins is inhibited. If pregnancy does not occur, the corpus luteum ceases producing oestrogen and progesterone. The drop in hormone levels and the effect of the prostaglandins cause the blood vessels to tighten and the endometrium to break down (Ray, 2018). Menstruation then begins and the whole cycle starts again (Ray, 2018).

Menarche, which is known as a woman’s very first period mostly occurs between the ages of 12 to 14 years (Yermachenko and Dvornyk, 2014). Studies by He, Kraft, and Chasman et al., (2010) and Lee, Kim, Oh, Lee, and Park (2016) found and agree that the general mean age of menarche is approximately 12.5 years of age. Studies by Said-Mohamed, Priorsi, and Nyati et al. (2018) found that specifically in black female South Africans the mean age of menarche was 12.7 and 14.5 years in urban and rural areas, respectively. Furthermore, Said-Mohamed et al., (2018) and Ahn, Lim, and Song et al. (2013) agree that an early onset of menarche is associated with an increased body mass index (BMI) and an increased chance of obesity as adults. This becomes especially concerning since Morris, Jones, Schoemaker, Ashworth, and Swerdlow (2011) found that the mean age of menarche decreases per decade. This is supported by Ahn et al. (2013) who found that menarche mean age will continue to decrease by an average of 0.726 years per decade. According to Yermachenko and Dvornyk (2014), the decrease in the age of menarche in women from African countries is associated with the increase of average body mass, however, data from African countries is limited. Conversely, a late onset of menarche (after the age of 15 years old) brings about other health issues in adulthood, such as increased risk of infertility (inability to fall pregnant) or subfecundity (a longer time to pregnancy) (Guldbrandsen, Hakonsen, and Ernst et al., 2014). Sport, although seen to have many positives, if intensity and nutrition is not correctly monitored, can have severe effects on a girl’s puberty specifically delaying the onset of menarche or causing irregular cycles (Homai, Shafai, & Zoodfekr, 2014). This is specifically caused by the decrease in body fat percentage of an athlete (Homai, Shafai, & Zoodfekr, 2014).
2.4 Premenstrual Syndrome (PMS)

Premenstrual syndrome is characterised by repeated, moderate-to-severe physical, emotional and behavioural symptoms that develop during the luteal menstrual cycle and disappear within a few days of menstruation (Ryu & Kim, 2015). The American Congress of Obstetricians and Gynaecologists (ACOG) has defined PMS as a condition in which a woman experiences at least one affective and one somatic symptom that cause deterioration in work, academic and social performance (Hofmeister & Bodden, 2016). Symptoms can occur at any time between menarche and menopause (Hofmeister & Bodden, 2016). The potential burden of the syndrome is high as women who suffer from PMS have a higher rate of work absence, increased medical expenses, and lower health-related quality of life (Hofmeister & Bodden, 2016).

Premenstrual Syndrome (PMS) occurs in 30-40% of females within reproductive age, which starts at menarche and ends at menopause, usually between the ages of 12 to 52 years (Ryu & Kim, 2015). The cause of PMS is not known. Theories by Ryu and Kim (2015), and Hofmeister and Bodden (2016) suggest increased sensitivity to normal hormone changes and neurotransmitter abnormalities. Hofmeister and Bodden (2016) further noted that changes in mood may be attributable to the effect that oestrogen and progesterone have on the serotonin, γ-aminobutyric acid, and dopamine systems. These can also alter the renin-angiotensin-aldosterone system (hormone system within the body that regulates blood pressure and fluid and electrolyte balance), which could explain some of the bloating that occurs during the luteal phase (Hofmeister & Bodden, 2016).

2.5 Societal Views Regarding Menstruation

Menstruation is a phenomenon unique to females. Although it is a natural process, it is linked with some misconceptions and practices, which may lead to adverse health effects (outcomes) such as nutritional deficiency disorders (stunting, wasting) and menstrual disorders (Shanbhag et al., 2012). The following complex psycho-social morbidities – Reproductive Tract Infections (RTI), Sexually Transmitted Infections (STI), Human Immunodeficiency Virus (HIV), AIDS, and teenage pregnancy - and high-risk behaviour (abortions) have been recognised as a threat to survival, growth, and development. In a study conducted by Shanbhag et al. (2012), as many as 40% to 45% of the adolescent girls reported to have menstrual issues, related to psycho-social stress and emotional changes. Shanbhag et al. (2012) and Mason et al. (2017) agree that in countries like India, cultural and societal taboos regarding menstruation include dietary restrictions, restrictions in participating in cooking, and visiting places of worship, or
involvement in social activities, as well as having to sit and sleep separately from the rest of the family when menstruating. In some communities, menstruation is perceived as unclean and therefore deems women untouchable during their period (Mason et al., 2017). Due to this perception, tasks such as washing and drying menstrual cloths becomes shameful for women, which may be potentially harmful to their health (Mason et al., 2017).

In low-middle income countries, Menstrual Hygiene Management (MHM) can be problematic for girls and women. This is due to a lack of knowledge of menstruation and MHM, the stigma around menstruation, and access to affordable menstrual hygiene products (Mason et al., 2017). In order to effect change and overcome these issues, males alongside females may need to become advocates for MHM. However, little is known about men’s knowledge and perceptions of menstruation (Mason et al., 2017). A study in India by Mason et al. (2017) found that most boys denied having any knowledge of menstruation during a focus group discussion. Later it was found that for the minority this was true but for the others it stemmed from embarrassment or not wanting to talk about the subject (Mason et al., 2017).

Even though boys’ knowledge proved to be limited, in the study conducted by Mason et al. (2017), their knowledge consisted of three aspects: biological function, cultural rights and girls’ behaviour and appearance (Mason et al., 2017). The knowledge about biological function varied among the 85 boys but was mostly based on misconceptions such as menstruation being a disease and blood coming out of the mouth (Mason et al., 2017). The majority of the boys were aware of the cultural taboos and practices around menstruation, as mentioned above (Mason et al., 2017). The responses around the girls’ behaviour and appearance seemed mainly to be negative with the boys’ highlighting that girls got “irritated” and “angry” and complained about pain when menstruating. Furthermore, the boys’ noticed that concentration during studying decreased and girls isolated themselves from friends and classmates when menstruating (Mason et al., 2017).

In 2016, Kgware, conducted a South African specific study examining menstruation and MHM in selected KwaZulu Natal schools. The difference in knowledge and experience of menstruation between girls in peri-urban, urban, and rural schools was noted (Kgware, 2016). In this study, in the urban and peri-urban areas, 53% of the participants were aware of menstruation before they reached menarche, however, in the rural areas, 63% of the participants were not aware of menstruation before they reached menarche (Kgware, 2016). With regard to school attendance, 6% and 15% of urban and rural participants, respectively,
specified that they had missed school because of menstrual-related issues, such as fear, not having absorptive material (pads, tampons, etc.), having period pains, and being confused, as well as not enjoying school while menstruating (Kgware, 2016).

As in other countries, there are also restrictions placed on menstruating girls in certain communities within South Africa (Kgware, 2016). The restrictions that were experienced by menstruating girls included: not playing with boys, no cooking, and no wearing of church uniform (Kgware, 2016). The findings by Kgware (2016) supported that of Shanbhag et al. (2012) and Mason et al. (2017) who found similar restrictions placed on menstruating girls. In the urban areas it was found that 22% of the participants were restricted in some form while menstruating, while 25% were only sometimes restricted (Kgware, 2016). In the rural areas, 22% were restricted and 14% were only restricted sometimes (Kgware, 2016).

Based on the South African study it seemed that the opinion on whether boys should be taught about menstruation and MHM, or not, varied significantly between the urban and rural participants (Kgware, 2016). The results indicated that 41% of the urban participants agree that boys should be taught, whereas 100% of the rural participants believed that the boys should not be taught about menstruation (Kgware, 2016).

The taboos and lack of knowledge regarding menstruation skew the perceptions boys have about girls and their periods, as seen in an American study conducted by Rajak (2015), which was similar to that of Shanbhag et al. (2012), Kgware (2016) and Mason et al. (2017). Menstrual myths and taboos are global, existing in one form or other around the world (Rajak, 2015). Research by Rajak (2015) further indicates that silencing conversations about menstruation negatively impacts the physical, psychological, and emotional development and well-being of women. Men’s beliefs around menstruation influence how men treat women (Rajak, 2015). Therefore, if men are in positions to make decisions for women, their perceptions about women impact the choices made (Rajak, 2015). This is an important consideration specifically in sport where coaches are predominantly males.

In Rajak’s, (2015) research, nine Minnesota male university students were interviewed about their knowledge and perceptions of menstruation. Five of the nine participants described their first reaction to menstruation negatively, using words such as “dirty”, “unclean”, “gross”, “eww”, and “disgusting”. Most of the participants admitted to first learning about menstruation at school, but also stated that they were uncomfortable with what was being taught and,
therefore, did not remember much (Rajak, 2015). It was also noted that when the men had conversations with women (usually a close friend or girlfriend) about menstruation, it usually only involved the symptoms and not the actual physiological process (Rajak, 2015). Women seemed to be uncomfortable giving details during the study. The participants continued to mention that they were not involved in any conversations regarding menstruation around the house and due to this “separation” and “secrecy” at home, the participants viewed menstruation as a “women’s issue” (Rajak, 2015). Seven of the eight participants mentioned that women experience physical pain and emotional changes during menstruation (Rajak, 2015). Three of the nine participants admitted to being comfortable speaking about menstruation, while four were reluctant, but not completely opposed to speaking about menstruation, and two were completely uncomfortable (Rajak, 2015). The majority of the boys mentioned that men to men conversations regarding menstruation rarely took place and when they did, it often involved sex or was referred to as a joke (Rajak, 2015). The participants agreed that because menstruation does not affect men, it will never be taken seriously, with one participant explaining that this is due to male privilege.

The lack of knowledge and the misconceptions of menstruation are not only apparent in third-world countries, but also exist in first-world countries, as seen in the research by Rajak, (2015). Due to taboos, myths, lack of knowledge, and negative connotations surrounding menstruation by both females and males, we need to understand and appreciate that people react based on perception and if the perception is negative, the reaction will most likely be negative. Although, the taboos and myths specifically refer to cultural, religious, and social exclusion, and do not refer to sport (regarding performance or participation), the probability that this will include exclusion from sport participation is likely. Furthermore, with the lack of knowledge concerning the biological processes of menstruation by men (and women), the physical and emotional effects may not be fully understood.

Within the societal construct, a club dynamic is prevalent in many swimmers’ careers, especially if they are competitive swimmers. Within South Africa, if a swimmer wants to compete, they must be registered with a club. Therefore, the club dynamic plays an important role not only to the coach, but to the swimmer as well. Clubs are essential in expanding youth development teams that nurture athletes by including educational concerns regarding the overall development of children and youth (Galatti, Cote, Reverdito, Allan, Seone, & Paes, 2016). Clubs also focus on internal communication and education to foster well-rounded youth
teams. Allowing participants to take part in club sports on an elite or recreational level, increases the possibility of lifelong participation due to the support given to the athlete (Galatti, Cote, Reverdito, Allan, Seone, & Paes, 2016). Furthermore, an approach that focuses on values helps to increase parents’ confidence in the club and keep them close to the activities that their children participate in. This is critical to children's development in sports (Galatti, Cote, Reverdito, Allan, Seone, & Paes, 2016). An effective club dynamic may bridge gaps in communication between athletes, parents, and swimmers allowing a more inclusive approach fostering positive and lifelong participation within athletes.

2.6 Coaches and Menstruation

In a study by Pantano (2017), 123 female and male coaches were given a questionnaire to complete regarding the female athlete triad. The female athlete triad is a condition experienced in physically active females and involves three components, 1) low energy with or without an eating disorder, 2) menstrual dysfunction, and 3) low bone density. Twenty-four percent had heard of the triad, 14% could name all its components. Fifty-four percent were happy to speak to their athletes about menstruation, but 70% had reported that they had not asked their female athletes about their menstrual cycle and 86% did not assess menstrual history, even if they were suspicious that a problem was present (Pantano, 2017). Furthermore, female coaches were more comfortable speaking to their female athletes about menstrual irregularities than male coaches, however, they were not more likely to ask their female athletes about their menstruation cycles. Thirty-nine percent of the 123 coaches thought that irregular, or loss of, menstruation was a normal consequence of exercise and there were no significant gender differences to this perception (Pantano, 2017). Swimming coach, Catherine Vogt, suggested that measures such as birth control can be used to plan an athlete’s period around their competitions (Latimer, 2017). She further recalled her own training when she was younger and admits that it is all ultimately a mental thing (Latimer, 2017).

2.7 Parents’ and their Daughter’s Menstruation

Joanne Barker (2019), transcribed what Dr Bridget Quinn, a female athlete specialist, highlighted how parents and athletes can nurture strong and healthy bodies and attitudes that will be significant not only as the athlete develops, but also in the future. Today, young athletes are under pressure from many angles, including athletic, academic, social, and their own self-added pressure and self-expectations (Barker, 2019). The drive, specifically athletically, to achieve at any cost pushes many athletes to over train, which places emotional and physical
health risks on the athlete. This is difficult for both the athlete and the parent to navigate (Barker, 2019). Parents need to be aware of certain physical factors that may change or should not change when their highly active daughter reaches puberty (Barker, 2019). The following physical factors may change due to puberty: muscular adaptations, lag in skeletal growth where there is a stage when adolescents lose strength, flexibility, and neuromuscular control. These are normal and temporary occurrences. However, it is important for an athlete and parent to understand this to avoid over training to counteract decreases in strength, flexibility, and neuromuscular control. The following physical factors should not change due to puberty and exercise, as it is not normal for female athletes to miss periods. Any interruption in the menstrual cycle is a sign of hormonal imbalance that needs to be addressed immediately as it may interfere with healthy bone development. One of the most important things parents can do when their daughter has reached puberty is focus on their daughter’s strengths, and forget their weight and physical appearance (Barker, 2019). Secondly, the way parents approach nutrition is important, as well as how they deal with their own insecurities or misconceptions about body image and/or food (Barker, 2019). Regarding parents approaching their daughter’s coach, it is advised that the parent makes their daughter aware that this is what they plan to do and that there is consent. Barker (2019), suggests that a team approach – parent, coach, and athlete be present when discussions take place. In best case scenarios, coaches and parents should work together to support the athlete (Barker, 2019).

According to a study by Chandra-Mouli and Patel (2017), females residing in low- and middle-income countries receive most of their information regarding menstruation from their mothers or closest female relative. In upper-middle income countries such as South Africa, 34% of participants received menstrual information from their parents, 30% from school, 19% from friends, 6% from magazines, and 11% from other sources, like sisters or their sexual activity (Ramathuba, 2015). It does, however, seem that female adolescents in poorer communities are unaware of the menstrual cycle prior to beginning their period (Scorgie et al., 2015). In a study by Scorgie et al (2015) only one out of the twenty-one participants had prior knowledge about menstruation, which she received from school. Only upon menarche was menstruation explained to 86% of the participants by their grandmothers, mothers, sisters, aunts, or female teachers (Scorgie et al., 2015).

Although there are studies that refer to who provides female adolescents with information about their menstrual cycles, which in most cases is the mother, school, or closest female relative,
with a male relative not being mentioned (Chandra-Mouli & Patel, 2017; Ramathuba, 2015; Scorgie et al., 2015). There is a lack of information pertaining to specific details between a parent and their daughter regarding menstruation and/or menstrual issues. Most females have found out about menstruation one way or another, but whether personal information such as specific PMS symptoms is discussed with a parent or not, is missing.

2.8 Athletes and Menstruation

In 2016, Harvey-Jenner examined the effects of PMS on the performance of 2016 Olympic athletes. The findings suggest that PMS symptoms played a role in fatigue and discomfort. This concurs with McIntosh (2015), who reported similar findings with an elite British tennis player. Premenstrual syndrome can cause disorderly mood swings in some women, which may vary from crying to outbursts of anger and anxiety attacks, and then revert to a stable emotional state (Sheehan, 2010). The most common emotional PMS symptoms are irritability, anger, depression, crying, increased sensitivity, anxiety and alternating sadness and rage (Sheehan, 2010 & Steiner, Peer, Palova, Freeman, Macdougall, & Soares, 2011). Although, previously considered a taboo subject, understanding the effect of menstruation on the female athlete has become increasingly important due to the increased number of women participating in sport (O’Brien & Robertson, 2010).

A study done by Sanghani (2015) highlighted that some athletes have begun speaking about the effects that menstruation has on their performance. Although, not necessarily from a physiological standpoint, but from a psychological and physical symptoms standpoint. Tennis player Heather Watson suggested that she had lost the first round in the Australian Open in 2014 because of “girl things” (Sanghani, 2015). The 2015 Wimbledon ladies’ champion agreed that training and competing can be difficult when female athletes have their periods. Fifty-five percent of female athletes surveyed online by the University College London and St Mary’s University said that their menstrual cycle affects their training and performance (Sanghani, 2015). Former British number one tennis player, Annabel Croft, admitted to having heavy bleeding and that she used to be strongly affected by it (Sanghani, 2015), she stated: “Every woman is different but any woman who has bad or heavy periods will know you feel overwhelmingly tired.” Tennis player, Tara Moore, additionally, explains that not all women in sport have enough information about periods and how to deal with it (Sanghani, 2015).

showed that 79% of girls opt out of trying out for an activity or team when they do not feel good. A worry such as feeling bloated or even a tampon string hanging out of a costume can affect the way a girl perceives her body (Latimer, 2017). When girls stay out of the swimming pool for this reason, it indicates that there are fewer that are exceeding the limits in the long run (Latimer, 2017). Therefore, elite athletes are starting to discuss menstruation. Katie Meili started swimming competitively at the age of eight and admits that getting your period during a competition can be “painful”, but it should not inhibit your performance (Latimer, 2017). Kelsi Worrell agreed with teammate Meili but further admitted there is a time when every female swimmer is worried about a tampon string showing (Latimer, 2017).

2.9 Menstruation and Performance

The understanding and knowledge of menstruation, both nationally and internationally, has been studied (Shanbhag et al., 2012; Rajak, 2015; Kgware, 2016; Mason et al., 2017). The perceptions about menstruation of both males and females have been investigated (Rajak, 2015 and Kgware, 2016). However, the physical and emotional symptoms that women experience when menstruating and the effect that these symptoms have on sport performance is lacking.

The unique physiology of female athletes may require tailored training approaches that differ from their male counterparts (Ihalainen, 2019). Menstruation has, however, been historically ignored and even considered taboo (Shanbhag et al., 2012; Rajak, 2015; Kgware, 2016, Mason, 2017; Ihalainen, 2019). Female physiology and training have been discussed among female athletes and coaches in practice (Ihalainen, 2019). Since 2016, the world has begun to embrace the distinction between the sexes, implying that men and women should be trained differently based not only on hormone types and levels, but also based on the emotional and physical effect that these hormone fluctuations can cause (Ihalainen, 2019).

A study by Bruinvels et al. (2016) found that more than half of elite female athletes reported that the hormonal fluctuations during menstruation had a negative impact on their performance in training and competition. Yet, Ihalainen (2019), indicates that Olympic gold medals have been won by elite female athletes while menstruating during competition.

Additional research by Martin et al. (2018) supports that of Bruivels et al. (2016) and found that 77% of female athletes experience negative side effects, such as PMS symptoms, due to menstruation. These physical symptoms include back pains, cramps, headaches, and bloating (Martin et al., 2018). This is further supported by Oosthuyse and Bosche (2010), whose...
findings indicated that fluctuations in strength, metabolism, inflammation, body temperature, fluid retention, and injury risk are associated with hormonal fluctuations during a female athlete’s menstrual cycle. However, the individualisation of how the menstrual cycle may or may not affect the female athlete was noted, with studies by Oosthuyse and Bosche (2010) and Martin et al. (2018) indicating no difference across the cycle.

The potential effects of hormonal fluctuations throughout the menstrual cycle on various types of training and adaptations during each phase to training are as follows:

**Follicular Phase**

During the early follicular phase, the female body is primed for high intensity exercise due to increased pain tolerance and higher perceived energy levels (Ihalainen, 2019). However, during the late follicular phase, the rise in oestrogen hampers pre-exercise carbohydrate storage, therefore endurance female athletes experiencing this phase should “carbohydrate load” (i.e., eat a lot of carbohydrates) the day before and during exercise in order to exercise at high intensities (D’Eon, Sharoff, Chipkin, Grow, Ruby & Braun, 2002). It has also been suggested that strength training may be more effective during the late follicular phase (Sung et al., 2014).

