Breathe in for nothing: an interpretative phenomenological analysis exploring the influence of a Pilates warm-up in singers

by

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Declaration

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March 2020

Abstract

Research on the use of Pilates for classical singers is limited, despite the well-documented benefits of this somatic (mind-body) exercise modality on the general public. Singers have specific needs, as the process of preparing for, and carrying out a performance can be extremely stressful and physically demanding and can therefore adversely affect physical and mental fortitude. However, these needs could be addressed by a Pilates warm-up designed for singers.

This study sought to ascertain the influence of a Pilates warm-up on four university singing students and one professional singer using interpretative phenomenological analysis (IPA). A specially designed Pilates warm-up for singers was taught to the participants over six weeks, with three workshops of five days each, interspersed with home practice. The effects thereof (mental, physical and vocal) were documented, before-and-after questionnaires (GAD-7, the Beck's Depression Inventory and the RAND 36-Item short form quality of life survey instrument) were completed, heart rate measurements taken (to determine if the warm-up initiated a parasympathetic nervous system response) and three semi-structured interviews were conducted with each participant. A focus group was then held with the participants to discuss the effects of the regime. The lived experience of the participants' use of the Pilates warm-up was analysed and together with the collected data, was grouped into sub-themes named: Singing; Well-being; Preparation for Singing/Preparing the Body to Sing; Tools; Resilience; Mindfulness; Mind-Body Communication; Nervous System; Strengthening the Body; Relaxation through Movement and Pilates Breathing. In the cyclical interpretative process of an IPA study, these sub-themes were then grouped together to form the main themes of the study, namely: Tools; Nervous System and Singing.

The results showed an overall improvement in quality of life as well as an increase in mindfulness and relaxation which benefitted all of the singers vocally in some way. Heart rate measurements, as well as anxiety and depression scores showed a general positive trend, although these results were inconclusive and require further study. The Pilates warm-up provided the singers in the study with specific tools with which to address their various issues which had an impact on their singing. Performance preparation and posture were found to be enhanced, muscle tension was reduced, vocal range increased and there were improvements in stamina and breathing. This study therefore highlights the potential benefits of the use of a Pilates warm-up for classical singers and the areas of research that should be undertaken to further delineate these benefits.

Opsomming

Navorsing oor die gebruik van Pilates vir klassieke sangers is beperk, ten spyte van die goed gedokumenteerde voordele van hierdie somatiese (verstand-liggaam) oefeningsmodaliteit vir die algemene publiek. Sangers het spesifieke behoeftes, aangesien die proses van voorbereiding vir ’n optrede, asook die optrede self baie spanningsvol en fisiek uitdagend kan wees. Dit kan fisieke en geestelike uithouvermoë benadeel. Hierdie behoeftes kan aangespreek word deur ’n Pilates-opwarming wat spesifiek ontwerp is met sangers in gedagte.

Hierdie navorsing poog om die geestelike, fisieke en vokale voordele van ‘n Pilates-opwarming te dokumenteer. Vier universiteitsangstudente en een professionele sanger is bestudeer deur middel van interpretatiewe fenomenologiese analise. Tydens drie vyfdag-werkswinkels het die deelnemers ’n spesiaal ontwerpte Pilates-opwarming vir sangers aangeleer. Die uitwerking daarvan is gedokumenteer; voor-en-na-vraelyste is voltooi (GAD-7, Beck se depressie-inventaris en die RAND 36-item-kortvorm-opname-instrument); harttempo is gemeet (om te bepaal of die opwarming ’n parasimpatiese senuweerespons geïnisieer het) en drie semi-gestruktureerde onderhoude is gevoer met elke deelnemer. Daarna is ’n fokusgroepbespreking gehou met die deelnemers om die effek van die regime te bespreek. Die deelnemers se geleefde ervaring van die gebruik van die Pilates-opwarming is geanaliseer en saam met die versamelde data in die volgende subtemas gegroepeer: Sang; Welstand; Voorbereiding vir Sang/Voorbereiding van die Liggaam vir Sang; Gereedskap; Herstelvermoë; Bewustheid; Kommunikasie tussen Verstand en Liggaam; Senustelsel; Versterking van die Liggaam; Ontspanning deur Beweging en Pilates-asemhaling. Deur die sikliese interpretasieproses van ’n interpretatiewe fenomenologies analisie-studie, is hierdie sub-temas saamgegroepeer om die hooftemas van die studie te vorm, naamlik: Gereedskap, Senustelsel en Sang.