**Ovulation**

During ovulation, a significant increase in quadricep strength has been found, suggesting that females could achieve their personal best in strength during ovulation (Sarwar, Niclos & Rutherford, 1996). However, a study conducted in 2019 found opposing results, which suggested that maximum strength was achieved during menstruation rather than during ovulation (Ruffner, 2019). According to Hasen and Kjaer (2016), increased risk of injury in young active females may be due to a physiologically high concentration of oestrogen, which reduces fibrillar crosslinking and enhances joint laxity. It has also been found that an increased chance of Anterior Cruciate Ligament (ACL) injuries occur during ovulation (peaked oestrogen levels) (Hasen & Kjaer, 2016; Lefevre et al. 2013). No research has specifically noted increased swimming injuries during ovulation.
Luteal Phase

Premenstrual Syndrome, which occurs seven to ten days before menstruation, may interfere with training and performance, suggesting that the body is not ready for high intensity exercise during this phase (Ihalainen, 2019). Body mass during this phase may be higher due to fluid retention. It has also been suggested that increases in body temperature and breathing could make it harder to exercise in the heat (Ihalainen, 2019). However, a study in 2019 revealed that thermoregulation during menstruation is inconclusive (Notley et al., 2019).

Having a natural menstrual cycle includes phases of high oestrogen levels which is associated with good bone health and better fertility (De Souza, Koltun, Etter & Southmayd, 2017). The menstrual cycle is part of a bigger health issue for female athletes. Low energy availability due to energy intake and expenditure being unbalanced, which can be due to overtraining or eating too little, can lead to irregular periods, the complete cessation of the period, or problems with bone health (Ihalainen, 2019). Concurring with Ihalainen (2019), Ackerman and Misra (2018) found that low energy availability is a common cause of menstrual dysfunction and amenorrhea (abnormal absence of menstruation) can be a warning of health and performance consequences associated with a lack of energy, including poor bone accrual and low bone mineral density (Ackerman & Misra, 2018). Athletes who consider a lean frame or bodyweight to be a performance requirement, or an advantage, are more likely to have disordered eating compared to those who participate in sports that do not require a lean frame or bodyweight (Ackerman & Misra, 2018). A study by Coste, Paris, Gatlier, Letois, Maimoun & Sultan (2011) showed that 61% of pubertal competitors had biochemical hyperandrogenism (higher levels of male hormones) and 50% of the swimmers had menstrual disorders.

The prevalence of menstrual disorders in sports like swimming ranges from 16 to 82% (Khodaee et al., 2016). In past studies, female swimmers appeared to be more vulnerable to delayed puberty and menstrual irregularities due to inadequate body fat stores and exercise stress (Khodaee et al., 2016). As mentioned by Ackerman & Misra (2018), very active or highly competitive swimmers are at risk of developing Relative Energy Deficiency in Sports (RED-S), which is a syndrome resulting from relative energy deficiency that affects many physiological functions including metabolic rate, menstrual function, bone health, immunity, protein synthesis, cardiovascular, and psychological health (Khodaee et al., 2016; Mountjoy et al., 2014).
2.10 Chapter Summary

This study encompasses the EST as the theoretical framework. Due to interactions being a significant part of an adolescent’s life, specifically an athlete, whether it is with peers, teachers, coaches, or parents, it is important to understand that social interactions take place and have significant effects on people, whether quantifiable or not. Menstruation, PMS, and perceptions regarding these phenomena will be considered throughout this study. Menstruation is considered on average to start between the ages of 11 and 14 years, with PMS affecting most females. How PMS affects a female is predominantly dependent on the individual. Although, most athletes admit to suffering from PMS, some suggest that it may just be a mental thing. At large, most societies have experienced and recorded menstruation as a taboo and have avoided the subject for many years. This is especially prevalent in how adolescent females learn about menstruation and how adolescent girls are still subjected to the stereotypical views and understanding of menstruation. The literature has acknowledged that coaches should have a fundamental understanding of menstruation and that open communication among parent, coach, and athlete would create an ideal situation, however, how much communication takes place between these parties is not well documented. Furthermore, female athletes have begun speaking out about menstruation and its effects on sport performance. Whether coaches are starting to understand the impact of menstruation on performance, physically or psychologically, remains unclear. The implementation of female specific guidelines for training periodisation remains questionable. Chapter 3 will examine the methodology followed in this study.
CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter a detailed explanation of the research process followed by the collection of the data will be given. The research process includes the research design selected for the study and its corresponding data collection methods. In this chapter, each of the methods will be individually explained including participant selection, sampling methods, analysis, rigor or validity testing, as well as the ethical consideration and bias. In conclusion, the point of methodological integration will be explained.

3.2 Research Design

In order to determine the effects of the menstruation cycle on female swimmers perceived by coaches, parents, and swimmers a case study approach was followed. A case study is a research strategy with characteristics that include: the focus on the interrelationships that represent the context of a specific organisation, the analysis of the relationship between the contextual factors and the organisation being studied, and the use of the findings to generate and/or contribute to an existing theory (Mills, Durepos, & Wiebe, 2010). The case study design further investigates participants and gathers data based on current observations or experiences within its natural context using multiple sources of evidence (Hancock & Algozzine, 2017). The research approach for this study focused on competitive adolescent female swimmers, their parents or guardians, and swimming coaches who are involved in the coaching of adolescent female swimmers. The case specifically investigates how menstruation is perceived by all three parties, within the context of swimming.

Within the case study a partially mixed method sequential dominant status (qual ⇒ QUAN) approach was used. The mixed method approach is a type of research in which elements of, at least, one qualitative and one quantitative research approaches are combined (e.g., the use of qualitative and quantitative viewpoints, data collection, and analysis), to gain the breadth and depth of understanding and corroboration (Schoonenboom & Johnson, 2017). Mixed methods are used to gain a deeper understanding and to give the participant a voice. It is also used to gain a deeper understanding and corroboration. In this design, the researcher examined whether the individual voices echo the larger statistical findings and whether the qualitative data agrees with the quantitative data and why. As indicated in Figure 3.1, qualitative and quantitative data
were collected separately during this study, with some quantitative data collected concurrently. Quantitative data is represented by *QUAN* as the main results will be formulated from this data, therefore using the qualitative data as supportive data to highlight and elaborate the findings of the quantitative data. The quantitative data was collected in the form of self-administered questionnaires. Different questionnaires for the swimmers, parents, and coaches were collected. Qualitative data is represented by *qual* due to its supportive nature. The qualitative portion consisted of focus group discussions with the female swimmers and interviews with six swimming coaches.

**3.3 Quantitative Research**

Quantitative research is data-orientated in which a systematic investigation of a fact or situation is done. It is the collection of quantifiable data that can be expressed or measured as a quantity (Bhat, 2020). In this study quantitative data was collected in the form of questionnaires completed by three different parties (coaches, parents, and swimmers). The questionnaires were either self-administered paper questionnaires or online questionnaires. The quantitative data was correlational as it collected data from three groups, which are considered to be closely knit in the swimming community (Bhat, 2020). Correlational data is carried out to give value to naturally occurring relationships (Bhat, 2020). As mentioned in Chapter 2, a naturally occurring relationship is found between the coaches and swimmers, coaches and parents, and parents and swimmers, therefore correlation was important to view each of the role players in

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**Figure 3.1 Mixed methods approach used for this study.**
the swimmers life, including themselves, and awareness of the menstrual cycle. This is why the main inclusion criteria for the sample groups was they had to have reached menarche (swimmers), or they had to be coaching adolescent female swimmers who had reached menarche (coaches), or they had to be a parent or guardian of a swimmer who had completed a questionnaire and had reached menarche (parents).

3.3.1 Coaches’ Questionnaires

3.3.1.1 Method

A questionnaire, titled “The menstrual cycle and female swimming performance: coaches’ perspective” (Appendix A), was used to establish the coaches’ perceptions. The questionnaire was developed from Johnson’s (2008) questionnaire, “Knowledge and Attitudes Regarding the Menstrual Cycle, Oral Contraceptives, and Sport Performance: The Conceptualization and Development of a Questionnaire for Athletic Coaches.” Sections 3 and 4 of Johnson’s questionnaire were used and adapted to develop the coaches’ questionnaire and tailored specifically to swimming. A link to Johnson’s (2008) questionnaire can be found in Appendix D.

3.3.1.2 Sample

This group was purposefully sampled and consisted of swimming coaches who were coaching adolescent female swimmers in South Africa. The following inclusion criteria was used to select the coaches’:

1. The coach had to be coaching adolescent female swimmers who had already begun their menstrual cycles. This criterion was largely due to the focus of this study.
2. The coach had to be coaching in South Africa.

3.3.1.3 Data Collection

The self-administered questionnaires were delivered on three separate occasions to separate coaches. The researcher made use of appointments and events where many coaches were together in one setting. The first coach’s questionnaire was delivered by appointment to the coach at his place of work (9 May 2019). The second handing out of questionnaires was done at a coaches’ conference (18-20 May 2019). The researcher contacted the conference director to arrange the distribution of questionnaires. Before distributing these questionnaires, the
researcher explained the research, its purpose, and the questionnaire to the coaches at the conference. Coaches were given the opportunity to read the information letter (Appendix B) before completing the questionnaire. They were also requested to complete a consent form (Appendix C) prior to completing the questionnaire. All coaches’ questionnaires were self-administered. The coaches then chose whether they would like to participate or not. Although, the consent forms and questionnaires were handed out simultaneously, they were collected separately to protect the identity of the participants. The final handing out of questionnaires was done by a field worker who had direct access to coaches at a national swim gala (23 June 2019). These coaches were approached at the gala and no prior appointment was made as the researcher did not have access to which coaches were attending the national gala.

3.3.2 Athletes’ Questionnaires

3.3.2.1 Method

The athletes’/swimmers’ questionnaire, titled “Menstrual Health Questionnaire” (Appendix D), was developed from Hendrix’s (2010) Menstrual History Questionnaire. The questionnaire was adapted to be specific to swimming and questions that were not relevant to the research were omitted. A link to the full version of Hendrix’s (2010) questionnaire can be found in Appendix D. Permission was obtained from Dr Hendrix prior to distributing the questionnaires (Appendix E). This questionnaire was both self-administered and distributed electronically by using Google Forms.

3.3.2.2 Sample

This group was purposefully sampled based on the following inclusion criteria:

1. The swimmer needed to be a member of a swimming club in South Africa,
2. The swimmer should have already started menstruating, and
3. Be between the ages of 12 to 18 years.

This inclusion criteria were used in conjunction with the swimmers who took part in one of the qualitative data collection methods (the focus group discussion) and in conjunction with the coaches who partook in the questionnaire. In order to get a wider range of perceptions, swimmers from across South Africa were encouraged to take part. Although geographical information was not needed, the questionnaire was only distributed to coaches in South Africa.
and upon requesting distribution of questionnaires to swimmers and parents, the researcher specifically requested that swimmers be based in South Africa.

3.3.2.3 Data Collection

The first set of questionnaires was handed out as hard copies in December 2019, during the Central Gauteng Aquatics swimming championships, to the swimmers who had taken part in the focus group. They were requested to supply consent forms from their parent or guardian (Appendix F) and an assent form (Appendix G) before completing the questionnaire. In January 2020, after the final focus group discussion took place, a questionnaire was handed to the participant to complete. These hard copy questionnaires handed out between December 2019 and January 2020 were completed and returned between December 2019 and February 2020.

The third, and final method, of collecting questionnaires was done as an online questionnaire (Appendix D & I). The researcher changed methods due to the outbreak of Covid-19, which subsequently caused a national lockdown to be called in South Africa. It was then, after amendments were made to the original ethical clearance (Appendix H), that the questionnaires were placed on an online platform, Google Forms. Both questionnaires were included in one document but broken into five sections – information letter for parents and swimmers, parents’ consent for themselves and their daughter, swimmers’ assent, parents’ questionnaire, and swimmers’ questionnaire. Parents and swimmers were requested to tick checkboxes online to provide consent and assent respectively. A link to these questionnaires was sent by the researcher on a coaches’ WhatsApp group (Image 3.1) requesting coaches to forward the link to their adolescent female swimmers aged 12 to 18 years. The message was sent on Wednesday, 8 April 2020, and read as follows:
3.3.3 Parents’ Questionnaires

3.3.3.1 Method

The parents’ questionnaire, titled “Questionnaire for parents” (Appendix I), was self-developed using a combination of the coaches’ questions and swimmers’ questions but adapted to be specific to the parents. Due to the small sample size, \( n = 25 \) a pilot of this questionnaire was not done to avoid losing participant numbers.

3.3.3.2 Sample

The parent, or guardian, was purposefully sampled based on the swimmers who had answered questionnaires. One parent, or guardian, was requested to complete a questionnaire for every swimmer.

3.3.3.3 Data Collection

The parents’ questionnaire followed the same process as the swimmers’ questionnaires. The athlete and parent questionnaires were handed out simultaneously. The questionnaires were handed out on three separate occasions using two different methods. The first two methods were handing out hard copies of the questionnaires to the parents. The third, and final, method was sending an online questionnaire (link attached to Appendix D and I) to South African coaches and requesting them to forward it to the relevant swimmers. The parents of the swimmers who completed a questionnaire were also requested to complete a questionnaire.
The first set of questionnaires was handed out as hard copies in December 2019 during the Central Gauteng Aquatics swimming championships to the parents of the swimmers who had taken part in the focus group. They were requested to supply a consent form before completing the questionnaire. In January 2020, after the final focus group discussion took place, a questionnaire was handed to the participant and one of her parents to complete. These hard copy questionnaires, handed out between December 2019 and January 2020, were completed and returned between December 2019 and February 2020.

The third and final method of collecting questionnaires was done as an online questionnaire. The researcher changed methods due to the outbreak of Covid-19, which subsequently caused a national lockdown to be called in South Africa. It was then, after receiving ethical clearance, that the questionnaires were placed onto an online platform, Google Forms. Both questionnaires were included in the same document but divided into two sections – parents and swimmers. Parents and swimmers were requested to tick checkboxes online to provide consent and assent, respectively. A link of these questionnaires was sent by the researcher, on a coaches’ group, requesting the coaches to forward the link to their adolescent female swimmers aged 12 to 18 years. The message was sent on Wednesday 8 April 2020 as discussed in section 3.3.2.3.

3.3.4 Quantitative Analysis

After the questionnaires had been completed, separate excel spreadsheets of findings from the coaches’, swimmers’, and parents’ questionnaires were created to organise the findings. Datasets were sent to the University of Johannesburg’s Postgraduate Departments’ Statistical Consultation Service (STATKON) to analyse the data. The data was analysed using SPSS (version 26.0). Descriptive statistics were used to produce statistical information from the quantitative data, which will be interpreted in Chapter 4 and 5.

3.3.5 Quantitative Reliability and Validity

Reliability in research relates to the consistency of a measure (Heale and Twycross, 2015), therefore if the questionnaires were reliable, similar answers should always be given even if given to a different group of coaches, parents, or swimmers. Validity refers to the extent to which the concept of the study is accurately measured (Heale and Twycross, 2015), in other words, if the questionnaires were able to answer the study’s research question. Validity is ensuring that the correct questions are asked, in this case, if the questionnaires give a reflection
of perceptions and knowledge of menstruation. Validity was achieved by asking questions that related to the research questions. A statistical reliability test could not be done due to the small sample size. In order to achieve reliability, the researcher ensured that the questionnaires could be re-tested by supplying the exact questionnaires. Johnson (2008) achieved a reliability coefficient of \( r=0.93 \) for the coaches’ questionnaire.

### 3.4 Qualitative Research

Qualitative data is data that characterises meaning, it is data that is descriptive rather than numerical (Bhat, 2020). This data is non-numerical and is not quantifiable in nature, rather it is data that can be observed or recorded and is arranged categorically based on the attributes of the findings (Bhat, 2020). For the purpose of this study, the benefit of using qualitative data was its ability to focus on the emotions and perceptions of people. It is about in-depth understanding rather than the numerical values representing a certain population, in this case two populations in the swimming community, namely coaches and female adolescent swimmers.

The qualitative methods used in the study were semi-structured focus group discussions with the swimmers and semi-structured interviews with the coaches. As mentioned previously in this chapter, the qualitative data in this study plays a supportive role to the quantitative data collected from the questionnaires. The researcher used these two qualitative methods to highlight and gather more in-depth information to certain questions asked in the questionnaires. This was done to gather more understanding into the perceptions of menstruation by swimmers themselves and the coaches of female adolescent swimmers.

#### 3.4.1 Swimmers Focus Group Discussions

##### 3.4.1.1 Method

In order to get the perceptions from the swimmers, focus group discussions or group interviews were employed using a semi-structured interview schedule. According to Patton and Cochran (2002), a focus group is when there are two or more participants partaking in a semi-structured interview. Focus groups sometimes work better for sensitive topics as people are more likely to share information when others experience things similar to them (Patton & Cochran, 2002). Focus group discussions also highlight the social structure of the community and give a more in-depth understanding of the community (Patton & Cochran, 2002). The focus group
discussion focused on three questions developed (Appendix J) from the swimmers’ questionnaire mentioned in the quantitative research methodology.

### 3.4.1.2 Sample

The swimmers included in the focus groups were purposefully sampled and had to adhere to the following inclusion criteria:

1. The swimmers needed to be an adolescent female.
2. They have already started their menstrual cycle.
3. They are between the ages of 12 to 18 years.
4. All the swimmers had to be coached by the same head coach.
5. They had to be registered as a competitive Central Gauteng Aquatics (CGA) swimmer.

The age group, 12 to 18 years, was chosen as it is between these ages that females start menstruating and to gain greater understanding regarding their menstrual cycle (Johnson, 2008). The aim was to have swimmers who have just begun menstruating, as well as swimmers who have been menstruating for several years because they should have a better understanding of their menstrual cycle. This club and sample were purposefully sampled and used because the researcher had direct access to, and a professional relationship with, the swimmers, parents, and coach. Although there is a professional relationship, the researcher does not personally coach the swimmers full-time; the researcher has stood in as an assistant coach when needed and, thus, acknowledges potential bias in the research process.

### 3.4.1.3 Data Collection

Initially one focus group was meant to take place but due to the swimmers’ time availability, the focus group was divided into three groups. The first group had three participants and the second and third group had two participants each. During the study, three participants requested to be removed from the study, therefore all information received from these participants was omitted. To have a minimum participant number of five, the researcher requested one additional participant.

Participation was done on a voluntary basis. Prior to requesting that the coach forward information to his swimmers, consent from the coach (Appendix K) to do the study within his club was obtained. An email requesting voluntary participants was sent to the head coach of the club. The coach was then requested to forward the information to the parents of the
adolescent females of menstruation age (12 to 18 years). If swimmers were then willing to take part in the study, their parents were requested to contact the researcher directly (Appendix L). The researcher’s details were provided in the email. Once the researcher had received contact from willing participants, consent and assent forms were sent to the parent and/or guardian. Consent and assent forms were requested prior to the focus group discussions taking place.

The first focus group discussion took place on Friday, 15 March 2019, at Cresta Virgin Active after the girls had completed their swimming training session for the day. Field notes of the discussion were recorded by the researcher with the discussion lasting approximately 15 minutes, with 10 minutes forming the discussion. The second focus group discussion took place on Saturday, 16 March 2019, at Cresta Virgin Active. Field notes of the discussion were recorded by the researcher with the discussion lasting approximately 12 minutes, with seven minutes comprising the discussion and five minutes used to explain the online system that, as previously mentioned, was omitted from the study. The third focus group discussion took place on Thursday, 28 March 2019, at Cresta Virgin Active after the two girls had completed their morning swimming training session. Field notes of the discussion were recorded by the researcher with the discussion lasting approximately the same time as the previous group. Since no consent was received for these discussions to be audio recorded, the researcher made use of field notes as the primary method to capture discussion points.

Due to three participants withdrawing from the study, an additional participant was requested to take part in the study and a one-on-one discussion with the participant was done on Thursday, 30 January 2020, after the swimmer had completed her morning training. This discussion lasted approximately 10 minutes and was audio recorded for 1 minute and 30 seconds, as only the questions and answers were audio recorded. The explanation of the information letter and the study was done before starting the audio recording.

Before any focus groups or interviews took place, participants had the opportunity to consider the information letter, ask any questions, and were then requested to complete consent and/or assent forms before taking part in an interview, or focus group discussion.

3.4.2 Coaches Interviews

3.4.2.1 Method

To determine the coaches' perspectives, the researcher made use of semi-structured interviews. Semi-structured interviews are one-on-one conversations between the researcher and
participant (Patton & Cochran, 2002). During a semi-structured interview, although there are predetermined questions by the researcher, the conversation is encouraged to flow naturally, thus allowing the researcher and interviewee to ask open-ended questions. Semi-structured interviews allow for more in-depth questions and responses and maintain a level of confidentiality as only the researcher is aware of the participants’ identity (Patton & Cochran, 2002). The coaches’ interviews consisted of six questions developed from the coaches’ questionnaire (Appendix M).

3.4.2.2 Sample

The coaches included in the semi-structured interviews were purposefully sampled and had to meet the following inclusion criteria:

1. They had to be coaching adolescent competitive female swimmers who had started their menstrual cycles.
2. They are coaching swimming in South Africa.
3. They had to have completed the coaches’ questionnaire included in the study.

These inclusion criteria were used for several reasons. The first criterion was used because this study’s focus is on menstruating adolescent females, therefore the coaches that took part needed to have some sort of interaction with, and/or understanding of, females who experience their menstrual cycles. Furthermore, this research examined Central Gauteng swimmers and their coach, and then coaches and swimmers from any province or city in South Africa. It was important that the head coach of the swimmers included in the focus group be one of the interviewees, even though it was not an inclusion criterion for all the other coaches. To obtain the various perceptions, the interviews had to include an equal number of male and female coaches. Although the number of interviews was planned, it was important to sample either male or female coaches until data saturation was achieved. The researcher understands that due to the sample size, a generalisation on findings cannot be given and the results can only be interpreted specifically for the coaches who took part in an interview. Should gender need to play a more significant role in findings to find generalisations, a larger population of male and female swimming coaches would need to be interviewed.
The second and final phase of qualitative data collection was done by interviewing the swimming coaches. As seen in Table 3.1, each of the coaches were interviewed on separate occasions, and although they were all asked the same questions, the duration of the interviews differed.

Each coach provided a consent form prior to taking part in an interview, as well as consenting to have the interview audio recorded. Coach one and two’s interviews were done face-to-face with the researcher, and coaches three to six were interviewed using an online platform known as Zoom. Zoom allowed the researcher to have one-on-one face-to-face semi-structured interviews without meeting with the coaches in person (this could not be done due to Covid-19). The approximate times of coaches three to six include two separate recordings for each of the four coaches. The first recording was to gain consent from the coach agreeing to take part and consent to record the interview. The second recording was the interview itself. All six coaches’ interviews were audio recorded and transcribed for coding.

Table 3.1 Semi-structured interviews with coaches

<table>
<thead>
<tr>
<th>Coach</th>
<th>Date</th>
<th>Location</th>
<th>Interview duration</th>
<th>Recording / notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coach 1</td>
<td>9 May 2019</td>
<td>Randburg</td>
<td>1 minute 34 seconds</td>
<td>Recorded</td>
</tr>
<tr>
<td>Coach 2</td>
<td>18 January 2020</td>
<td>OR Tambo</td>
<td>5 minutes 20 seconds</td>
<td>Recorded</td>
</tr>
<tr>
<td>Coach 3</td>
<td>3 July 2020</td>
<td>Zoom</td>
<td>6 minutes 36 seconds</td>
<td>Recorded</td>
</tr>
<tr>
<td>Coach 4</td>
<td>8 July 2020</td>
<td>Zoom</td>
<td>6 minutes 13 seconds</td>
<td>Recorded</td>
</tr>
<tr>
<td>Coach 5</td>
<td>8 July 2020</td>
<td>Zoom</td>
<td>5 minutes 23 seconds</td>
<td>Recorded</td>
</tr>
<tr>
<td>Coach 6</td>
<td>9 July</td>
<td>Zoom</td>
<td>9 minutes 12 seconds</td>
<td>Recorded</td>
</tr>
</tbody>
</table>
3.4.3 Qualitative Analysis

Once all qualitative data had been collected, all findings whether field notes or voice recordings were transcribed to organise the data for analysis. The field notes were transcribed (Appendix N) by paraphrasing since all participants did not consent to being recorded. Recording participants, although ideal, is not necessary. Audio recordings must be consented to and if a participant is uncomfortable being recorded, note taking is an acceptable method in data collection. Although not as accurate as voice recordings, the researcher took care in taking notes as accurately as the word-for-word answers given during the interviews. Due to this technique, the research acknowledges that all handwritten notes should be taken as paraphrase and not a direct quote from a participant. Due to the last focus group done as an interview being audio recorded, the discussion was transcribed (Appendix O) word-for-word and could play a role in directly quoting the participant. All six coaches’ interviews were audio recorded and transcribed word for word (Appendix P).

Once all qualitative data had been organised through transcriptions, the researcher analysed the data using a thematic approach as provided by Patton and Cochran (2002), which includes the following steps:

1. Read and annotate transcripts. This step was not to get answers from the interviews, but for the researcher to make preliminary observations to get a feel for the data, and where the discussion was leading.

2. Themes, which are summaries of what is going on in the conversation, were given to each topic within the focus groups and interviews. Themes are encouraged to be as abstract as possible leading to examples of what the conversations are about.

3. Coding schedule, which is a list of all the themes and is given a number to represent the theme. Each broad code may have several subcodes. Two coding schedules were given, one for the swimmer’s discussions and one for the coaches’ interviews. A coding schedule was developed by using inline coding (coding relevant lines individually).

4. Coding the data. This step involves applying the coding schedule from step three to the whole set of data. In this case, the coding scheme used for the coaches’ interviews were
applied to all six coaches and done as inline coding (coding each relevant line). Codes could then be given categories which reflect broader analytical themes.

3.4.4 Qualitative Reliability

Qualitative trustworthiness is achieved by satisfying four criteria: 1) credibility, 2) transferability, 3) dependability, and 4) confirmability.

Credibility in qualitative methodology is achieved by using co-coding. Co-coding was done after coding was done in Word by the researcher and was done to remove the researcher’s potential bias to the topic. A co-coder, who did not have much understanding of the study, was requested to code lines. The co-coder completed a confidentiality form (Appendix Q) before receiving the transcripts to code. After co-coding, the researcher and co-coder compared their codes and chose those that were best suited to the study. After completing of coding, the co-coder returned all transcripts to the researcher and deleted any copies that were in possession.

Transferability is achieved by having a thorough step-by-step method of the data collection, which would allow someone else to replicate the researcher’s study. In this case, participant group sizes were given, dates of collection given, and the exact questions asked were supplied in the form of only the questions as well as transcribed findings, which included the questions asked.

Dependability and confirmability were achieved by having outside personnel conduct an ‘audit’ on the study. Dependability refers to the stability of findings over time. In this study, quantitative data was collected as well. Although, the qualitative data played a supportive role, the researcher can see if the findings between the qualitative and quantitative data that asked similar questions were similar. Furthermore, confirmability is the degree to which findings of the research could be confirmed by others. It ensures that interpretations of the findings are not done biasedly by the researcher. In this study, co-coding was done on all qualitative findings to ensure confirmability, taking the researchers bias out of the equation.

3.5 Point of Integration

The point of integration occurs when data collection and data analysis are linked at multiple points, and when the qualitative and the quantitative databases are fused to produce information that mutually support each other (dos Santos, Erdmann, Meirelles, de Melo Lanzani, da Cunha & Ross, 2017). In this study, although, qualitative and quantitative data collection were
performed separately, the objectives of the findings from these sources were similar and explored similar questions to allow for integration in Chapter 5. The data analysis for qualitative and quantitative data were also done separately allowing the researcher to integrate the results in the discussion of the findings (dos Santos, Erdmann, Meirelles et al., 2017). The findings from the quantitative data, qualitative data, and from the literature review will be integrated to answer the research questions.

3.6 Ethical Considerations

As this study made use of human participants, four foundational ethical principles for research on human participants were considered: 1) non-maleficence & beneficence, 2) respect for human dignity, 3) justice (Dhai & McQuoid-Mason, 2011), and 4) research bias.

Non-maleficence & beneficence

The researcher had the responsibility to avoid harm of participants by ensuring that participants are not subjected to unnecessary discomfort during participation. The researcher was professional and practised sensitivity during the study by keeping all relations with participants professional and confidential. No names of participants were mentioned and only the researcher is aware of which swimmers took part in the study. The privacy of participants who completed the online questionnaires will be protected and information received will be kept confidential. No participant names were required for the online questionnaires, therefore these participants remained anonymous. In order to ensure that participants who completed the questionnaires remained confidential, the consent forms, assent forms, and questionnaires were collected separately to avoid placing a name with an answer. Online questionnaires did not require participant names or email addresses, therefore all participants who completed the online questionnaires were anonymous and shall remain so. Due to qualitative data being collected by interacting with the participants, confidentiality of these participants will be kept, as any mention of names were removed from data collection. Due to the focus group discussion, privacy of the participants was limited as the participants were aware of who the other participants were, however, none of the questions discussed in the focus group required details about the swimmers’ periods. Participants were required to keep all focus group discussions to themselves. Only the researcher and supervisors will have access to the data, however, biographical information was kept anonymous to all parties concerned, except the researcher. Names will not be mentioned in the results and each person was allocated a code or number to represent their information. No personal information such as cell phone numbers or email
addresses will be shared. The researcher has a responsibility to keep the identity of these participants confidential. There was no direct benefit or risk to participants of the research, however, the research may prove to educate coaches and female athletes in the future.

**Respect for human dignity**

The researcher met the needs of the principle of respect for human dignity by implementing the principle of respect for autonomy. Participants had the right to full disclosure and received full disclosure of what was expected, what the study entailed, and what the benefits of the study would be, as well as the right to choose for themselves whether they would like to participate in the study or not. An informed consent and assent letter were signed by the parents of the participants and participants, respectively. Participants who completed the online questionnaire were required to check boxes to give consent and assent. Participation was voluntary. The researcher remained objective throughout the study. Findings will be made available to the coach, parents, swimmers, and Swimming South Africa, but will be written up in such a way that confidentiality is guaranteed. All data collected will be correctly disposed of and destroyed three years after the study.

**Justice**

The principle of justice refers to the fair and right treatment of the participants. When participants withdrew from the study, the researcher remained fair by respecting the wishes of the participant and letting them withdraw judgement free. Justice also ensures that vulnerable populations such as minors are protected by following the correct procedures in gaining consent and assent. Furthermore, equal opportunities were provided to participants willing to partake by providing an online questionnaire when access to hardcopies were no longer possible.

**Bias**

Bias refers to any systematic error in the design, conduct, or analysis of a study (Althubaiti, 2016). Bias can arise from the approach used to select participants, or the approach used for collecting data. These are known as selection and information bias, respectively. Selection bias occurs when online questionnaires are used due to participants self-selecting participation, therefore it is often those who may have something to say that will choose to partake in the study (Bethlehem, 2010). Furthermore, when using online questionnaires, groups of the population will be under-represented due to their lack of access to the internet (Bethlehem, 2010). Information bias can be as a result of questionnaires, or interviews, and can cause social
desirability bias, which happens when sensitive questions are asked in a questionnaire or interview (in this case, knowledge and perception of menstruation), answers given can be affected by external expectations caused by social approval (Althubaiti, 2016). This can be especially prevalent if participants are not anonymous. Answers are given based on what the participant thinks the researcher may want to hear, rather than what may be truthful.

### 3.7 Chapter Summary

In this case study a partially mixed method sequential dominant status (qual ⇒ QUAN) approach was used, with methods from both qualitative and quantitative research design being used. In this specific case, quantitative data bears the most importance, with the qualitative data collected acting as a support. Two qualitative methods for data collection were used, which were semi-structured interviews and focus group discussions. Qualitative data was collected from swimmers and coaches. Surveys were used as the quantitative data collection method. These were both hard copy paper surveys for the coaches, and some swimmers and parents, and online surveys for the remainder of the parents and swimmers.

After qualitative and quantitative data was collected, data was organised and then analysed. Qualitative data was organised into transcriptions in Word and analysed using inline coding and co-coding. Quantitative data was organised into three excel spreadsheets, one sheet for each questionnaire - coach, swimmer, and parent. Once the data had been organised, it was then analysed by a statistician using SPSS to produce descriptive statistics. Lastly, triangulation of quantitative data, qualitative data, and the literature are used to increase reliability and trustworthiness of the methodologies used, which is discussed in Chapters 5 and 6. Chapter 4 examines the results obtained from the data collected next.
CHAPTER 4

RESULTS

4.1 Introduction

In this chapter, the results collected from the quantitative data and qualitative data are given. Results are divided into research questions providing the quantitative and qualitative results for each research question. The quantitative results were obtained from the questionnaires, and the qualitative results from the focus group discussions and semi-structured interviews. A deeper understanding of results are provided in the discussion in Chapter 5.

4.2 Demographic Results

The following sections present the demographic information of the participants, coaches and parents who completed the questionnaires. There was a total of 83 participants between the three groups - swimmers, parents, and coaches - in this study. There were 31 coaches, 25 swimmers, and 25 parents or guardians for the quantitative data respectively. Five swimmers (all of whom answered the questionnaire) and 6 coaches (4 of whom answered the questionnaire) that took part in the focus group discussions and one-on-one interviews, respectively.

4.2.1 Swimmers Demographic Results

A total of 25 female swimmers participated in both the qualitative and quantitative parts of this study. All 25 swimmers answered the swimmers’ questionnaire, whereas only five of those 25 swimmers took part in a focus group discussion. As previously mentioned in Chapter 3’s inclusion criteria, all the swimmers were female as the study was on menstruation, which only females experience.

As seen from Figure 4.1, all 25 of the female swimmers who completed the swimmers’ questionnaire were between the ages of 13 and 18 years. Only three female swimmers were 13 years old, six being 14 years old, four being 15 years old, one being 16, nine being 17, and two being 18 years old. The swimmers had a mean age of 15.52 years with a standard deviation of 1.661.
As seen in figure 4.2 (n=25), the majority (52%) of the female swimmers were South African National Junior (SANJ) swimmers, which indicates that they are highly competitive and are most likely top swimmers in their age groups. While 12% were Level 3, 20% Level 2, and 12% were Open Water swimmers with one swimmer not providing her level (labelled missing).

4.2.2 Parents Demographic Results

A total of 25 parents completed the parents’ questionnaire. The parents and the swimmers were directly related (parent 1 = swimmer 1). No demographic details were requested from the parents, as this study is not concerned with the gender of the parent, instead it is concerned with the communication between parent and coach.
4.2.3 Coaches Demographic Results

A total of 31 coaches completed the coaches’ questionnaire, of which six coaches additionally took part in the semi-structured one-on-one interviews.

As seen from Figure 4.3, 58% female coaches and 42% male coaches made up the sample (n=31) of coaches who participated in the whole study. Although, female coaches made up more of the coaches who completed the questionnaires, there is not a large discrepancy between the representations of both genders. In addition to the questionnaire, the six coaches who partook in the interviews were purposefully sampled, and thus comprised three males and three females, giving each gender a 50% weighting.

4.3 Results of Research Question One:

Were young female swimmers (12 to 18 years in age) aware of their menstrual health and did they believe that there are emotional and physical changes that occur throughout their menstrual cycle?

In this section, the quantitative and qualitative responses pertaining to the first research question will be given separately and interpreted as a whole in Chapter 5.

4.3.1 Swimmers Quantitative Results

With regard to the 25 swimmers’ age at menarche, (Table 4.1) the mean age of menarche for this group was seen to be 13 with a standard deviation of 1.528 (13.00±1.528). Table 4.1 further indicates that the median age of menarche was found to be 12 with the minimum and maximum
ages being 11 and 16, respectively. It was important to see if swimmers were aware of when they started menstruating. This gives us an indication of the swimmers’ awareness regarding their own menstruation.

Table 4.1 Approximate age of the swimmers when they started menstruating (reached menarche).

<table>
<thead>
<tr>
<th>Descriptive statistics of the swimmers’ age at menarche</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Median</td>
</tr>
<tr>
<td>Std. Deviation</td>
</tr>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
</tbody>
</table>

When asked if the swimmers experience irregular/infrequent periods, 14 (56%) of the swimmers answered that they do not experience irregular or infrequent periods. However, as seen from Table 4.2, eight of the swimmers (32%) experience infrequent or irregular periods, and three (12%) are not sure whether their periods may be irregular or infrequent.

Table 4.2 Female adolescent swimmers experience irregular or infrequent periods.

<table>
<thead>
<tr>
<th>Do you experience irregular/infrequent periods?</th>
<th>Number of swimmers</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>No</td>
<td>14</td>
<td>56</td>
</tr>
<tr>
<td>Not Sure</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>100</td>
</tr>
</tbody>
</table>

Figure 4.4 represents how long the swimmers (n=25) have gone without menstruating and how many swimmers have experienced the same amount of time without having a period, 48% reported having no period for a maximum of 32 to 60 days, 40% swimmers reported that the longest they have gone without their period is 31 or less days. Figure 4.4 also indicates that 8% of the swimmers have gone without a period for a maximum of 61 to 90 days, and 4% reporting that they had previously gone without her period for a maximum three to four months.

As depicted in Figure 4.5 (n=25), 52% of the swimmers reported having slight pain, 32% reported having no pain, and 16% reported having a great deal of pain.
Figure 4.4 Maximum number of days that the swimmers have gone without menstruating.

Figure 4.5 Percentage of swimmers who have cramping and pain accompany their menstrual cycle.

Figure 4.6 Number of swimmers that have taken certain actions due to menstruation in the past.
As depicted by Figure 4.6, the majority of the girls (n=20) indicated that they continue life with little change when on their period, while 10 girls admitted to taking pain medication. Regarding performance, six said they function less efficiently at sport, followed closely by four girls saying they function less efficiently at school, and four girls saying they function less efficiently at home. Four girls said they continue training but decrease their training load and three girls reduce their level of training or exercise. One girl said she loses time from school and one girl misses training.

![Figure 4.7 Adolescent female swimmers’ perceptions on whether vigorous activity affects their menstrual cycles.](image)

Figure 4.7 Adolescent female swimmers’ perceptions on whether vigorous activity affects their menstrual cycles.

Figure 4.7 depicts the percentage of the swimmers (n=25) who believe that vigorous activity affects their menstrual cycle and those who do not. The majority, 56% of the swimmers believe that vigorous training affects their menstrual cycle (represented by the label ‘yes’), 44% believe that vigorous training has no effect on the swimmers menstrual cycle (represented by the label ‘no’).

As indicated in Figure 4.8, 14 of the swimmers believe that vigorous activity affects their menstruation. The majority (n=4) of swimmers experienced menstruating less often when their training increased. The effects least experienced by the swimmers were that their period lasts longer, and that exercise makes menstrual pain more severe. These effects were selected by one of the swimmers (it may have been a different swimmer for each). One swimmer interpreted the question incorrectly and answered what effects menstruation has on exercise rather than what effects exercise has on menstruation. She said that she is not able to give as much effort when training (labelled as ‘less effort’ on the bar chart). Three swimmers said that it reduces their period, with two swimmers selecting (it may have been different swimmers for
each) that pain is less severe, flow is reduced, and causes irregular cycles. Four swimmers admitted that vigorous exercise causes them to menstruate less often. This figure highlights how aware the swimmers are of their menstrual cycles in relation to their training and whether or not they notice any changes brought on by exercise.

Figure 4.8 The perceived effects of vigorous activity on menstruation.

Figure 4.9 Signs and symptoms experienced by the adolescent female swimmers.
As depicted in Figure 4.9, of the 29 PMS or menstruation signs and symptoms experienced by the swimmers, the majority (18) indicated they were frequently thinking about food. The second most experienced indicated by the girls were: change in energy (16), muscle pains (15), mood swings (14), irregular menstrual periods (13), and headaches (13). One swimmer marked “other” and described that she has experienced sharp pains after racing. These signs and symptoms once again highlight the swimmers’ awareness about their experiences of their menstrual cycles, but are also important for coaches to consider, especially irregular menstrual periods and change in energy, which are symptoms of Relative Energy Deficiency in Sports (RED-S).

4.3.2 Swimmers Qualitative Results

The focus group discussions highlighted three main categories:

1. The athlete’s perception of her menstruation,
2. The athlete’s perception of the effects of menstruation on her training,
3. And the relationship between the athlete and coach.

As depicted in Table 4.3, the first two categories of the focus group discussions relate specifically to research question one. Regarding perceptions of their own menstruation, three of the female swimmers alluded to experiencing signs and symptoms of fatigue, aggression, stress, and being short tempered. Armour, Parry, Steel, and Smith (2020) found that the majority of the female athletes reported experiencing period pains (82%) and premenstrual symptoms (83%). One swimmer admitted that outside opinions are that of cramping during menstruation, but admitted that she does not experience this, while another said that before her period, she gets more annoyed with close family members. One swimmer admitted that when using a feminine hygiene product, she worries that the string of the tampon could stick out.