Die resultaat het algehele verbetering in lewenskwaliteit gewys, asook ’n toename in bewustheid en ontspanning. Al die sangers het vokaal daarby gebaat op die een of ander manier. Harttempo-metings, sowel as angstigheid-en depressietellings het geneig na ’n positiewe verandering, alhoewel die uitslae nie afdoende was nie en verdere studie nodig is. Pilates-opwarming het die sangers in die studie spesifieke gereedskap gegee om verskillende sake aan te spreek wat ’n impak op hulle sang gehad het. Daar is bevind dat voorbereiding vir optrede en postuur verbeter het, en daar was ’n vermindering in spierspanning, ’n toename in vokale reikwydte en ’n verbetering in stamina en asemhaling. Hierdie studie werp lig op die potensiële voordele van ’n Pilates-opwarming vir klassieke sangers, en ook op die navorsingsareas wat bestudeer behoort te word ten einde die voordele verder uit te wys.

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List of acronyms

Acronyms listed in conceptual order.

CNS	Central Nervous System
ANS	Autonomic Nervous System
SD	Sympathetic Division
PD	Parasympathetic Division
HR	Heart Rate
HRV	Heart Rate Variability
HPA	Hypothalamus, Pituitary gland and Adrenal glands
TAM	Transversus Abdominus Muscle
RA	Rectus Abdominus Muscle
IOM	Internal Oblique Muscle
FHP	Forward Head Posture
FSP	Forward Shoulder Posture
CRPS	Complex Regional Pain Syndrome
MPA	Music Performance Anxiety
BDI	Beck's Depression Inventory
IPA	Interpretative Phenomenological Analysis
PTAF	Pretoria Technikon Arts Faculty

1. Introduction

1.1. Background and rationale

In the golden age of singing, the famous teachers of the time had no access to scientific data to back up their methods (Cherland, 2003:61). Yet one could not possibly argue that singing has not benefited from research into voice production. As Austin (2007:57) points out, scientific research has an effect on even the greatest teachers eventually. Scientific knowledge is not an accumulation of static facts, rather, research should serve to inform the basis of what is being taught and perhaps how it is being taught, without detracting from the goals of teaching and singing. As Barefield *et al*. (1999/2000:30) aptly state, "there is an inevitable element of trial and error involved". This is because every singer is physically, emotionally and psychologically different. While there might be an 'ideal' voice product to strive for, it might not be within the capability of every singer to attain this and therefore less desirable methods might be employed, however illogical they may seem. The human body is capable of doing what necessity requires of it, regardless of the potential side effects or future negative consequences. Unfortunately, these negative consequences can cause problems for the singer later. Coupled with other challenges that life inevitably brings, the singer might find themselves in need of physical and mental fortification and rehabilitation in order to perform at their best.

Singing and Pilates are not the most obvious combination. Although I have practiced both for most of my adult life, I kept them separate from each other professionally as a singer and a Pilates teacher, even though I knew the benefits of the method first-hand. It took some years and some injured singers to understand that the benefits I enjoyed due to Pilates for my singing were not peculiar to myself but were also beneficial to my professional singing clients, even though they had not come to me for any singing related issues.

Along with the relief of sore hips, knees, necks or backs, my singing clients had gained vocally too. I realised in hindsight that the common denominator between singing, Pilates and my singing clients was indeed myself, as I had a singer's perspective in my use of Pilates from which they could benefit. I began to wonder if the Pilates warm-up I had designed for myself could be of as much use to other singers. For example, the mind-body aspect of Pilates has helped my performance anxiety and I use it as a successful prophylactic to keeping my mind calm and focused on the day of performance and to keep my body from tensing up.