When asked about their perceptions of the effects of menstruation on their training, most of the girls agreed that menstruating does affect their training due to the various signs and symptoms that they feel because of menstruation. Fifty percent of the Australian female athletes that took part in a study by Armour, Parry, Steel, and Smith (2020) felt fatigue and noted that performance was reduced due to menstrual or premenstrual signs and symptoms. One girl alluded to being fine when on her period because of the use of feminine hygiene products allowing her to train as normal, while the other girls claimed to feel slower, heavier, and unable to train as hard when menstruating.
Table 4.3 Overview of categories, codes, and subcodes for the swimmers focus group discussions

<table>
<thead>
<tr>
<th>Categories</th>
<th>Codes</th>
<th>Subcodes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Athletes perception of her period</td>
<td>Signs &amp; Symptoms</td>
<td>Tired, Short Tempered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stressed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aggressive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Short tempered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Annoyed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pain</td>
</tr>
<tr>
<td></td>
<td>Other people’s opinions</td>
<td>Cramps</td>
</tr>
<tr>
<td></td>
<td>Medication</td>
<td>Panado</td>
</tr>
<tr>
<td></td>
<td>Reaction</td>
<td>Aggressive</td>
</tr>
<tr>
<td></td>
<td>Menstruation stage</td>
<td>Pre-menstruation</td>
</tr>
<tr>
<td></td>
<td>Feminine Hygiene Products</td>
<td>Tampons</td>
</tr>
<tr>
<td>Athletes perception of the effects of menstruation on training</td>
<td>Personal Experience</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Feminine Hygiene Products</td>
<td>Tampons</td>
</tr>
<tr>
<td></td>
<td>Signs &amp; Symptoms</td>
<td>Tired</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slower</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Heavier</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Training dip</td>
</tr>
<tr>
<td></td>
<td>Training Pattern</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not as hard as usual</td>
</tr>
<tr>
<td></td>
<td>Menstruation stage</td>
<td>Menstruating</td>
</tr>
<tr>
<td>Athlete and Coach relationship</td>
<td>Personal experience</td>
<td>Fine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Crying</td>
</tr>
<tr>
<td></td>
<td>Coaches reaction</td>
<td>Expectation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Awkward</td>
</tr>
<tr>
<td></td>
<td>Menstrual stage</td>
<td>During period</td>
</tr>
<tr>
<td></td>
<td>Training pattern</td>
<td>Hard</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Crying</td>
</tr>
<tr>
<td></td>
<td>Speak to coach</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Athletes reaction</td>
<td>Look at him</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complains more</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fatigued</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Awkward</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>Male</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Father figure</td>
</tr>
</tbody>
</table>
4.4 Results of Research Question Two:

**Did swimming coaches believe that there are emotional and physical effects that accompany pre-menstruation or menstruation in young female adolescent swimmers, and were they aware of the effects of overtraining female swimmers?**

In this section quantitative and qualitative results pertaining to research question two will be given.

4.4.1 Swimmers’ Quantitative Results

![Figure 4.10 Overuse injuries experienced by the adolescent female swimmers.](image)

As seen from Figure 4.10, at least 14 girls have experienced an injury. As per the various injuries, 14 girls indicated that they have experienced a rotator cuff (shoulder muscle overuse injury) injury, four girls have experienced a groin injury, and at least three girls have experienced a stress fracture.

Overuse injuries are an indication that overtraining may be taking place. Stress fractures are a common symptom of RED-S due to a decrease in bone health. Although, this question does not relate to the coaches’ knowledge of overtraining, it is an indication of injuries experienced by swimmers due to overuse, which the coach should be aware of.
4.4.2 Coaches’ Quantitative Results

Figure 4.11 Coaches perspective of physical symptoms that accompany PMS or menstruation.

The results in Figure 4.11 indicate that when asked about physical symptoms, 31 coaches believe that abdominal pain accompanies PMS or menstruation, 26 coaches believe that diarrhoea and fluid retention accompany PMS or menstruation, and 21 coaches believe that migraines and aggravated asthma accompany PMS or menstruation. Fifteen of the coaches believe that cramping and altered zinc and potassium levels accompany PMS or menstruation. The rest of the physical symptoms were only selected by 14, or fewer, of the coaches: weight gain (10), other (7), and referred pain (3). This information allows comparisons between the swimmers’ and coaches’ perceptions about the menstrual cycle indicating whether coaches’ knowledge of the signs and symptoms of menstruation or PMS is similar to the actual signs and symptoms experienced by female swimmers.

Depicted in Figure 4.12, all 31 of the coaches believe that a female’s mood is affected pre and/or during menstruation, while more than 16 believe that cravings (25), aggression (22), and sleep (21) are affected pre and/or during menstruation. Fifteen, or fewer, of the coaches believe that cognition (11), accident proneness (6), and suicide (5) are affected pre and/or during menstruation. As above, this highlights the coaches’ knowledge allowing us to compare the coaches’ knowledge to the way the swimmer feels.
As seen in Figure 4.13, symptoms like irritability (30), abdominal bloating (26), and change in appetite (25), are the three most common PMS symptoms according to coaches. Other symptoms also mentioned by the coaches included fatigue (24), tension (23), breast swelling (22), headaches (22), depression (21), nausea (17), and anxiety (17) with the remaining seven symptoms selected by 15, or fewer, of the coaches, which were dizziness (15), constipation...
(14), joint & muscle pain (13), insomnia (12), forgetfulness (7), cold sweats (6), and blurred vision (2).

![Effects of overtraining on female athletes](image)

**Figure 4.14 Effects of overtraining female athletes as perceived by coaches.**

As depicted in Figure 4.14, the two main effects chosen by the coaches were chronic fatigue (26) and that menstruation may stop (23). All the other effects were chosen by 10, or fewer, of the coaches ranging from extreme weight loss (10), oestrogen concentrations becoming toxic (5), low testosterone levels (4), the anterior pituitary gland may shrink (3), and progesterone concentrations becoming toxic (2) with only nine coaches admitting to not being sure what effects accompany overtrained female athletes.

**4.5 Results of Research Question Three:**

**Were coaches aware of their female swimmers’ menstruation, and did young female swimmers, swimming coaches, and/or the swimmers’ parents discuss anything related to menstruation?**

**4.5.1 Swimmers’ Quantitative Results**

As seen in Figure 4.15 (n=25), 80% of the swimmers said ‘no’ that their coaches are not aware of when they menstruate, while the remaining 20% of the swimmers said ‘yes’ that their coaches are aware of when they menstruate.
Figure 4.15 Coaches awareness of when swimmers menstruate as perceived by the swimmers.

Figure 4.16 Who informs the coach that the swimmer is menstruating?

Figure 4.17 Percentage of coaches who ask when the swimmer started menstruating as perceived by the swimmers.
As a follow-up to the five swimmers who indicated that their coach is aware when they are menstruating (Figure 4.15). When asked who informs the coach of their menstruation, as shown in Figure 4.16, four indicated that they make the coach aware, whereas only one swimmer said that it was her or one of her parents that made the coach aware. From Figure 4.17 (n=25), it can be seen that the majority (76%) of the swimmers indicated that ‘no’ they were not asked by the coaches when they started menstruating, while the remaining 24% of the swimmers indicated that ‘yes’ their coaches did ask when they started menstruating.

![Pie chart showing the percentage of coaches who speak to swimmers about menstrual-related issues.](image)

**Figure 4.18 Percentage of coaches who speak to the swimmer about menstrual-related issues as perceived by the swimmers.**

When asked whether their coaches speak to the swimmer about menstrual-related issues, the majority (72%) of the swimmers indicated that ‘no’ their coaches have not spoken to them about menstrual-related issues, while the remaining eight percent answered ‘yes’ and have had discussions with their coach about menstrual-related issues.

When asked which subjects the coaches have discussed with their swimmers about menstruation (Figure 4.19), three swimmers recall the subject being about menstruation and training. While only one swimmer said that their coach said they must regard it as normal. Other items indicated by individual swimmers related to a coach speaking to them about menstrual-related issues; they recalled the following subjects: 1) How menstruation affects mood, 2) conversation regarding contraceptives, how they work, and why females would use them, and 3) one other swimmer recalled her coach speaking to her about her actual menstruation.
4.5.2 Parents’ Quantitative Results.

When asked about whether parents (n=25) make coaches aware of their daughters’ mood changes or menstruation (figure 4.21), the majority of the parents (76%) indicated “no”, the coach is not made aware of the swimmers mood changes or PMS. While only five parents (20%) indicated “yes” and one parent (4%) said “sometimes”.

Twenty (80%) of the parents indicated “no”, they do not make the coach aware whereas five (20%) of the parents indicated “yes”, they do make their daughters’ coach aware of their daughters’ menstruation or menstrual-related issues.
Figure 4.21 Percentage of parents who make their daughters coach aware of their daughters’ menstruation.

As seen in Figure 4.22, 72 % (18) of the parents recorded that, “no”, their daughters coach does not ask them whether their daughter has started menstruating or anything regarding menstrual issues, whereas 28% (7) of the parents indicated that, “yes”, their daughters coach does ask when their daughter started menstruating and does not speak to the parent about menstrual-related issues.

4.5.3 Coaches’ Quantitative Results

As seen in Table 4.4, the mean number of female swimmers that coaches know for certain have begun menstruating is 10.54 ≈ 11 with a standard deviation of 9.252 (10.54 ± 9.252). The minimum number of swimmers’ menstruations that coaches were aware of was one swimmer and the maximum number was 30. Twenty-eight of the 31 coaches, who completed the
questionnaire, were able to give a value for this question, while the remaining three coaches were not aware for certain if any of their swimmers were menstruating. When asked how they were certainly aware that the swimmer had begun menstruating, 14 coaches said that the athlete told them, while eight said that a parent of the athlete told them, and three coaches said that they asked the athlete. Furthermore, four coaches said that the swimmer communicated with the female coach, three said that it was due to their swimmers missing training, while one coach said it was because of the dark circles under the swimmer’s eyes, and another one coach said that it was due to the swimmer’s age.

Table 4.4 Number of female swimmers that coaches know for certain have started menstruating.

| Descriptive statistics of number of female swimmers that have begun menstruating |
|-----------------------------|-----------------|
| Mean                       | 10.54           |
| Median                     | 7.00            |
| Std. Deviation             | 9.252           |
| Minimum                    | 1               |
| Maximum                    | 30              |

Table 4.5 Representation of whether coaches ask their female swimmers certain questions about menstruation.

<table>
<thead>
<tr>
<th>Do coaches ask their female swimmers certain questions about menstruation?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question</td>
</tr>
<tr>
<td>Do you ask whether your swimmers have started menstruating or not?</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Sometimes</td>
</tr>
<tr>
<td>Do you ask when the swimmer started (at what age) menstruating?</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Sometimes</td>
</tr>
</tbody>
</table>

Table 4.5 represents whether coaches ask their swimmers if they have started menstruating or not, and if they ask their swimmers when (at what age) they started menstruating. Although, the majority (20) of the coaches indicated, “yes”, they do ask if their female swimmers have started menstruating, the majority (18) indicated that “no”, they do not ask at what age the female swimmer started menstruating. Of the 20 coaches that said that they ask if their
swimmers have started menstruating, eight of the coaches were male and 12 were female, and of the 12 coaches that said that they ask at what age the swimmer started menstruating, four were male coaches and eight were female coaches.

![Figure 4.23 Coaches' awareness of when their swimmers are menstruating.](image)

As per the results in Figure 4.23 (n=31), the majority (87%) of the coaches indicated that “yes”, they are aware of when the swimmers are menstruating while 13% indicated that “no” they are not aware of when their swimmers are menstruating. When asked how they were aware of this information, 14 coaches said that the athlete told them, five said that a parent of the swimmer told them, and five coaches said they asked the swimmer. Furthermore, four coaches said it was because the swimmer missed training, two coaches said that the female coach informs them, one said due to physical symptoms (cramping, lower back pain etc), and another one said that there is a code shared with the swimmers that they use when they are menstruating.

![Figure 4.24 Percentage of coaches whose swimmers have complained about PMS.](image)

**Figure 4.24 Percentage of coaches whose swimmers have complained about PMS.**
As indicated by Figure 4.24 (n=31), the majority of the coaches (65%) indicated “yes”, their swimmers complain of PMS while 32% percent indicated “no”, their swimmers do not complain of PMS, and one coach did not give an answer.

![Figure 4.25 Percentage of coaches whose swimmers’ parents speak to them about menstrual-related issues.](image)

Do any of the parents of the swimmers talk to you about menstrual related issues?

<table>
<thead>
<tr>
<th>Choice</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>74%</td>
</tr>
<tr>
<td>No</td>
<td>23%</td>
</tr>
<tr>
<td>Missing</td>
<td>3%</td>
</tr>
</tbody>
</table>

Figure 4.25 Percentage of coaches whose swimmers’ parents speak to them about menstrual-related issues.

As seen in Figure 4.25 (n=31), 74% of the coaches said “yes”, they have parents of the swimmers that speak to them about menstrual cycle related issues, while 23% indicated “no”, they do not, and 3% who did not answer the question.

4.5.4 Swimmers’ Qualitative Results

The third category of the swimmers focus group discussions relates to research question three, namely the athlete and the coach’s relationship. In exploring the relationship between the swimmers and the coach, most of the girls admitted that they would not tell him when they are menstruating, while all the girls had the same male coach. This answer concurs with Armour, Parry, Steel, & Smith (2020), who found that most athletes did not discuss menstruation with their coaches. A reason mentioned by one of the swimmers involved their coach's gender, which when telling him she would feel awkward and that she is of the opinion that he would make it awkward.

Contradicting the previous swimmer’s viewpoint, one girl said she would tell her coach because it was once expected by the coach as well as the fact that she views him as a father figure in her life. Although, most of the girls admitted to not telling their coach about their menstruation, they did allude to reacting in certain ways such as just staring at their coach.
(alluding to glaring at the coach in a facetious way) and complaining more during the set (not about menstruation but about the set and what they have to do). While indicating that she will not tell her coach, one swimmer alluded to feeling like crying when she was on her period and the set was hard.

4.5.5 Coaches Qualitative Results

Table 4.6 shows the overview of the six categories covered in the one-on-one interviews with the coaches. Category one to four relate to research question three as these four themes cover the communication between the swimmers, coaches, and parents as perceived by the coach.

Regarding the coaches’ awareness of the athlete’s menstruation, the majority of the coaches said that they are aware of when their athletes are menstruating. This concurs with Johnson (2008) who found that 73% of coaches were aware of whether one or more of their swimmers were menstruating. One coach admitted to being aware most of the time, but explained that new girls usually do not say anything because they are embarrassed: “Especially the new girls. They don’t always tell you because they still shy.” (C2) while another coach credited her years of experience for her being able to see the signs: “Very much so. I think after 36 years you get to see the signs hey.” (C6)

The parent-coach relationship refers to whether the parent approaches the coach and speaks to the coach about their daughter's menstruation. When asked if the parents of the swimmers speak to the coaches regarding their daughters' menstruation or menstrual-related issues, mixed reviews from the coaches were received. Two coaches said that sometimes the parents spoke to them with one coach elaborating that information given is minimal. Two coaches agreed that it was not really around the menstrual cycle, but parents would speak to them when it came to the initial stages of their daughters' menstruation. One coach admitted that parents do not usually speak about their daughter’s menstruation or menstrual cycle. One coach said that the parents do not speak to him while another coach said that they do, but then highlighted that she starts approaching parents when she believes that the swimmer is close to reaching menarche, based on the swimmers age. Although, reviews were mixed, Johnson (2008) found that only 5.4% of parents informed coaches, highlighting that most parents do not tell the coach about their daughters' menstruation or menstrual-related issues.

On the topic of whether the swimmers speak to the coach about their own menstruation, the majority of the coaches (n=4) said yes, which is in agreement with Johnson (2008) who found
that 61.9% of the coaches reported that their athletes told them. One of them highlighted that the only information the swimmers give is when they are menstruating. Two coaches, both male, agreed that the swimmers sometimes spoke to them about their menstruation, however, one admitted that it was very seldom and the other highlighted that he believes that although he encourages the swimmers to speak openly to him, it is not always easy to speak to a male coach about menstruation.

Once coaches gave an account of whether swimmers spoke to them regarding menstruation or not, the coaches were requested to elaborate on their response to the swimmer. The majority of the coaches (n=4) said that they were supportive and understanding of the swimmer, with two coaches highlighting that they adjust swimming sets if needed. One coach said that he refers his swimmers to a gynaecologist if needed. One coach said that she approaches it in such a way that it cannot become a mental block for the swimmers, so she highlights from the beginning that menstruation is normal and a part of life, while another female coach educates her swimmers around menarche and encourages that they wear a dark costume and use a dark towel at the swimming pool.

Regarding the coach-swimmer relationship, this theme looked at whether coaches ask the swimmers questions related to menstruation, such as if they are menstruating, rather than the swimmer approaching the coach. Five of the six coaches said no, explaining that they left it up to the swimmer to approach them. Johnson (2008) also found that most coaches did not ask their swimmers. One coach that answered “no” did, however, explain that if the swimmer is complaining about signs and symptoms like cramping, she will ask certain questions: “Have you eaten?” or “Are you hydrated?” or “Is it that time of the month?” (C4).

Another coach who answered “no” described that when the swimmers are reaching menarche, an outside source, usually the parent(s) approach the coach and from there the coach will have a group discussion with his female swimmers explaining why it is important that he be made aware of when they are menstruating. The one coach who answered “sometimes” said that if she witnesses that they experience signs and symptoms like being tired often, she will approach the subject with the swimmer, however, she explained that she takes it slow with the new girls.
Table 4.6 Overview of the categories, codes, and subcodes of the one-on-one coaches’ interviews.

<table>
<thead>
<tr>
<th>Category</th>
<th>Code</th>
<th>Sub code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coaches awareness of swimmers’ menstruation</td>
<td>Aware</td>
<td>Yes, no, mostly</td>
</tr>
<tr>
<td></td>
<td>New girls</td>
<td>No, embarrassed</td>
</tr>
<tr>
<td></td>
<td>Disclosure</td>
<td>Athlete</td>
</tr>
<tr>
<td></td>
<td>Experience</td>
<td>Signs</td>
</tr>
<tr>
<td>Parent-coach relationship</td>
<td>Daughters menstruation</td>
<td>Yes, no, sometimes</td>
</tr>
<tr>
<td></td>
<td>Information</td>
<td>Minimal</td>
</tr>
<tr>
<td></td>
<td>Menarche</td>
<td>Mostly</td>
</tr>
<tr>
<td></td>
<td>Signs &amp; Symptoms</td>
<td>Heavy periods, sometimes, no</td>
</tr>
<tr>
<td></td>
<td>Few</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Kids</td>
<td>Speak</td>
</tr>
<tr>
<td>Swimmer-coach relationship</td>
<td>Disclosure</td>
<td>Sometimes</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>Male coach</td>
</tr>
<tr>
<td></td>
<td>Response</td>
<td>Supportive, understanding, adjust expectations, question, advise, mental block, normal, menarche, dark towel</td>
</tr>
<tr>
<td>Accommodate swimmer in training</td>
<td>Adjust training</td>
<td>Cope, stop</td>
</tr>
<tr>
<td></td>
<td>Sign &amp; Symptoms</td>
<td>Heavy periods, cramping, tired</td>
</tr>
<tr>
<td></td>
<td>Diving</td>
<td>Embarrassed, stay in</td>
</tr>
<tr>
<td></td>
<td>Menstruating stage</td>
<td>First day, premenstrual</td>
</tr>
<tr>
<td></td>
<td>Swimmers choice</td>
<td>Training, climb out</td>
</tr>
<tr>
<td></td>
<td>Question</td>
<td>Assumption</td>
</tr>
<tr>
<td></td>
<td>Attention</td>
<td>Different</td>
</tr>
<tr>
<td></td>
<td>Exceptions</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Exclusions</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Menstruation</td>
<td>Normal</td>
</tr>
<tr>
<td>Coach – swimmer relationship</td>
<td>Question</td>
<td>No, sometimes</td>
</tr>
<tr>
<td></td>
<td>Signs and symptoms</td>
<td>Tired, cramping, headaches</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>Open relationship, not shy, question, new girls</td>
</tr>
<tr>
<td></td>
<td>Outside source</td>
<td>Parents, Menarche</td>
</tr>
<tr>
<td></td>
<td>Group discussion</td>
<td>Girls</td>
</tr>
<tr>
<td></td>
<td>Knowledge</td>
<td>Menstruation</td>
</tr>
<tr>
<td></td>
<td>Questions</td>
<td>Eaten hydration, menstruation</td>
</tr>
<tr>
<td></td>
<td>Swimmers responsibility</td>
<td>Speak to coach, bring it up</td>
</tr>
<tr>
<td>Female specific periodised guideline</td>
<td>Yes</td>
<td>Important, interesting, helpful</td>
</tr>
<tr>
<td></td>
<td>Information</td>
<td>Minimal</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>Male coaches</td>
</tr>
<tr>
<td></td>
<td>Knowledge</td>
<td>Research papers, numbers, facts, physiological effects, hinder performance</td>
</tr>
<tr>
<td></td>
<td>Difference of opinion</td>
<td>Other coaches</td>
</tr>
<tr>
<td></td>
<td>Personal opinion</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>Menstrual cycle</td>
<td>Pharmaceutical, performance, cope</td>
</tr>
<tr>
<td></td>
<td>manipulation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coach better</td>
<td>Knowledge</td>
</tr>
<tr>
<td></td>
<td>Undecided</td>
<td>Not always with her swimmers, coach</td>
</tr>
<tr>
<td></td>
<td>Work</td>
<td>How</td>
</tr>
</tbody>
</table>
4.6 Results of Research Question Four:

Were any adjustments made to the training program by the coaches for the swimmers during times of extreme discomfort or fatigue due to menstruation?

This section gives the quantitative and qualitative results that represent the answers for research question four.

4.6.1 Swimmers Quantitative Results

![Figure 4.26](image1)

**Figure 4.26** Number of coaches who, if aware, accommodate the swimmer during her menstruation as perceived by the swimmer.

When asked if their coaches accommodate them in training, three of the five girls, whose coach is aware, are accommodated by their coach when menstruating, whereas two of the five are not. In answering how coaches accommodate them (Figure 4.27), one swimmer indicated that her coach is more patient or sympathetic when she is menstruating and two of the swimmers’ coaches ease training for the swimmer when she is menstruating.

![Figure 4.27](image2)

**Figure 4.27** Number of adolescent female swimmers' perception of how their coach accommodates them in training based on the swimmers from Figure 4.26 that said their coach accommodates them.
4.6.2 Parents Quantitative Results

![Bar chart showing number of parents accommodated](image)

Figure 4.28 Number of parents on whether the coach accommodates their daughter if made aware of her mood changes and/or PMS.

Although, not answered by all parents, as seen in Figure 4.28, six parents answered either “yes” or sometimes said that their daughters’ coach does accommodate their daughter’s mood change and/or PMS.

4.6.3 Coaches Quantitative Results

Table 4.7 Whether coaches have had swimmers that asked to withdraw from training or competitions due to menstrual-related issues and then whether the coach lets the swimmer withdraw.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Number of coaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have any swimmers that you coach asked to withdraw from training or competition?</td>
<td>Yes</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>4</td>
</tr>
<tr>
<td>Does the coach allow them to withdraw?</td>
<td>Yes</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Sometimes</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 4.7 shows that 97% of the coaches have had swimmers who requested to withdraw from training or competition due to menstrual-related issues. Of the twenty-seven coaches, majority (22) said they do allow the swimmer to withdraw, while one said sometimes, and only four coaches said no they do not allow them to withdraw.
Figure 4.29 Percentage of coaches that believe whether the menstrual cycle has the potential to influence sport performance.

As seen in Figure 4.29 (n=31), the majority (97%) of the coaches indicated “yes” they believe that menstruation does have the potential to influence sport performance, while one coach indicated “no” they do not believe that the menstrual cycle has an influence on sport performance. When asked how they believed it affects performance, 44 responses were received. Of the 44 responses, 32 of them alluded to negative effects such as poor performance, negative attitudes, bad cramping, and fatigue, while 9 responses mentioned what the actual effects of the menstrual cycle are on the female body and did not compare that to sport performance, like PMS symptoms and fluctuating hormones. One coach alluded to a positive effect being more energy, while two coaches mentioned that the menstrual cycle could either make performance worse or better.

Figure 4.30 Percentage of coaches that change expectations of their female swimmers if they know that the swimmer is menstruating or suffering from PMS.
As indicated in Figure 4.30 (n=31), 71% of the coaches indicated “yes” they do change their expectations, whereas 26% indicated “no” they do not, and 3% gave no response. Of the coaches that said that they change their expectation of the swimmer, the majority changes the training expectation while some alluded to emotionally supporting the swimmer by being more sympathetic.

![Figure 4.31 Percentage of coaches who adjust the swimmers training set if the swimmer complains about menstrual-related issues.](chart)

As seen in Figure 4.31 (n=31), 58% of the coaches indicated “yes” they do adjust the training sets, while 36% indicated “no” they do not adjust training sets if the swimmer complains about menstrual-related issues, and 3% indicated “sometimes”. One coach provided no response. Of the coaches who said that they adjust training sets, the majority said they adjust the set by decreasing the intensity, while two coaches say they stop the session, and one coach allows the swimmer to climb out when needed.

### 4.6.4 Coaches Qualitative Results

When asked whether coaches adjust the swimming training sets if they know that the swimmer is menstruating, most of the coaches said that they adjust the sets if the swimmer experiences bad signs and symptoms: “If they experience heavy periods, like they will feel tired or so on, so I just would say take it slow. If they cannot continue, they must tell me. If they really bad, they can climb out.” (C2); “Depending on the pain level because I had some girls where the pain level was really high. Where they’d come to training and I could see I can’t get anything out of them so I’ll just let them do a couple of laps and maybe do some land training if they wish.” (C3); “I have always said though, if they don’t feel well during a set, they just say ‘I’m not well, do you mind if I get out?’” (C6).
Three coaches mentioned stopping the training session if the swimmer is not coping: “If they not coping with the training set, I’ll allow them to actually stop training.” (C1), with one of those coaches highlighting that he leaves it up to the swimmer to decide if they can continue or not: “A female swimmer would say to me that they are suffering very badly from pain. I suppose that’s when they are premenstrual. Then you know I leave it up to them to decide whether they can train or not train.” (C5). Another suggested that when the swimmers are menstruating, they usually do not want to dive, so she allows them to stay in the water rather than doing a diving start. Johnson (2008) found that 0.8% of the coaches sent the athlete home, while 6.9% of the coaches encouraged the athlete to continue training. One coach specifically said that he gives a lighter session depending on the signs and symptoms. If they are severe, he shortens the session or gives the swimmer land training to do: “Depending on the pain level because I had some girls where the pain level was really high, where they’d come to training and I could see I can’t get anything out of them, so I’ll just let them do a couple of laps and maybe do some land training if they wish.” (C3).

One of the female coaches blatantly said no, she does not adjust sets, concurring with Johnson (2008). While another said she avoids drawing attention to the swimmer explaining that it is normal and therefore no exceptions or excuses are accepted, however if the swimmer is experiencing menstrual or premenstrual signs and symptoms, she may ask to be excused using the phrase: “I don’t feel well,” and may then climb out. (C6)

Regarding a female-specific periodised guideline, most of the coaches said that they would be interested in one. Reasons varied from, it would be interesting: “Ja (Afrikaans for yes), that would be interesting.” (C2); helpful: “Ja (Afrikaans for yes). If there’s anything that’s going to help me coach them better, then I’ll definitely be interested.” (C5); and important: “Yes, I think it’s important.” (C1); and wanting the knowledge for research purposes to know the numbers and statistics, and whether or not there is an actual physiological effect during menstruation that hinders performance: “Yes. For research purposes I suppose. I mean, you know, is there any physiological evidence to suggest that it does have an impact on peak performance? I would like to know the numbers. I would like to know the stats. I’d like to know the facts.” (C4). One of the male coaches specifically highlighted that there is not enough information for male coaches on what to do when a female is menstruating: “Yes. Definitely. I don’t think there’s enough information out there, especially for male coaches on what to do when a female is menstruating.” (C3). On the other hand, one of the female coaches said to be undecided due
to her not always being with her swimmers and having to involve other coaches in the process: “You know, it’s difficult to say that because I run two different gyms so I’m not always there. So, it means that it would now envelop other coaches to have to do that as well, so I don’t know how well that would work.” (C6).

Kroshus, Sherman, Thompson, Sossin, and Austin (2014) found that few coaches had policies in place to deal with disordered eating, stress fractures, or menstrual irregularity, and in agreement found that the majority of coaches would be interested in such a policy, with 72.9% being specifically interested in a policy for dealing with menstrual irregularity in female athletes.

4.7 Chapter Summary

Adolescent female swimmers and coaches alike seem to be aware of the signs and symptoms that accompany the menstrual cycle. Although, the adolescent female swimmers were able to answer all the questions about their menstrual health, some have experienced irregular or infrequent periods. Coaches were aware of the effects of overtraining on female swimmers, and the signs that accompany overtraining, however, their awareness of their female swimmers’ menstrual cycles were based more on observation than direct communication from the swimmer or parent. Although, most coaches said that they do ask their swimmers about their menstrual cycle or menstrual-related issues, mixed reviews were received from the interviewed coaches, the parents, and the swimmers who all said that the coaches do not ask their swimmers about menstruation. Regarding accommodating the swimmers, the majority of the coaches, if aware, accommodated the swimmer by being more understanding. Coaches explained that they do adjust sets, but whether this is being done correctly or at the right times during the menstrual cycle requires more research. Lastly, regarding the interest in a female-specific guideline, most of the interviewed coaches were interested. Chapter 5 will elaborate on the results through discussions and comparisons with literature
CHAPTER 5

DISCUSSION OF RESULTS

5.1 Introduction

In this chapter, the results of the quantitative and qualitative data, from Chapter 4, are integrated and discussed to answer the research questions mentioned in Chapter 1. Furthermore, the findings will be compared to the literature.

5.2 Discussion of Research Question One:

Were young females (12 to 18 years in age) aware of their menstrual health and did they believe that there are emotional and physical changes that occur throughout their menstrual cycle?

When swimmers were asked at what age they reached menarche, the mean age was 13, with a minimum age of 11, and a maximum age of 16, as seen in Table 4.1 in Chapter 4. Most of the girls in the study started menstruating at 12 years old, which is considered within the norm and concurs with Yermachenko and Dvornyk (2014), He, Kraft, and Chasman et al., (2010) and Lee, Kim, Oh, Lee, and Park (2016) who found that the average age of menarche was 12 to 14 years. However, the research has found that females are starting their periods earlier each decade, which is concerning due to the chance of increased Body Mass Index (BMI) and obesity in adulthood (Said-Mohamed, Prioreschi, & Nyati et al., 2018; Ahn et al., 2013).

Although only three girls in this study started menarche younger than 12 years of age, and five after the age of 14 years, the swimmers and coaches should be aware of this to increase preventative measures for future problems that may arise due to starting at a younger or older age than considered the norm. As mentioned, early onset of menstruation increases the chance of a larger BMI or chance of adult obesity, whereas a late onset of menarche (older than 15 years) may cause infertility or increased difficulty in falling pregnant in adulthood (Guldbrandsen et al., 2014). Although, the effects of early and late onset of menarche are only seen in adulthood, it is important for young females to be aware of the effects and for coaches to understand the role that sport may play and how their knowledge of their female swimmers’ biology and physiology may set their swimmers up to have healthier lives while training and

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1 Table 4.1 see page 41.
when they stop training. After determining the age at menarche, the swimmers were asked to
say whether or not they had ever experienced infrequent or irregular periods.

As seen in Table 4.2 in Chapter 4, most of the girls said that they do not experience irregular
or infrequent periods while three admitted to being unsure. When asked how frequently they
experience their periods, most of the girls answered every 21 to 35 (Figure 4.4) days, which
shows that the girls are aware of their menstrual patterns and what is considered irregular or
infrequent. More than half the swimmers mentioned missing their period for more than 32 days.
Although, the girls in this study mostly reported having what is considered normal menstrual
cycles, as shown in Figure 4.9, more than 50% reported that they have at one point or another
experienced irregular or infrequent periods, which may be considered normal if it is not
prolonged or consistent. As females, it is important to understand what is considered normal
and healthy around the menstrual cycle and although the majority of the swimmers within this
study fall within that norm, when it comes to athletes, individualism is essential. After
answering questions around menstrual health, a deeper look at Premenstrual Syndrome (PMS)
signs and symptoms among the swimmers were investigated.

When asked about the pain and cramping accompanying their menstrual cycle, most of the
swimmers responded slightly, as seen in Figure 4.5 in Chapter 4. Only 16% of the girls
experience a great deal of cramping and 32% do not experience cramping at all. These
sentiments were shared with the girls who took part in the focus group discussions, who
mentioned more psychological and emotional effects than physical effects. One girl admitted
that cramping was that of outside opinions, but personally she does not experience cramping.
This is in agreement with findings from Steiner, Peer, Pavlova, Freeman, Macdougall, and
Soares (2011), who found that 21.3% of adolescent girls in a study of 578 participants
experienced severe PMS symptoms and the majority, 70.4%, experienced few or no PMS
symptoms, whereas Nixon, Hendricks, Zondi, & Ashworth, 2020 suggested that up to 80% of
females experience PMS symptoms. As seen in Figure 4.6, 24% function less efficiently at
sport, 16% continued training, but decreased the training load, 12% reduced their level of
physical activity, and 4% missed training during their periods, but 80% of the girls said that

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2 Table 4.2 see page 41
3 Figure 4.4 see page 42
4 Figure 4.9 see page 44
5 Figure 4.5 see page 42
6 Figure 4.6 see page 42
they continue life with little change, indicating that menstruation does not affect the swimmers to the point where they cannot continue with their normal routines. The swimmers believe that vigorous activity affects their menstruation and that menstruation affects physical activity. As highlighted in Figure 4.8, swimmers believe that vigorous activity shortens the duration of their period, makes their menstrual flow lighter, eases the pain of cramping, and that they menstruate less often. Although most of the girls gave what is considered a positive effect, when asked about the effects of menstruation on training, most of the responses are negative alluding to menstruation making swimmers feel fatigued, heavy, and slow during training sessions. Whilst having a lighter flow and fewer periods may seem positive, these may be an indication of too little energy intake for exercise undertaken, or an indication that there is a hormonal imbalance that should be addressed (Miller, 2017). Comrades runner, Ann Ashworth, during a 2020 webinar hosted by Coach Parry, shared her experience regarding the thinking behind a female athlete losing her period when training and from her experience, ‘when a female athlete loses her period it is seen as a badge of honour and almost used as a tool to gauge whether the athlete is training hard enough or not’ (Nixon, Hendricks, Zondi, & Ashworth, 2020).

This way of thinking needs to be a forewarning to female athletes, coaches, and parents, as it allows our athletes to step into an unhealthy state because healthy female athletes menstruate regularly. When a female athlete loses her period, it is a sign that she may be experiencing Relative Energy Deficiency in Sport (RED-S), which is caused by one of two factors, either the athlete is not taking in enough calories (energy), usually due to a restrictive diet to achieve weight loss to be light and lean, or the athlete’s training volume and intensity has increased substantially and they have not substituted with an increase in calories to fuel the extra energy needed for training (Mountjoy, Sundgot-Borgen, Burke et al., 2014). This is concerning for all athletes, although male and female athletes alike can experience RED-S, females are the only ones that experience it due to a loss of period. When female athletes start to experience lighter and then no periods for a prolonged period of time, they should seek medical advice and be open to the idea that they may be experiencing RED-S. Relative Energy Deficiency in Sport is considered unhealthy and can be a sign of overtraining. Many other symptoms may accompany the loss of menstruation in RED-S, such as increased susceptibility to injuries (specifically stress fractures), decreased bone health, decreased metabolism, decreased cardiovascular

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7 Figure 4.8 see page 44.
function, and an increased psychological stress, which all affect an athlete’s performance negatively as they will not be able to reach a peak state of performance no matter how hard they train and will often experience the opposite (Mountjoy, Sundgot-Borgen, Burke et al., 2014).

Furthermore, changes in the endocrine system need to be considered when an athlete is experiencing RED-S as levels of certain hormones will increase or decrease in response to the lack of available energy, which may cause other complications. The following hormone levels increase in female athletes experiencing RED-S: Progesterone (Lagawski & Kapczuk, 2016), Ghrelin (Scheid, De Souza, Leidy, & Williams, 2011), and Cortisol (Ackerman, Patel, Guereca, Pierce, Herzog, & Misra, 2013; Tornberg, Melin, Koivula, Johansson, Skouby, Faber, & Sjodin, 2017). An increase in these hormones can highlight certain signs and symptoms. Progesterone is responsible for getting the female body ready for pregnancy, therefore the increase in this hormone increases symptoms associated with PMS, which can set an athlete back physically and mentally, if experienced continuously (Lagawski & Kapczuk, 2016). Ghrelin is an appetite hormone that is responsible for making a person feel hungry and when levels are increased for prolonged periods of time, ghrelin can enhance adipogenesis (formation of fat cells) (Scheid, De Souza, Leidy, & Williams, 2011). Cortisol, which is known as the stress hormone, increases when we are experiencing stress (it may be physical or psychological) and causes heart rate and blood pressure to increase. Small levels of cortisol increase is natural and has many benefits, however, too much cortisol experienced for a prolonged period of time is unhealthy and may have dangerous effects (Ackerman et al., 2013; Tornberg, Melin, Koivula, Johansson, Skouby, Faber, & Sjodin, 2017). With an increase in certain hormones, comes a decrease in others. When experiencing RED-S, the following hormones decrease in female athletes: Estradiol (Loucks & Thuma, 2003), Testosterone (Russell, Stark, Nayak, Miller, Herzog, Klibanski, & Misra, 2009), and Leptin (Estour, Germain, Diconne et al., 2010; Donoso, Munoz-Calvo, Barrios, Garrido, Hawkins, & Argente, 2010; and Corr, De Souza, Toombs, & Williams, 2011). Estradiol is an important sex hormone responsible for regulating the female menstrual cycle that can produce severe effects if levels decrease. Decreased levels of Estradiol can affect everything from bone health to emotional wellbeing. Symptoms of low oestrogen levels include, but are not limited to, irregular periods, infertility, weak bones, weight gain, and depression (Cobb, 2018). Although, Testosterone is often associated with men, the female body does produce some levels of testosterone naturally and low levels of testosterone in females can cause certain health and sex issues. Low
testosterone levels can lead to, but is not limited to, a lack of muscle tissue, depression, obesity, osteoporosis, low memory, and heart disease (Turner, 2011). Leptin, like Ghrelin, is a hormone responsible for appetite control, but unlike Ghrelin, Leptin leaves someone feeling full. Leptin is released from fat cells and regulates food intake and energy expenditure. High and low levels of Leptin lead to their own symptoms and side effects. A low level of Leptin tricks the body into believing that it has no fat and therefore uncontrolled hunger and food intake is often experienced. This may lead to childhood obesity or delayed onset of puberty.

5.3 Discussion of Research Question Two:

Did swimming coaches believe that there are emotional and physical effects that accompany pre-menstruation or menstruation in young female adolescent swimmers, and were they aware of the effects of overtraining female swimmers?

Overtraining and RED-S has been discussed under the previous research question as it directly affects the athlete’s physiology. However, coaches’ awareness about menstruation, the symptoms that accompany the menstrual cycle, and overtraining is important to consider. Coaches, male and female, are directly responsible for the training sessions that the athletes take part in. Therefore, coaches should be aware, and have a certain amount of knowledge, of the effects of overtraining on the female body and psychology, and how to identify these signs and symptoms. Although, overtraining is difficult to diagnose, an early warning sign can be the loss of the menstrual cycle and overuse injuries (Carfagno & Hendrix, 2014). By tracking the menstrual cycle and being aware of overuse injuries, coaches could pick up on early signs of overtraining. Menstrual tracking gives the coach the tool to pick up if a swimmer is missing periods and therefore start questioning why, and then put preventative measures in place to ensure that the athlete’s energy is not depleted to the point of experiencing RED-S (Rauh, Barrack, & Nichols, 2014).

A total of 21 overuse injuries had been reported by the 25 swimmers, as seen in Figure 4.10. More than half of the swimmers have experienced a rotator cuff injury, which is an overuse injury affecting the shoulder. This concurs with Kruger, Dressler, and Botha (2012) who found, that 62.4% of master’s swimmers in South Africa reported experiencing shoulder pain. Studies by Tate, Turner, Knab, Jorgensen, Strittmatter, and Michener (2012) and Toros, Schmidtka-

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8 Figure 4.10 see page 47.
Varnagy, Szendro, Lehel, and Mayer (2020) found that less than 50%, 20.6%, and 30%, respectively, of swimmers suffer from shoulder pain, which opposes the findings of Kruger, Dressler, and Botha (2012) and this current study. A study by Busse (2018), however, also found that more than 50% (58.6%) of 15 to 20 year old Swedish swimmers reported experiencing shoulder pain. Three swimmers have experienced stress fractures, which is a common sign of RED-S and overtraining. Although only 12% of these swimmers have experienced stress fractures, it is an indication that some of these swimmers may have previously been overtrained.

In this study, almost 75% of the coaches who completed the questionnaire were aware that menstruation may stop due to overtraining (as seen in Figure 4.14). Johnson (2008) found similar results in a study done with 207 coaches in the state of Florida (United States of America), with 75% of her respondents selecting that menstruation may stop. Although, the remaining quarter of this study's coaches are not aware that excessive exercise and weight loss can cause menstruation to stop, it highlights the need that some coaches be educated around menstruation and overtraining, and why monitoring the menstrual cycle may be seen as beneficial.

Most of the coaches in this study were also able to identify symptoms that may accompany pre-menstruation or menstruation, with most coaches acknowledging the physical and mental symptoms as seen in Figure 4.11 and 4.12, respectively. However, all coaches (n=31) selected the physical symptom of abdominal pain, which opposes what the swimmers said, as most of the swimmers’ symptoms were psychological. Cramping mostly did not affect the swimmer, or only slightly affected the swimmer, as depicted in Figure 4.5 and discussed during the focus group discussions. This indicates that coaches are not aware of how their swimmers are personally feeling and what other symptoms may be surpassing cramping or abdominal pain. Research by De Haan and Sotiriadou (2019) found that coaches differ their practices according to the athlete’s gender and are determined by the socio-cultural background of the coach. This could be a factor as to why coaches presume that cramping is the most common symptom, which hinders female athletes, of premenstrual syndrome. In their research, De Haan

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9 Figure 4.14 see page 50.
10 Figure 4.11 see page 48.
11 Figure 4.12 see page 49.
and Knoppers (2020) further question whether coaches are sufficiently prepared to respond on an individual basis to their athletes along the lines of gender.