Salonen (2018:4), in a PhD which investigated the impact of an occupational health course for tertiary music students (using the somatic Body Mapping system), states that:

> Impactful research on the health and well-being of musicians is therefore critical in order to broaden awareness, stimulate interest, build capacity in music education and performance, create interdisciplinary synergies and facilitate evidence-based knowledge exchange. These aspects will facilitate the development of supportive, integrated and coordinated approaches for musicians' health in both the educational and professional sectors.

Her research expresses a need to further the acceptance and promotion of preventative programmes for the health and well-being of musicians in general and in South Africa in particular (Salonen, 2018:5). Pilates has provided the most complete set of tools for me in this regard and yet it seems underutilised by singers. Therefore, for my Master's research I wanted to understand what the influence of a Pilates warm-up on other singers would be. If they could benefit through my research, then further use of the Pilates method by singers could be encouraged by more research in this field.

Daily life places strain and tension on bodies. Performing and singing can cause an accumulation of physical and mental tensions. If left unchecked, this accumulation could result in a variety of physical

issues, such as postural problems and misalignments of the spine. Through a Pilates warm-up, the singer would gain a very practical tool set with which to undo these excess tensions and prevent future physical issues. A Pilates warm-up can be practised in a limited space with no special equipment required. It therefore travels well, and its practice is not reliant on the weather. It is also less likely to dehydrate the singer than outdoor activities and it could be useful to the singer on many levels.

1.2. Overview of the existing literature

While much research has been done on various aspects of singing technique and on various aspects of health and well-being, there seems to be little attention given as to how this knowledge can be integrated practically for the singer specifically. Few useful results are found when searching for 'Pilates for Singers'. Two articles on the use of Pilates specifically aimed at singers proved useful. Misins (2012:228), in a journal article, mentions Pilates for "proper breathing" and published author, Melton (2001), discusses the "powerful benefits of Pilates training" for singers despite some discussed "incompatibilities". In a thesis for partial fulfilment of a Master's degree, Vendafreddo (2012:12) mentions Pilates in movement training for musical theatre singers "to supplement the goals of kinesthetic awareness, proper alignment, relaxation and concentration". The theoretical but untested doctoral document by Asher (2009) on "an integrated vocal pedagogy-Pilates method to improve voice performance" was the most pertinent. A study by McCarther (2012:50) which alludes to Pilates as one of the "modalities or methodologies that can be beneficial to students" and further suggests various Pilates exercises for singing teachers to use for students' postural and breathing issues (McCarther, 2012:15,23-26,35-38,43,47-49), was also relevant. Interestingly, both of these doctoral studies provide Pilates exercises for singers but neither study actually researched the effects of these exercises on singers. Neely (2012:ii) examined and compared the use of Pilates as well as the Alexander Technique, Feldenkrais and yoga for awareness and alignment in singers. However, although all were considered complementary approaches for singing, she found it "difficult to draw any conclusions on the effectiveness of these methods because clinical medical research is limited" (Neely, 2012:ii). Clearly, Pilates is starting to make its way into the singing world's consciousness, but more scientific research is needed.

According to Searle and Meeus (2001:8) and Robinson *et al*. (2000:7), the Pilates method of exercise is known to improve posture, restore correct alignment, improve muscle tone, change body shape and even improve outlook and reduce stress. Research into the neuromyofascial web (Myers, 2011) shows the importance of the interconnectedness of the various aspects of the body. To what extent this interconnectedness might be utilized specifically for the benefit of singers through the use a Pilates warm-up, is an interesting concept. Robinson *et al*. (2000:7,230) state that Pilates, by focusing on aligning the spine and gently warming up and strengthening the body, can improve mental and physical states and could have benefits to the voice as well. However, very little research has been done on the impact of Pilates on singers/singing or a Pilates warm-up for singers specifically.

A Pilates warm-up for singers is a series of Pilates exercises tailored to prepare the body and mind for singing and performance. Adams *et al*. (2012:123), in a study examining if Pilates is experienced as a method which engages both the mind and the body and can therefore be called somatic, explain that "[i]nward focus, internal body sensations, mindful practice, consciousness of intent, or even spiritual aspects are all terms used in describing various mind-body approaches". Their study concluded that their participants' "[r]eports of increased body awareness, conscious use of breath, increased confidence, increased ability to concentrate, the use of intuition for injury prevention, improved stress management, and relaxation imply that their experience in Pilates is indeed a mind-body somatic practice" (Adams, *et al*., 2012:129).