Although, research by Ozbar, Kayapinar, Karacabey, and Ozmerdivenli (2017) and Tsampoukos, Peckham, James, and Nevill (2010) showed that menstruation does not significantly affect physical training performance, the opposing effects need to be considered. This includes the fact that if not monitored correctly, exercise can affect the intensity, duration, and symptoms of the menstrual cycle. Menstrual irregularity is higher in athletic females than in sedentary females, and the age of menarche is later for athletic females than it is for sedentary females (Lamina, Ezema, Ezugwu, Amaze, Nwankwo, & Ngozi, 2013). This concurs with the findings from Cho, Han, Shin, and Kim (2017) who found that 70% of female participants began having irregular menstrual periods when taking part in intensive exercise when they previously had regular menstrual cycles. If coaches are not willing to be open to the idea or understand that menstruation can have adverse effects on some female athletes, they are doing their athletes an injustice by not accommodating them or adjusting training sets rather labelling it as part of life and not an excuse. Not only does this suggest that an athlete who struggles with training due to menstruation is weak, it also discourages the athlete to speak about future menstrual issues that they may encounter while training. Coaches and athletes need to be aware that the role of the menstrual cycle is crucial in determining whether the athlete is healthy and can be an excellent way for coaches and athletes to determine if there are any red flags regarding training and eating habits.

5.4 Discussion of Research Question Three:

| Were coaches aware of their female swimmers’ menstruation, and did young female swimmers, swimming coaches, and/or the swimmers’ parents discuss anything related to menstruation? |

When exploring whether communication between the swimmers, coaches, and parents take place specifically around the topic of menstruation and menstrual-related issues, results were varying, reflecting different perceptions among the three groups. When coaches were asked about their awareness of their swimmers menstruating (Figure 4.23\textsuperscript{12}), the majority of them indicated that the athlete made them aware. However, according to the swimmers, the majority

\textsuperscript{12} Figure 4.23 see page 56.
highlighted that the coaches were not aware, as seen in Figure 4.15\textsuperscript{13}, and that the coach does not ask the swimmer about menstruation, or about menstrual-related issues as depicted in Figure 4.17\textsuperscript{14} and 4.18\textsuperscript{15}, respectively. The swimmers' perspectives are supported by what the parents answered to the question, “Do you make your daughter’s coach aware of her menstruation or menstrual-related issues?” that they do not make the coach aware (Figure 4.20\textsuperscript{16} and Figure 4.21\textsuperscript{17}) nor does the coach ask the parent about the daughter’s menstruation (Figure 4.22\textsuperscript{18}). The coaches' answers in the questionnaire highlighted an opposing opinion of the relationship, where it comes across as if the majority of coaches had an open discussion where they asked their swimmers whether they had started menstruating and at what age they had started. However, when interviewed, all (100%) of the coaches said they do not ask their swimmers about menstruation or menstrual-related issues and only speak about the topic if the swimmer approaches them about it. Johnson (2008) found that 0.7 to 1.5% of coaches asked their athletes about menstruation, therefore the data obtained from the one-on-one interviews more closely reflects the norm.

In addition to when the swimmer has started menstruating, when coaches were asked about their awareness if the swimmer has her period during training, the majority of the coaches said that they are aware of when their swimmers are menstruating and that the athletes supplied this information. As seen from the results, the opposite was reflected by the athletes. The same sentiment was shared about whether the parents spoke to the coaches about their daughters' menstruation. The majority of the coaches said that the parents speak to them about their daughters' menstruation or menstrual-related issues, whereas most of the parents said that they do not make the coach aware and that the coach does not ask. Male coaches do not often discuss menstruation and could benefit from improving communication with their female athletes (Bell & Rimmer, 2017).

As seen above, the communication amongst the swimmers, parents, and coaches is viewed differently by the swimmers and parents, and the coaches. While the coaches say that they are asking questions and communicating with the swimmers about menstruation or menstrual-

\textsuperscript{13} Figure 4.15 see page 51.
\textsuperscript{14} Figure 4.17 see page 51.
\textsuperscript{15} Figure 4.18 see page 52.
\textsuperscript{16} Figure 4.20 see page 53.
\textsuperscript{17} Figure 4.21 see page 54.
\textsuperscript{18} Figure 4.22 see page 54.
related issues, the parents and swimmers disagree with this sentiment. The coaches that were interviewed also highlighted that, although, they do not ask swimmers whether they are menstruating or not, they are aware of whether they have started menstruating due to observations, such as the swimmer complaining about headaches, cramping, or missing swimming. This implies that the awareness is based on assumption and not facts supplied by the swimmer or the swimmer’s parent. The difference in answers from the coaches who answered the questionnaires and those interviewed may be that when answering a questionnaire, there is more time to answer and could reflect what they think the researcher would want.

Although previously considered a taboo topic and often viewed as a weakness and excuse, swimmers, parents, and coaches need to understand the importance of menstrual awareness. There needs to be a clear understanding between swimmers and coaches that menstruation does not mean weakness or even that the periodised plan needs to change. It is, however, an opportunity for the coach to track whether they are training their athletes correctly or not, and additionally to optimise training for the individual. The research is inconclusive and there are mixed reviews regarding the menstrual phases and performance (Oosthuysen & Bosch, 2010; Ozbar, Kayapinar, Karacabey, & Ozmerdivenli, 2017; Martin et al., 2018). Most females, whether athletes or not, experience signs and symptoms of PMS, which can hamper the athlete’s performance. These PMS symptoms, as highlighted by Ashworth, can make an athlete hesitant to train or that the athlete will not want to train (Nixon, Hendricks, Zondi, & Ashworth, 2020). This should not be seen by coaches or the community as a weakness but rather as an opportunity to move training sets around (still achieving the same periodisation), working the athlete harder when they are not experiencing PMS symptoms and using the days when the athlete experiences their PMS symptoms as an opportunity to work on technique or recovery. Not only will the athlete be more willing to train, but the approach will also be more inclusive and can be applied to athletes alike, giving the athlete a psychological edge because their training sessions are working with them rather than against them.

In a webinar hosted by Nixon, Hendrix, Zondi, and Ashworth (2020), Ashworth continually emphasised that everyone is different, and every female will experience their PMS symptoms at different times in their cycle and at different intensities. She explained that on her first day of menstruation, although she is bleeding, she feels invincible and that is often when she gives her personal best efforts and results, whereas Haley Nixon on the same webinar explained that
she experiences the opposite on the first day of her period (Nixon, Hendricks, Zondi, & Ashworth, 2020). This is an indication that each athlete should be treated as an individual and trained as an individual, especially in individual sports, such as swimming and running. Coaches, athletes, and parents need to speak openly about menstruation, its effects, how to deal with it, and most importantly whether the athlete experiences regular periods. As depicted by Kristiansen, Tomten, Hanstad, and Roberts (2012), coaches need knowledge about psychological, physiological, technical, and tactical skills, as well as that coaching context shapes the interaction between coaches and athletes. This places a joint responsibility on the three parties to ensure that the athlete is not being overtrained or is not undereating, ensuring that training does not become the cause of health issues or psychological issues in the future. By tracking the athlete’s menstrual cycle, the coach, athlete, and parent become more aware of the female physiology and can ensure that overtraining does not take place, and also gives the coach and the athlete an opportunity to work with the athlete’s menstrual cycle, rather than against it.

Speaking openly about the menstrual cycle should not be viewed as taboo, embarrassing, or used as an excuse to get out of training. Rather it should be viewed to increase knowledge, empowering both the coach and the athlete. By speaking openly, it allows coaches and athletes to avoid falling into the same traps, which include not tracking the menstrual cycle, and therefore not picking up on early signs of RED-S. This will help them avoid making the same mistakes with future female athletes, which in turn may encourage a lifelong participation in sport filtering down to younger generations, thus giving female athletes the edge that they need (Nixon, Hendricks, Zondi, & Ashworth, 2020). By speaking openly, assumptions about PMS symptoms experienced by athletes can be minimised, although cramping, headaches, and fatigue are examples of PMS symptoms, just because a female is experiencing these symptoms, it does not necessarily mean that they are being caused by the premenstrual or the menstrual phase. The symptoms could just as likely be an indication of dehydration, lack of food intake, or even anxiety due to school-related stress. Without assumption, the coach can cater more accurately to the athlete’s needs, making the process more inclusive and considering all aspects of training, not just the program and the competitions. By having a more inclusive and community approach towards menstruation, athletes can be nurtured for future success. Communication does not only give information, it encourages efforts, improves attitudes, and stimulates thinking. Without communication, stereotypes develop, and assumptions are made
causing messages to be distorted, which decreases the learning experience for the athlete, coach, and parent alike.

The role that coaches play and the impact that they have in and on their athletes’, lives should also be considered. Athletes are often attentive to what their coach says whether positive or negative, as highlighted by Ann Ashworth in The Female Athlete Webinar where she remembered her coach telling her that she needed to lean up (Nixon, Hendricks, Zondi, & Ashworth, 2020). In an article written by Barker (2019) highlighting an interview with a female athlete specialist doctor, the doctor highlighted that she often hears from athletes that more is better. This indicates that athletes are often placed under a lot of pressure to perform and will do so at any cost. Ashworth experienced unhealthy eating habits, which ultimately led to her experiencing RED-S as a result of what her coach had told her to do (Nixon, Hendricks, Zondi, & Ashworth, 2020). If handled correctly by the coach and substantiated with the correct research and knowledge, the situation experienced by Ashworth could have been avoided. She would have been set up for success and ultimate performance, rather than losing her period, experiencing severe fatigue, and experiencing a mental setback.

5.5 Discussion of Research Question Four:

Were any adjustments made to the training program by the coaches for the swimmers during times of extreme discomfort or fatigue due to menstruation?

When considering whether adaptations or adjustments were made by coaches to training sets based on the swimmer’s menstrual signs and symptoms, we need to consider whether coaches were aware of information regarding the swimmers’ menstrual cycle. As explored earlier, the awareness of coaches’ knowledge of their swimmers’ menstrual cycles received mixed reviews. While coaches claimed to be aware of the swimmer’s menstruation, the parents and swimmers said that coaches were not aware of this information. Further interrogation through the interviews revealed that coaches do not ask and are not told about swimmers’ menstrual cycles from either the swimmer or the parent. Rather, awareness around their swimmers’ menstruation is based on assumptions, such as the age of the swimmer or complaints of headaches, cramping, and fatigue. Although, these are all signs and symptoms of PMS, many other factors can induce the same signs and symptoms. With the age of menarche continuously shifting and based on many factors, coaches can no longer use age as a defining factor that a female has in fact reached puberty.
According to the swimmers, if the coach was aware of their menstruation (five girls reported that their coaches were aware), the majority (60%) of those coaches did in fact accommodate the swimmer, as depicted in Figure 4.26\textsuperscript{19}. It was, however, highlighted that accommodating the swimmer was not necessarily done by adjusting sets, but rather the coach being supportive and understanding of the swimmer’s circumstances.

The coaches who answered the questionnaire gave a different interpretation (Figure 4.31\textsuperscript{20}). Most alluded to accommodating the swimmer and adjusting sets by making sets shorter, less intense, or letting the swimmer climb out if they were not coping in the training session. This contradicts the findings of Johnson (2008), who had no coaches respond that they shorten sets or decrease the intensity. Only 0.8% of the coaches in Johnson’s (2008) study worked out a plan for the athlete to cope and 4.6% allowed the athlete to decide whether they could train or not, but about 40% of the coaches were understanding, supportive or empathetic.

If coaches are more aware of their swimmers’ menstrual cycles, they can periodise training and adapt sets in a way that would be beneficial to the performance of the swimmer. Stopping a set, decreasing the volume, or decreasing the intensity may not necessarily be the correct measure to put in place when a female swimmer is struggling with premenstrual or menstrual signs and symptoms. Although no significant effects on performance by the menstrual cycle have been recorded, studies (Sung, Han, Hinrichs, Vorgerd, Manchado & Platen, 2014; Oosthuyse & Bosch, 2010; Shaharudin, Ghosh, & Ismail, 2011; Pestana, Salvador, Pereira, Mostarda, Leite, Silva, & de Carvalho, 2017) have shown that it is beneficial to do strength training, endurance sets, or anaerobic sets at various phases within the menstrual cycle. Muscle strength and muscle diameter increased during the follicular phase-based strength training, more so than in luteal phase-based strength training, suggesting that strength training should be done during the follicular phase of the menstrual cycle (Sung, Han, Hinrichs, Vorgerd, Manchado & Platen, 2014). Whereas Oosthuyse and Bosch (2010) found that endurance performance increased and therefore should be trained in the mid-luteal phase of the menstrual cycle. Studies by Shaharudin, Ghosh, and Ismail (2011) and Pestana, Salvador, Pereira, Mostarda, Leite, Silva, and de Carvalho (2017) found that there is no difference in anaerobic performance between the luteal and follicular phase, however, the study in 2017 noted that maximum heart rate was significantly lower in anaerobic performance during the mid-follicular

\textsuperscript{19} Figure 4.26 see page 61.
\textsuperscript{20} Figure 4.31 see page 64.
phase. With that in mind coaches would have an upper hand if they planned their sets according to their female athletes’ menstrual cycle.

5.6 Conclusion

The adolescent female swimmers were able to answer all the questions about their menstrual cycles indicating that they are aware of their menstruation patterns. Although, most of the swimmers indicated that they had a regular cycle, more than half of the swimmers have experienced irregular or infrequent menstrual cycles at some point or another. Coaches indicated that they are aware of their swimmer’s menstrual cycles and that they gained this information from their athletes. However, swimmers held a different view as they clearly stated that they do not tell their coaches about their menstrual cycles. Parents, like the swimmers, also highlighted that they do not make their daughter’s coach aware of their daughter’s menstruation. The interviews revealed that the coaches’ knowledge of their swimmers menstruation is based on observational assumption (display of PMS symptoms) rather than the swimmer or parent telling the coach. Coaches are understanding and supportive when it comes to swimmers' menstrual cycles and claim to accommodate the swimmer by decreasing the volume and intensity of training sets with some coaches allowing swimmers to climb out. Although coaches are adjusting sets, whether they are doing it correctly and whether it is actually being done during the swimmer’s menstruation requires further research.
CHAPTER 6

SUMMARY AND CONCLUSION

6.1 Summary

The purpose of this study was to analyse the extent of knowledge that athletes, parents, and coaches have about menstruation and training, their perceptions of menstruation, and whether communication takes place between the three parties to ensure longevity of the athlete’s involvement in the sport.

In Chapter 1, the research problem was stated. Menstruation affects adolescent female swimmers and the knowledge of athletes, coaches, and parents about menstruation seems to be minimal. Chapter 2 examined the various literature including the theoretical framework of the study as well as the facts and perceptions about menstruation. It concluded that menstruation is seen as a taboo topic and that female athletes are only now starting to speak up about menstruation. Furthermore, the effects of menstruation on performance is inconclusive, with the research finding no significant effects. However, highly competitive female athletes have voiced that their period has negatively affected their performance.

Chapter 3 consisted of the study design, the different participants and how they were sampled, the different sets of data collection and the corresponding procedures, the data analysis, and ethical considerations. In Chapter 4, the results relating to the various research questions were presented. Although knowledge about menstruation was prevalent, communication among the athletes, coaches, and parents was lacking and received mixed reviews. Although coaches noted the signs and symptoms experienced by females before or during menstruation, sets were not always adjusted to suit the athlete’s needs.

Chapter 5 included the discussion of the results as they relate to each of the research questions. Young female swimmers were able to answer all the questions about their menstruation indicating that they are aware of their menstrual health, however, the swimmers who have, or who are, experiencing irregular or infrequent menstrual cycles should seek medical advice. All the swimmers alluded to experiencing physical or emotional changes throughout their menstrual cycle, with the majority highlighting emotional symptoms more than physical symptoms. Coaches were aware of the physical and emotional changes that occur during the menstrual cycle. Communication between coaches, parents, and swimmers received mixed
reviews, indicating that there is a gap in communication. Furthermore, the coaches’ awareness of their swimmers’ menstruations seemed to be based on assumption rather than information received from the parent or swimmer. Accommodating the swimmers and adjusting the sets again received different views from the swimmers and the coaches. The swimmers highlighted that the coaches were not aware of when they were menstruating and therefore could not adjust the set accordingly, whereas most of the coaches said that they do adjust sets to accommodate the swimmer during menstruation. The conclusion for each research objective will be provided below.

6.2 Conclusion

6.2.1 Research Objective One:

**To collect descriptive data regarding the perceived effects of the menstrual cycle from swimmers, parents, and coaches.**

Descriptive data was collected from swimmers, parents, and coaches in the form of quantitative and qualitative data. The swimmers’ perception on menstruation is that vigorous activity affects menstruation, and that menstruation affects training. Furthermore, coaches agreed with the swimmers that menstruation does affect training. Parents were not required to give their perceptions on menstruation and training but were rather requested to highlight if their daughter complains about PMS and if they notice any mood changes. Most of the parents said that their daughters complain about PMS and that there are mood changes associated with their menstruation.

6.2.2 Research Objective Two:

**To determine the level of awareness that young female swimmers and coaches have of the menstrual cycle, as well as the impact that this has on performance in training and competition.**

Athletes are aware of their menstrual cycles and what they are experiencing, however, most athletes have experienced irregular or infrequent menstrual cycles at some point or another. Coaches share the sentiments of awareness with the majority saying they are aware of when their athletes are menstruating; however, during deeper investigation, the coaches’ awareness is based on assumption and not fact. With the observation of certain factors being the indicator
for whether an athlete has reached menarche or is menstruating, coaches may in fact be accommodating the athlete incorrectly and adjusting sets for the wrong reasons. The effects of menstruation on performance in training and competition was not tested but was rather based on perception. Most of the swimmers and coaches believe that menstruation affects performance by making the swimmer feel heavy, slow, and more fatigued.

6.2.3 Research Objective Three:

**To determine the extent to which coaches understand the effects of the menstrual cycle on their young female swimmers.**

Coaches are aware of the physical and emotional effects of the menstrual cycle on their female swimmers. They were also able to identify the effects of overtraining on female athletes. Most of the coaches said that they adjust sets if their swimmer is experiencing PMS symptoms, but whether they are adjusting sets correctly cannot be determined without further research.

6.2.4 Research Objective Four:

**To adapt the findings into guidelines that could be used by the club, coaches, and parents to enhance the sporting experience of female athletes.**

Communication about the female athlete’s menstruation among coaches, athletes, and parents is crucial in an athlete’s development and performance within sport. In this study, the communication from coaches, athletes, and parents received mixed reviews. The coaches highlighted that they did communicate with their athletes about menstruation and/or menstrual-related issues, while the swimmers and the parents reflected differently, indicating that there is a gap in communication among the three parties. Although, previously seen as a taboo topic and something private in a female’s life, we need to understand that the coaches’ and athletes’ awareness and communication of menstruation is to benefit the athlete in two ways: 1) monitoring the health and wellness of the athlete as the loss of menstruation may be an early sign of RED-S, and 2) doing the correct training at the correct time within the menstrual cycle to maximise results.
Communication between the swimmer and the coach is essential for the efficacy of correct periodisation and training to maximise results. A guideline to assist with non-invasive open communication would include:

1. Having a blank monthly calendar in an online format (such as Google Docs) that is accessible to the coach, swimmer, and parent.

2. Educating the swimmers on how to track their menstrual cycles. It is as simple as marking the day their period starts and the day their period ends on the calendar.

3. Educating the coaches about the phases of the menstrual cycle according to what their swimmers have marked on the calendar.

4. Educating the coaches about the type of training that is most effective during each phase.

5. Explaining to the coach that they need to look for red flags, such as the absence of swimmer’s period for a prolonged period of time, or if the swimmer’s period is shorter each month.

6. Should the swimmer be willing, they can supply other information such as signs and symptoms.

The guideline proposed allows the coach to be aware of the swimmer’s menstrual cycle without the swimmer having to verbally tell the coach. In order to protect the swimmer’s privacy, consent for something like this would have to be given by the parent and assent by the swimmer. The document would also need to be password-protected to ensure that no one other than the three parties has access to the document.

6.3 Guidelines

Coaches, athletes, and parents should be aware of what is considered a normal and healthy menstrual cycle pattern. The only way this awareness is created is through education and communication. Coaches, parents, and athletes should be educated on the physiology of the female body, what is considered normal, and what should be considered as a red flag indicating that medical advice should be sought. Thereafter, menstrual tracking needs to be considered. We need to appreciate that an athlete may not want to tell their coach every time they are menstruating, and this has to be respected in order not to violate the athlete’s rights to privacy. However, an understanding between the athlete and coach needs to be determined in the event
that the athlete starts experiencing irregular, infrequent, or missed periods for a prolonged period of time, the athlete needs to disclose this information to their coach to avoid reaching RED-S. If an athlete is, however, willing to make her coach aware of her menstrual tracking and provide him/her with the information needed to determine the follicular and luteal phase of the menstrual cycle, the coach should use this information to periodise the training sets for this athlete according to that calendar.

A different set of guidelines dealing with education, periodisation, and RED-S that could be facilitated by a club and implemented by coaches, parents, and swimmers proposes:

1. Coaches are appropriately educated, through a lecture done by an expert in the field, about female physiology and the menstrual cycle.

2. Coaches, parents, and athletes have a group discussion, facilitated by the club, about what menstrual tracking is, the importance of menstrual tracking, and what information needs to be reported to the coach for the athlete’s benefit.

3. Coaches to periodise the athletes training around their menstrual cycle, this can be done by scheduling strength sessions during the follicular phase, endurance training should be done mid-luteal phase, and anaerobic (speed) training should be done mid-follicular phase.

4. Should symptoms of RED-S appear (missing period for more than three months as shown on the calendar mentioned below), the coach must approach the parent and the athlete and refer the athlete (with the parent present) to specialists, namely a dietician and/or gynaecologist.

The following recommendations can be implemented by coaches immediately to track menstrual cycles, periodise training sessions according to each individual menstrual cycle pattern, and to identify early symptoms of RED-S:

1. Create a Google document with a blank monthly calendar (Figure 6.1).

2. Have a step-by-step guide for your swimmers on how to use the calendar. This can be individualised per coach. An example of the steps that can be provided:

   ✓ When you start your period, highlight the day you started in green.
   ✓ When your period ends, highlight that day in red.
If you experience any unusual or severe signs and symptoms prior to, or during, your menstruation, list them on the day, in that day's “box”.

3. The coach needs to monitor this calendar and once they’ve picked up the swimmer’s menstrual cycle patterns, they need to create their training sets accordingly.

4. If the coach notices that a swimmer has not menstruated for several months, they need to approach the swimmer and parents, bearing in mind that it could be that the swimmer has forgotten to complete the document.

5. If the swimmer has, in fact, missed periods, the coach should recommend that they seek medical advice from a gynaecologist and a dietician (if they have lost a lot of weight and suffer from chronic fatigue).

<table>
<thead>
<tr>
<th>Month X</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2</td>
</tr>
<tr>
<td>8 9</td>
</tr>
<tr>
<td><strong>Severe stomach cramps</strong></td>
</tr>
<tr>
<td>15 16</td>
</tr>
<tr>
<td>22 23</td>
</tr>
<tr>
<td>29 30</td>
</tr>
</tbody>
</table>

Figure 6.1 Example of a calendar that can be used on Google docs.

The above, Figure 6.1, is an example of the calendar that coaches can create on Google documents, which the swimmer will highlight and fill in menstrual-related symptoms if needed. This example refers to step two mentioned above. It is essential that the coach receives consent and assent before sharing this with the swimmers.
Once the swimmer has completed the calendar for three to four months, the coach will be able to pick up on the swimmer’s normal menstrual pattern (this will be different for each swimmer), and should eventually be able to pinpoint when the swimmer’s next period will be. This will allow the coach to determine the swimmer’s menstrual phases prior to the time each month. The follicular phase starts on day one of the period and ends when ovulation starts. Ovulation is the shortest phase and takes place between day 11 and 14 (it lasts 24 hours and will fall on a different day for each female). The luteal phase starts at the end of ovulation and ends when the next period starts. Ovulation is the most difficult phase to determine as it is short and varies depending on the length of the individual's menstrual cycle. It generally occurs four days prior to, or after the midpoint of, the menstrual cycle. The coach would need to be aware of each individual's menstrual cycle pattern to determine menstrual phases as correctly as possible without requiring hormone tests. By knowing this, the coach can plan the training sets accordingly and schedule strength training during the follicular phase, endurance training during the mid-luteal phase, and anaerobic training during the mid-follicular phase.

As mentioned in Chapter 2, communication among athletes, parents, and coaches is essential. Within the swimming dynamic the swimming club can play an important role in bridging these gaps and in creating a culture that diminishes the taboo stereotype associated with menstruation. If the club dynamic educates, supports, and communicates about menstruation without any prejudice, it will instil trust and comfort in the swimmers to talk freely about menstruation, the effects they feel, and how it affects performance. The culture in clubs needs to move away from the view that menstruation is a weakness or excuse. Clubs should create a culture of working with the swimmer’s physiology by adapting the training to suit the menstrual phase instead of stopping training or competitions during menstruation. This approach will not only make female swimmers feel heard but will also encourage them to train regardless of their menstrual cycle and ensure lifelong participation in the sport. The club can achieve this by 1) educating the coaches and swimmers on the menstrual cycle by hosting a lecture presented by a professional in the field, 2) encouraging open communication starting with the online calendar process, and 3) checking in with their female athletes on a regular basis. The club can also facilitate a group discussion with parents, female athletes, and coaches on how to handle the menstrual cycle and the importance of communication. Included in this group discussion should be eating habits and the need for energy when you are training.
It is important for coaches to look beyond the here and now. Having an inclusive program and club dynamic, lifelong participation in the sport will not only include training but also the willingness for athletes to be involved in the sport in various different ways such as time-keeping (which is needed for competitions), officiating, or even teaching and coaching the sport themselves once they have moved away from competitive swimming. This will not only empower future female athletes but allow for equal opportunities within swimming.

6.4 Limitations

The following limitations appear due to the nature of the research:

1. Due to the number of participants, no results in this study can be generalised and all results are specific to the participants who took part in the study.

2. Online questionnaires minimise the number of people who have access to answering the questionnaire.

3. Covid-19 decreased the ability to interview people directly disallowing the researcher to pick up on body language.

4. Due to Covid-19, sport participation within South Africa has been limited, thus limiting the contact between coaches and athletes.

5. Due to the researcher’s acquaintance and professional relationship with the swimming club, there is potential bias in the way questions were asked, answered, and interpreted.

6. Many of the swimmers who answered the questionnaires may have been from the same swimming clubs, therefore only a handful of coaches may be represented by the swimmers and parents’ results.

7. Contraception use was not factored in, which has an influence on hormones and how the swimmer experiences her menstrual cycle.

6.5 Future Research

The recommendations for future research encompass the following:

1. Include a larger sample size of participants.

2. Investigate whether swimmers track their menstrual cycles.
3. Ask whether swimmers would be willing to share their tracking information with their coaches.

4. Include other factors that may cause the same symptoms as PMS. Determine how often swimmers struggle with PMS as compared with other issues such as school, home, or social anxiety, dehydration, and/or lack of eating.

5. Contraceptive use compared to non-contraceptive use and the pros and cons of each in sport.

6. Adapt training sets according to the swimmer’s menstrual cycle pattern, as mentioned in the recommendations, and record the results.
REFERENCES


APPENDIX A - Coaches Questionnaire

Department of Sport and Movement Studies

Questionnaire for Coaches (Adapted from Johnson, 2008)

*The menstrual cycle and female swimming performance: coaches’ perspective*

Gender: ___________

1. Tick all of the physical changes that you believe can occur to women pre and/or during menstruation:
   - Abdominal Pain
   - Migraine
   - Fluid Retention
   - Altered zinc and potassium levels
   - Other (Please specify): _______________________________________
   - Cramping
   - Diarrhoea
   - Weight gain
   - Aggravated asthma
   - Referred Pain

2. Tick all the areas that you believe can potentially be affected pre and/or during menstruation:
   - Cognition
   - Mood
   - Cravings
   - Other (Please specify):
   - Sleep
   - Aggression
   - Suicide
   - Accident Proneness

3. Tick all the symptoms that you believe may accompany PMS (Premenstrual Syndrome)
   - Irritability
   - Tension
   - Headache
   - Depression
   - Change in appetite
   - Constipation
   - Abdominal bloating
   - Anxiety
   - Cold Sweats
   - Dizziness
   - Nausea
   - Fatigue
4. Regarding the menstrual cycle, what may happen if a female athlete over trains:
   ___ Estrogen concentrations may become toxic
   ___ Progesterone concentrations may become toxic
   ___ Menstruation may stop
   ___ The anterior pituitary gland may shrink
   ___ Extreme weight loss
   ___ Chronic fatigue
   ___ Low testosterone levels
   ___ I am not sure

5. How many athletes do you know, for certain, have begun the menstrual cycles? _____
   How do you know this information? _______________________________________

6. Do you ask whether the swimmers have started menstruating or not? ___ YES
   ___ NO

7. Do you ask when the swimmer started (at what age) menstruating? ___ YES __ NO

8. Of the swimmers who have begun their menstrual cycles, do you know when any of
   them are menstruating?
   ___ YES
   ___ NO
   If yes, how do you know this information?
   ________________________________________________________________________

9. Do any of your swimmers ever complain of PMS? ___ YES ___ NO

10. Have any of the swimmers that you coach ever asked for permission to withdraw from
    training or competition because of menstrual cycle-related issues? ___ YES ___ NO
    
    If yes, do you allow the swimmer to withdraw? ___YES ___ N

11. Do you believe that the menstrual cycle has the potential to influence sport
    performance? ___YES ___ NO
    If yes, in what way(s)? ________________________________
12. Do any of the parents of the swimmers talk to you about menstrual cycle-related issues?  
   ___ YES  ___ NO

13. Do you change your expectations of the swimmer if you know she is menstruating or suffering from PMS?  ___YES ___NO  
   If yes, how do your expectations change?
   ___________________________________________________________________________

14. Do you adjust your training set for swimmers who are complaining of menstrual cycle-related issues? ___ YES ___ NO  
   If yes, explain how:
   ___________________________________________________________________________
DEPARTMENT OF Sport and Movement Studies

RESEARCH STUDY INFORMATION LETTER – COACHES QUESTIONNAIRE

11 April 2018

Good Day

My name is Nadine Marais and I would like to invite you to participate in a research study on the perceived effects of the menstrual cycle on female swimmers by coaches, parents and swimmers: a case study.

Before you decide on whether to participate, I would like to explain to you why the research is being done and what it will involve for you. I will go through the information letter with you and answer any questions you have. This should take about 10 to 20 minutes. The study is part of a research project being completed as a requirement for a Master’s Degree in Sport Science through the University of Johannesburg.

The purpose of this study is to determine whether the menstrual cycle has an effect on young competitive female swimmers, as well as examine the perceptions around the menstrual cycle by parents and coaches.

Below, I have compiled a set of questions and answers that I believe will assist you in understanding the relevant details of participation in this research study. Please read through these. If you have any further questions I will be happy to answer them for you.
DO I HAVE TO TAKE PART? No, you don’t have to. It is up to you to decide to participate in the study. I will describe the study and go through this information sheet. If you agree to take part, I will then ask you to sign a consent form.

WHAT EXACTLY WILL I BE EXPECTED TO DO IF I AGREE TO PARTICIPATE? As the participant you will be required to complete an online questionnaire. This questionnaire will examine the knowledge and understanding that swimming coaches have regarding their young female swimmers’ (aged 12 – 16 years) menstruation cycle and whether they believe this may affect their swimmers’ performances. Participation is once off and will take a few minutes.

WHAT WILL HAPPEN IF I WANT TO WITHDRAW FROM THE STUDY? If you decide to participate, you are free to withdraw your consent at any time before submitting the completed questionnaire without giving a reason and without any consequences. Due to the anonymity of the questionnaire, withdrawal cannot take place after the submission of a completed questionnaire as there is no way to determine which questionnaire belongs to which person. If you wish to withdraw your consent, you must inform me as soon as possible.

IF I CHOOSE TO PARTICIPATE, WILL THERE BE ANY EXPENSES FOR ME OR PAYMENT DUE TO ME: You will not be paid to participate in this study and you will not bare any expenses.

RISKS INVOLVED IN PARTICIPATION: There are no risks involved in participating in this study, however due to the sensitivity of the information being collected; your questionnaire will be kept anonymous.

BENEFITS INVOLVED IN PARTICIPATION: There is no direct benefit, however by participating in this study better awareness of the potential effects that the menstruation cycle may have on female swimmers can be gained. By participating in this study, you will help the researcher educate coaches to better understand and manage their female athletes, encouraging a lifelong participation in the sport.

WILL MY PARTICIPATION IN THIS STUDY BE KEPT ANONYMOUS? Yes. Names on the questionnaire/data sheet will be removed once analysis starts. All data and back-ups thereof will be kept in password protected folders and/or locked away as applicable. Only I or my research supervisor will be authorised to use and/or disclose your anonymised information.
in connection with this research study. Any other person wishing to work with you anonymised information as part of the research process (e.g. an independent data coder) will be required to sign a confidentiality agreement before being allowed to do so.

**WHAT WILL HAPPEN TO THE RESULTS OF THE RESEARCH STUDY?** The results will be written into a research report that will be assessed. In some cases, results may also be published in a scientific journal. In either case, you will not be identifiable in any documents, reports or publications. You will be given access to the study results if you would like to see them, by contacting me.

**WHO IS ORGANISING AND FUNDING THE STUDY?** The study is being organised by me, under the guidance of my research supervisor at the Department of Sport and Movement Studies in the University of Johannesburg. This study has not received any funding.

**WHO HAS REVIEWED AND APPROVED THIS STUDY?** Before this study was allowed to start, it was reviewed in order to protect your interests. This review was done first by the Department of Sport and Movement Studies, and then secondly by the Faculty of Health Sciences Research Ethics Committee at the University of Johannesburg. In both cases, the study was approved.

**WHAT IF THERE IS A PROBLEM?** If you have any concerns or complaints about this research study, its procedures or risks and benefits, you should ask me. You should contact me at any time if you feel you have any concerns about being a part of this study. My contact details are:

Nadine Marais  
083 296 3965  
Nadinemarais2@gmail.com

You may also contact my research supervisor:  
Dr Heather Morris-Eyton  
heatherm@uj.ac.za

If you feel that any questions or complaints regarding your participation in this study have not been dealt with adequately, you may contact the Chairperson of the Faculty of Health Sciences Research Ethics Committee at the University of Johannesburg:
Prof. Christopher Stein  
Tel: 011 559-6564  
Email: cstein@uj.ac.za

**FURTHER INFORMATION AND CONTACT DETAILS:** Should you wish to have more specific information about this research project information, have any questions, concerns or complaints about this research study, its procedures, risks and benefits, you should communicate with me using any of the contact details given above.

*Researcher:*

Nadine Marais
The Perceived Effects of the Menstruation Cycle on Female Swimmers by Coaches, Parents and Swimmers: A Case Study

Please initial each box below:

☐ I confirm that I have read and understand the information letter dated 11 April 2018 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

☐ I understand that my participation is voluntary and that I am free to withdraw from this study at any time without giving any reason and without any consequences to me.

☐ I agree to take part in the above study.

___________________   ______________________   ________________
Name of Participant        Signature of Participant     Date

_______________________      _____________________  ________________
Name of Researcher       Signature of Researcher    Date
Menstrual Health Questionnaire (Adapted from Hendrix, 2010)

Please complete the following information as accurately as possible. Due to the sensitivity of some of these questions, please be assured that your answers will remain confidential. When in doubt, the more information/explanation the better!

Age: _______________

Level: _______________

Coaches Name: _______________

1. Approximate age of first menstrual period:

2. When was your last period?

3. Have your periods been irregular and/or infrequent? ___ Y ___ N ___Not sure

4. How often have you had menstrual periods during 2018?

___Once every 20 days or less  ___Every 21-27 days
___Every 28-35 days  ___Every 36-50 days
___Every 3-4 months  ___Very irregular, sometimes monthly, sometimes skip several months
___Other (Please Specify)________________________________________

5. My periods usually last ____ days
6. Number of periods so far in 2018 ____

7. What is the longest you have gone without having a menstrual period?
____________________

8. Do pain and cramping accompany your menstrual cycle? ___ Not at all ___ Slightly ___ A great deal

9. If yes, do you (tick all that apply):

__ Take Pain Medication
__ Lose time from school (sick room or stay at home)
__ Function less efficiently at school
__ Function less efficiently at home
__ Function less efficiently at sport
__ Reduce your level of physical exercise/training
__ Miss training
__ Continue training but decrease training load
__ Continue life with little change

10. Do you think vigorous exercise/training effects your menstrual periods? ___ YES ___ NO
    If yes, please explain these changes:
    _____________________________________________________________________

11. During 2018, has the trend of your sporting activity: ___ Basically stayed the same ___ Increased ___ Decreased
    If it has increased or decreased, please explain:
    _____________________________________________________________________

12. Have you had any of the following injuries (tick all that apply):
Menstrual Health Questionnaire

___ Stress Fracture
___ Rotator Cuff (Shoulder Injury
___ Groin Injury

13. Do you now or have you ever experienced (tick all that apply):

___ Irregular menstrual periods
___ Absent menstrual periods
___ Headaches
___ Light-headedness/ Dizziness
___ Fainting
___ Change in energy
___ Change in urinary function/ number of times urinating a day
___ Sleeping difficulties
___ Chest pains
___ Rapid heart beat
___ Shortness of breath
___ Mood Swings
___ Episodes of crying for “no reason”
___ Frequently thinking about food
___ Confusion
___ Difficulty concentrating
___ Anxiety
___ Less social interaction with family
___ Frequently tired
___ Memory problems
___ Difficulty making decisions
___ Constipation
___ Diarrhoea
___ Muscle Pain
___ Joint Pain
___ Obsessive-compulsive behaviours
Menstrual Health Questionnaire

___ Feeling of depression
___ Other (Explain)

14. Please list all current prescription medication:

_____________________________________________________________________

15. Is your coach aware of when you menstruate? ___ YES ___ NO

16. If yes, does he or she accommodate for this? ___ YES ___ NO
   If yes, explain how:

_____________________________________________________________________

17. Does your coach ask you when you started menstruating? ____ YES ____ NO

18. Does your coach speak to you about menstrual related issues/topics? ____ YES ____ NO
   If yes, what about?

_____________________________________________________________________

The following link can be used to view the online questionnaire: FILL OUT IN GOOGLE FORMS
APPENDIX E – Permission from Dr Lauren Hendrix

Permission from Dr Lauren Hendrix

[Image of an email conversation]

Dr. Lauren Hendrix <dlh@email.com>

To Nadine:

Apologies for the delay. Thank you Julie. I truly appreciate it! Keep well.

Dr. Lauren Hendrix

Nadine,

My sincere apologies for taking so long to respond to you. You are welcome to use the Menstrual Health Questionnaire. I created the questionnaire for in-office use. I do not have a value of the questionnaire. I’d love to hear more about your research once it is completed. I did my undergrad research study on Disordered Eating and Performance-Related Injury Rates in Female Collegiate Athletes. Very interesting topics we both have.

Dr. Lauren

On Fri, May 11, 2018 at 9:51 AM, West County Spine and Joint <info@westcountyandjoint.com> wrote:

Nadine,

Sorry that we haven’t responded sooner.

I’m including Dr. Lauren in this email, so she can respond accordingly.

Good luck with your endeavors!

In health,

Julie

On Thu, May 10, 2018 at 4:51 AM, Nadine Marais <nadinemaris3@gmail.com> wrote:

To whom it may concern,

I hope this finds you well.

I am a Sport Science Masters student at the University of Johannesburg in South Africa hoping to study the “Understanding the Effects of the Menstrual Cycle by Coaches and Female Swimmers of a Johannesburg Swimming Club.”

Dr Lauren’s Menstrual Health Questionnaire will make a great asset to my study. Would it at all be possible to please get permission to use the questionnaire, as well as get the reliability coefficient (r-value) of the questionnaire?
APPENDIX F – Research Consent Form (Parents for their daughters)

DEPARTMENT OF SPORT AND MOVEMENT STUDIES

RESEARCH CONSENT FORM – PARENTS FOR THEIR DAUGHTERS PARTICIPATION

The Perceived Effects of the Menstruation Cycle on Female Swimmers by Coaches, Parents and Swimmers: A Case Study

Please initial each box below:

☐

I confirm that I have read and understand the information letter dated 11 April 2018 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

☐

I understand that my daughter’s participation is voluntary and that she is free to withdraw from this study at any time without giving any reason and without any consequences to her.

☐

I agree to allow my daughter to take part in the above study.

_______________________       ________________________  ________________
Name of Parent         Signature of Parent      Date

_______________________      ______________________ ________________
Name of Researcher       Signature of Researcher    Date
Hello

My name is Nadine Marais I WOULD LIKE TO INVITE YOU TO BE PART OF research on the menstrual cycle and how it affects us emotionally especially during sport.

WHAT IS RESEARCH?
Research is something we do to find new knowledge about the way things, and people, work. We use research studies to help us find out more about children and teenagers and the things that affect their lives, their schools, their families and their health. We do this to try and make the world a better place.
WHAT IS THIS RESEARCH PROJECT ALL ABOUT?

This research project is all about girls’ periods and their emotions around their periods. We want to see if feelings and emotions change at different time of the month because of the period. We mainly want to see what these emotions do during sport.

WHY HAVE I BEEN INVITED TO TAKE PART IN THIS RESEARCH PROJECT?

To help me gain information that can be given to coaches to help better understand female athletes.

WHO IS DOING THE RESEARCH?

I, Nadine Marais, the student will be doing the research under Dr Heather Morris-Eyton (Supervisor) and Dr Natasha Janse van Rensburg (co-supervisor). I am doing the research to teach coaches that female athletes are different and that their periods should be taken into account when training or competing.

WHAT WILL HAPPEN TO ME IF I AGREE TO BE A PART OF THIS RESEARCH?

You will need to answer a questionnaire about your period. If you are part of the case study (only 10), you will need to answer the questionnaire about your period, and be part of a “focus group” think study group: This is only the 10 girls and the researcher together. We will talk about your period and I will also explain how the journal will work. During this “focus group” you can ask me any questions about something you don’t understand or something that you want to understand better. We will have the “focus group” at the end of the study as well. The last part that you need to do is fill in a journal (that I will show you and teach you how to use in the focus group) everyday for 8 months. The journal is all about your period (when it starts and finishes every month) and how you are feeling. No one but you and I will be able to log into the journal and it will have a password.

The girls’ who are part of the case study, one or both of your parents will be given a questionnaire about your period. I ask the parents if they know when you are on your period. No one will know whose parent answered which questionnaires because I don’t ask your parents for your name or theirs. If you don’t want your parent to answer a questionnaire, you can say no.

CAN ANYTHING BAD HAPPEN TO ME?
Nothing bad can happen to you but because you are giving me personal information, I will make sure that this information stays private.

CAN anything good happen to me?
Nothing good can happen to you but you will be helping me get information that can teach coaches in the future how to treat their female athletes.

WILL anyone know if I agree to be part of this research?
Due to there being a focus group discussion, all participants, my supervisor, and I will know your name. When the study is finished, I am going to write a report of all the information that I learnt but no names will be mentioned in this report. All your personal information will stay private. No one will know which answers you gave. All those taking part in the “focus group” will be asked to keep what is discussed private.

If I have any questions about this research, who can I talk to?
Researcher:
Nadine Marais
Nadinemarais2@gmail.com
0832963965

Supervisor:
Dr H. Morris-Eyton
heatherm@uj.ac.za
011 559 6968

REC Chairperson:
Prof C Stein
cstein@uj.ac.za
011 559 6564

WHAT IF I do not want to do this?
You don’t have to do this if you don’t want to. Even if your parents said yes, it doesn’t mean that you have to do it. You can say no without getting into trouble. If you don’t want to do it
Research Study Assent Form

anymore, please tell me as soon as you can. You can also leave the study at anytime without your parents’ permission.

Please tick the box indicating your choice below:

Do you understand this research and are you willing be part of it as explained above?

Yes ☐ No ☐

Has the researcher answered all of your questions?

Yes ☐ No ☐

Do you understand that this choice is yours and that you can pull out of the research at any time without getting into trouble?

Yes ☐ No ☐

_______________________       _____________________  ________________
Name of Participant        Signature of Participant     Date

_______________________      _____________________  ________________
Name of Researcher       Signature of Researcher    Date
APPENDIX H – Ethical Clearance Letter

Ethical Clearance Letter

FACULTY OF HEALTH SCIENCES
RESEARCH ETHICS COMMITTEE

NHREC Registration: REC 241112.035

ETHICAL CLEARANCE LETTER
(RECX 2.1)

<table>
<thead>
<tr>
<th>Student/Researcher Name</th>
<th>Nadine Marais</th>
<th>Student Number</th>
<th>201438919</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor Name</td>
<td>Dr H. Morris-Eyton</td>
<td>Co-Supervisor Name</td>
<td>Dr N. Jane van Rensburg</td>
</tr>
<tr>
<td>Department</td>
<td>Sport &amp; Movement Studies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qualification</td>
<td>M. Phil Sport Sciences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Title</td>
<td>THE PERCEIVED EFFECTS OF THE MENSTRUATION CYCLE ON FEMALE SWimmers BY COACHES, PARENTS AND SWimmers, A CASE STUDY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>3 April 2020</td>
<td>Clearance Number</td>
<td>RE 01-179-2018</td>
</tr>
</tbody>
</table>

Approval of the amended research proposal with details given above is granted, subject to any conditions under 1 below, and is valid until 3 April 2021.

1. Conditions:
   None.

   *Please note that failure to comply with the conditions above (if any) prior to implementation of the research will invalidate the ethical clearance.

2. Renewal:
   It is required that this ethical clearance is renewed annually within two weeks of the date indicated above. Renewal must be done using the Ethical Clearance Renewal Form (RECX 10.0), to be completed and submitted to the Faculty Administration office. See Section 12 of the REC Standard Operating Procedures.

3. Amendments:
   Any changed amendments to the research proposal that has been granted ethical clearance must be submitted to the REC using the Research Proposal Amendment Application Form (RECX 8.0) prior to the research being amended. Amendments to research may only be carried out once a new ethical clearance letter is issued. See Section 13 of the REC Standard Operating Procedures.

4. Adverse Events, Deviations or Non-compliance:
   Adverse events, research proposal deviations or non-compliance must be reported within the stipulated time frames using the Adverse Event Reporting Form (RECX 9.0). See Section 14 of the REC Standard Operating Procedures.

The REC wishes you all the best for your studies.

Yours sincerely

Prof. Christopher Stein
Chairperson, REC
Tel: 011 559 6864
Email: cstein@uj.ac.za

RECX 2.1 – Faculty of Health Sciences
Research Ethics Committee

Secretary, Mr. Vula Manthata
Tel: 011 558 4013 email: meters@uj.ac.za
APPENDIX I – Parents Questionnaire

Department of Sport and Movement Studies

Questionnaire for Parents

1. Are you aware of when your daughter is menstruating? ___ YES ___ NO

2. Do you notice any mood changes when she is about to start and/or during menstruation? ___ YES ___ NO

   If yes, please specify: _______________________________________________________

3. Does your daughter ever complain about any PMS symptoms? ___ YES ___ NO

   If yes, please specify the symptoms: __________________________________________

4. Do you give your daughter any medication during her period? ___ YES ___ NO

5. If yes, what is it for:
   ___ Headache
   ___ Stomach cramps
   ___ Nausea
   ___ Other

6. If your daughter experiences mood changes and PMS due to menstruation, is her coach aware/ made aware of this? ___ YES ___ NO

   If yes, does the coach accommodate your daughter? ___ YES ___ NO

   How?
   _______________________________________________________________________

7. Do you make your daughters coach aware of her menstruation or menstrual related issues? _____ YES _____ NO
8. Does your daughter's coach ask you about when she started menstruating or matters related to menstruation? ____ YES ____ NO

The following link can be used to view the online questionnaire: [FILL OUT IN GOOGLE FORMS]
Guiding Questions – Swimmers

1. How do you usually feel when you have your period?
2. Do you think it affects your training?
3. Would you discuss how you feel with your coach?
APPENDIX K – Permission from Head Coach

15 May 2018

ATT: Department of Sport and Movement Studies - UJ

RE: Nadine Marais – Student Number: 201438919

To whom it may concern,

I hereby give Nadine Marais (Student Number: 201438919) permission to go ahead with her Masters study titled “The Perceived Effects of the Menstruation Cycle on Female Swimmers by Coaches, Parents and Swimmers: A Case Study”, within my club and using my female swimmers (aged 12-16 years old).

Should you require anything further, please don’t hesitate to contact me.

Kind Regards

Adrian Goate

Head Coach

083 226 4313

adrian@aquaathlete.co.za
Dear Aqua Athlete Parents and Swimmers,

As many of you are aware, I am currently pursuing my Masters Degree in Sport Science at the University of Johannesburg.

In order for it to be successful, I require the voluntary participation in a case study by 10 girls aged 12-16 years who have already begun menstruating.

Participation will remain confidential and parental consent will need to be provided in order for you to take part.

All procedures will be explained to you, the participant and to your parent(s) before the study can commence.

The study is expected to last approximately 8 months and does not require a change in schedule (it is based on your current everyday activities).

If you are interested in the study and would like to take part - please either let me know at the pool or contact me on 033 296 3565.

Thanking you in advance.
APPENDIX M - Coaches Interview

1. Are you aware of whether any of your swimmers are menstruating?
2. Do any of the swimmers parents speak to you about matters around/regarding their daughter’s menstruation cycle?
3. Do any of your swimmers speak to you about matters around/regarding their menstrual cycle?
4. If so, how do you respond to the swimmer? Do you then accommodate the swimmer in training and how?
5. Do you ask any of your swimmers about menstrual related issues?
6. Would you be interested in incorporating a female specific “guideline” within your periodized training programmes (eg. A guideline that incorporates the monitoring of the swimmers menstruation cycle)?
APPENDIX N – Paraphrased Transcription of Focus Group Discussion

Paraphrased transcription of focus group discussion

Group 1

R = Researcher

P1 = Swimmer 1

P2 = Swimmer 2

<table>
<thead>
<tr>
<th>Who spoke</th>
<th>Paraphrasing</th>
<th>Reflection</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Greeted the participants. Explained what the focus group was going to be about. Encouraged as much information as possible.</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Question 1. How do you usually feel when you have your period?</td>
<td></td>
</tr>
<tr>
<td>P1</td>
<td>Tired. Short tempered.</td>
<td>Alluded to facial expressions and how they change during menstruation.</td>
</tr>
<tr>
<td>P2</td>
<td>Stressed. Upset with people easily. If someone annoys her, she hurts them.</td>
<td>The atmosphere was light-hearted here. The girls giggled a bit at the hurting part.</td>
</tr>
<tr>
<td>R</td>
<td>More information was requested about what the participant meant when she said “hurts them”</td>
<td></td>
</tr>
<tr>
<td>P2</td>
<td>She alluded to using her nails to scratch people.</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Question 2. Do you think it affects your training?</td>
<td>By it the researcher was referring to their periods.</td>
</tr>
<tr>
<td>P1</td>
<td>She did not think that it affects her training because She uses tampons so Trains as normal</td>
<td></td>
</tr>
<tr>
<td>P2</td>
<td>She thought it does affect her training because</td>
<td>There were originally 3 participants in this group, 1 of which asked to leave the study. With the previous</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Example of paraphrased transcription of field notes</strong></td>
<td>She is tired all the time and Is more tired than usual.</td>
<td>question, participant 2 answered last whereas she answered second. Could be an indication that she was getting more comfortable.</td>
</tr>
<tr>
<td><strong>R</strong></td>
<td>Question 3. Would you discuss how you feel with your coach?</td>
<td></td>
</tr>
<tr>
<td><strong>P1</strong></td>
<td>She said she’s normally fine but When she’s on her period and There’s a hard set She feels like crying but She won’t tell her coach, She will just look at him.</td>
<td>Alluding to not needing to tell her coach. Alluding to the look doing the speaking for her.</td>
</tr>
<tr>
<td><strong>P2</strong></td>
<td>She doesn’t tell him but Complains more during the session.</td>
<td></td>
</tr>
<tr>
<td><strong>R</strong></td>
<td>The researcher then asked why she won’t tell him</td>
<td></td>
</tr>
<tr>
<td><strong>P2</strong></td>
<td>She won’t tell him because he’s a man.</td>
<td></td>
</tr>
</tbody>
</table>
# Example of transcription from a recording (Swimmer focus group discussion)

## APPENDIX O - Transcription from a Recording (Focus Group Discussion)

Transcription

P5 = Swimmer 5

R = Researcher

<table>
<thead>
<tr>
<th>Speaker</th>
<th>What was said</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Okay.</td>
<td>Statement</td>
</tr>
<tr>
<td></td>
<td>It’s short and sweet but,</td>
<td>Statement</td>
</tr>
<tr>
<td></td>
<td>I want you to give me as much detail as possible for each question.</td>
<td>Instruction</td>
</tr>
<tr>
<td></td>
<td>Okay.</td>
<td>Statement</td>
</tr>
<tr>
<td></td>
<td>So uhm,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>It’s obviously about menstruation and,</td>
<td>Statement</td>
</tr>
<tr>
<td></td>
<td>Menstruating while you are swimming and,</td>
<td>Statement</td>
</tr>
<tr>
<td></td>
<td>Things like that.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>So,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>How do you usually feel when you are on your period?</td>
<td>Menstrual Symptoms</td>
</tr>
<tr>
<td>P5</td>
<td>I feel alright,</td>
<td>Personal experience</td>
</tr>
<tr>
<td></td>
<td>Like many people say you supposed to have cramps and stuff but,</td>
<td>Common menstrual symptoms</td>
</tr>
<tr>
<td></td>
<td>I don’t ever really get cramps or,</td>
<td>Personal experience</td>
</tr>
<tr>
<td></td>
<td>Like so</td>
<td></td>
</tr>
<tr>
<td></td>
<td>While I’m swimming it’s alright,</td>
<td>Personal experience</td>
</tr>
<tr>
<td></td>
<td>I’m just scared that the tampon string is out so,</td>
<td>Personal experience</td>
</tr>
<tr>
<td></td>
<td>Just have to double check.</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Uhm,</td>
<td>Effect on training</td>
</tr>
<tr>
<td></td>
<td>Do you think it affects your training?</td>
<td></td>
</tr>
<tr>
<td>P5</td>
<td>Ah ja,</td>
<td>Personal experience</td>
</tr>
<tr>
<td></td>
<td>I think so because</td>
<td>During Menstruation</td>
</tr>
<tr>
<td></td>
<td>Ah like</td>
<td></td>
</tr>
<tr>
<td></td>
<td>When I’m on my period,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I feel fatigued, and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I feel tired.</td>
<td>Common menstrual symptoms</td>
</tr>
<tr>
<td>----</td>
<td>--------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>R</td>
<td>So</td>
<td>Effect on Training</td>
</tr>
<tr>
<td></td>
<td>How do you think it affects your training?</td>
<td></td>
</tr>
<tr>
<td>P5</td>
<td>I think you can’t train as hard as you usually do.</td>
<td>Effects on Training</td>
</tr>
<tr>
<td></td>
<td>So then you obviously</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Go through a dip.</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Uhm and</td>
<td>Coach – Athlete Relationship</td>
</tr>
<tr>
<td></td>
<td>Then would you discuss how you feel with your coach?</td>
<td></td>
</tr>
<tr>
<td>P5</td>
<td>I’ll just tell him I feel fatigued and,</td>
<td>Coach – Athlete Relationship</td>
</tr>
<tr>
<td></td>
<td>Stuff but,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I won’t tell him like the exact reason why I feel fatigued and,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stuff</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>So</td>
<td>Menstrual Cycle Information</td>
</tr>
<tr>
<td></td>
<td>He doesn’t have any information regarding your menstrual cycle or,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anything like that (pause) and,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>You won’t share it with him?</td>
<td></td>
</tr>
<tr>
<td>P5</td>
<td>No</td>
<td>Statement</td>
</tr>
<tr>
<td>R</td>
<td>Is there a reason why you won’t?</td>
<td></td>
</tr>
<tr>
<td>P5</td>
<td>I don’t know,</td>
<td>Coach – Athlete Relationship</td>
</tr>
<tr>
<td></td>
<td>I just think that it will be awkward because,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Coaches name) just makes situations awkward  [Laughter]</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Okay,</td>
<td>Statement</td>
</tr>
<tr>
<td></td>
<td>That’s literally it.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thank you</td>
<td></td>
</tr>
<tr>
<td>P5</td>
<td>You welcome [giggle]</td>
<td>Statement</td>
</tr>
</tbody>
</table>

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APPENDIX P – Transcription from a Recording (Coaches Interview)

Coach 1 Interview Transcription

C1 = Coach 1

R = Researcher

<table>
<thead>
<tr>
<th>Speaker</th>
<th>What was said</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Okay</td>
<td></td>
</tr>
<tr>
<td></td>
<td>So are you aware of any</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Of whether any of your swimmers are menstruating?</td>
<td>Swimmers menstruating</td>
</tr>
<tr>
<td>C1</td>
<td>Right now</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uh, no</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Well</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In general, not necessarily [interruption]</td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Right now.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Okay.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Do any of the swimmers’ parents speak to you about matters around or Regarding their daughters’ menstruation cycles?</td>
<td>Parents and their daughters menstruation</td>
</tr>
<tr>
<td>C1</td>
<td>Uhm,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sometimes,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not always</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Okay.</td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>And its very minimal when it comes to information shared</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Okay.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Do any of your swimmers speak to you (pause)</td>
<td>Swimmers and their menstruation</td>
</tr>
<tr>
<td></td>
<td>About matters around</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regarding their menstrual cycles?</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>C1</strong></td>
<td>Sometimes again</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not all the time although</td>
<td></td>
</tr>
<tr>
<td></td>
<td>We do try and get them to talk openly.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>It’s not always easy for girls to talk to a male about that.</td>
<td></td>
</tr>
<tr>
<td><strong>R</strong></td>
<td>Okay.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uhm, and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If they do,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>How do you respond to the swimmer</td>
<td></td>
</tr>
<tr>
<td><strong>C1</strong></td>
<td>Very supportive of what’s going on and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I take a stance of understanding and,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>We may adjust training sets etcetera</td>
<td></td>
</tr>
<tr>
<td><strong>R</strong></td>
<td>Okay</td>
<td></td>
</tr>
<tr>
<td><strong>C1</strong></td>
<td>And expectations of them.</td>
<td></td>
</tr>
<tr>
<td><strong>R</strong></td>
<td>That was my next question.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Do you then accommodate the swimmer in training?</td>
<td></td>
</tr>
<tr>
<td><strong>C1</strong></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td><strong>R</strong></td>
<td>And how?</td>
<td></td>
</tr>
<tr>
<td><strong>C1</strong></td>
<td>Adjust the training set.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uhm [long pause]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If they not coping with the training set,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I’ll allow them to actually stop training.</td>
<td></td>
</tr>
<tr>
<td><strong>R</strong></td>
<td>Okay</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uhm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Do you ask any of your swimmers about menstrual related issues?</td>
<td></td>
</tr>
<tr>
<td><strong>C1</strong></td>
<td>Nope.</td>
<td></td>
</tr>
<tr>
<td><strong>R</strong></td>
<td>And then</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Would you be interested in incorporating a female specific guideline within your periodized program?</td>
<td></td>
</tr>
</tbody>
</table>

Response to swimmer
Accommodations during training
Ask swimmers about menstruation
Female athlete periodization
Example of transcription from a recording (Coaches interview)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>So</td>
<td>Monitoring menstrual cycles</td>
</tr>
<tr>
<td></td>
<td>Something that incorporates the monitoring of swimmers menstruation cycles?</td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>Yes</td>
<td>I think its important</td>
</tr>
<tr>
<td>R</td>
<td>Okay</td>
<td>Thank you</td>
</tr>
<tr>
<td>C1</td>
<td>Done?</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Done</td>
<td></td>
</tr>
</tbody>
</table>
I, __________________________ hereby declare that I understand and agree to the following conditions with regards to the coding of the audio recordings.

1. I understand that the audio recordings are received for the purpose of transcribing records of interviews held with the participants in a research study.
2. I understand that the identity of the participants as well as the content of the interviews are confidential and may not be revealed.
3. I undertake to treat all transcribed material as confidential content to which only I will have access. I will keep all transcriptions and any copied material securely.
4. I will return all copies back to the researcher on completion of the coding.

NAME: ______________________  RESEARCHER NAME: ______________________
SIGNATURE: _________________  RESEARCHER SIGNATURE: _______________
DATE: ______________________  DATE: ________________________________
This certifies that the dissertation listed below was edited for proper English language, grammar, punctuation, spelling, and overall style.

Dissertation title:
The Perceived Effects of the Menstruation Cycle on Female Swimmers by Coaches, Parents and Swimmers: A Case Study

Candidate:
Nadine Merais

Date issued:
28 October 2020
APPENDIX S - Confirmation of HDC Approval

FACULTY OF HEALTH SCIENCES
HIGHER DEGREES COMMITTEE

HDC-01-144-2018
29 November 2018

TO WHOM IT MAY CONCERN:

STUDENT: MÁRÁIÁN, N
STUDENT NUMBER: 201436812

TITLE OF RESEARCH PROJECT: The Perceived Effects of the Menstruation Cycle on Female Swimmers by Coaches, Parents and Swimmers: A Case Study

DEPARTMENT OR PROGRAMME: SPORT AND MOVEMENT STUDIES

SUPERVISOR: Dr H Morris-Ryton
CO-SUPERVISOR: Dr N Jane van Rensburg

The Faculty Higher Degrees Committee has scrutinised your research proposal and concluded that it complies with the approved research standards of the Faculty of Health Sciences, University of Johannesburg.

The HDC would like to extend their best wishes to you with your postgraduate studies.

Yours sincerely,

Prof H Abrahamse
Acting Chair: Faculty of Health Sciences HDC
Tel: 011 559 6550
Email: habrahamse@uj.ac.za
APPENDIX T – Turnitin Originality Report

<table>
<thead>
<tr>
<th>Similarity Index</th>
<th>7%</th>
</tr>
</thead>
</table>

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Assignment: proposal
Paper ID: 1122907847

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