Singers are likely to have different physical exercise needs in comparison to the average person due to the specific musculature involved in voice production. Also, the amount of time that a singer has available to devote to exercising might be very limited due to the high time demands of vocal

practice, rehearsals, performance, memorising and learning repertoire. The singer's body is the instrument and therefore a singer's exercises should be sympathetic to this function, as well as to the lifestyle of stress and travel that often accompany professional singing. When an exercise programme is not sympathetic it may have adverse rather than beneficial effects. For example, Freer (2011:37) describes how the Valsalva manoeuvre (holding the breath while exerting physical pressure) is often used as a technique in lifting weights at the gym and can result in excessive strain in the musculature which determines laryngeal position. Freer (2011:37) goes on to describe how the weights should be lifted using the out-breath and core muscular strength as in breathing for singing. The use of the exhale and core muscular strength are central to the Pilates method also. There is precedent in using Pilates for singers by Body Control Pilates (Robinson, *et al*., 2000:230) but it is strategic rather than academic. Asher (2009:80) in her doctoral study, has devised an integrated Pilates/singing pedagogy in which "breath management and posture are the central idea[s] that connect[] singing and Pilates-based exercises". However, that study was not based on a Pilates warm-up and it is only theoretical, with one of her recommendations being the testing of Pilates exercises on voice production (Asher, 2009:127).

Buckmire and Rosen (2001:52) mention that "hydration and general physical health" are an important part of a singer's good vocal hygiene. However, they do not elaborate on how a singer is to acquire or maintain this good health in a busy and demanding schedule, which comprises not just the demands of the voice but also the demands of everyday life, which cause tensions in the body. La Pine (2008:27) discusses the negative effects of musculoskeletal tensions on the correct functioning of the larynx but does not give any suggestions to the singer as to how to alleviate or prevent such muscular stresses in the cervical and *thoracic* regions.

Robinson *et al.* (2000:230) note that singers "need excellent breathing techniques and a strong centre" and state that the improvement in posture and alignment of the head and neck through Pilates can "dramatically improve your voice". Gilman and Johns (2017:131.e1) concluded in their study on the effects of head position on vocal effort, that "posture may play a more important role in vocal fatigue than previously thought". This is because posture can determine how much stress and strain are placed on the body. Following a fourteen-week participatory study, Atilgan *et al.* (2017:642) stated that Pilates, as "a therapeutic exercise, provides proper posture by enabling the deep postural muscles to be strengthened". Atilgan *et al.* (2017:643,644) further found Pilates to have "protective effects on health", also that it "raised awareness and enhanced well-being" and that "flexibility improved and postural distortions were prevented".

In a literature review on Pilates for the elderly, Resende da Costa *et al.* (2016:697-698), found a wide range of benefits. Vancini *et al.* (2017:850) saw an improvement in quality of life (including depression and anxiety) after participation in the method by overweight and obese individuals. It was further deduced by Vancini *et al.* (2017:855) that "Pilates training may be used as an effective alternative approach to improve overall patient health, self-esteem, emotional and psychological state, mood, and motivation". As a mind-body exercise method, Pilates uses visualisations and mental focus to help create body awareness and enhanced physical control (Searle & Meeus, 2001:56). Clearly there are both physical and psychological benefits to doing Pilates, but little is mentioned for the singer specifically in the literature.

According to a study of musicians commissioned by Help Musicians UK (Gross & Musgrave, 2017:5) "71.1% of respondents identified as having suffered from panic attacks and/or anxiety, and 68.5% from depression." Weinstein *et al.* (2009:383) researched the effects of mindfulness on a sense of well-being and mental health and found it to be psychologically beneficial. This seems to be a relevant commendation for singers to use a mind-body method such as Pilates to improve mindfulness.

The stresses involved in performing require the singer's attention due to the effects on the body, for example, Acocella's (2015) investigation into stage fright and the effects of this "self-poisoning by adrenaline". This phenomenon could have disastrous consequences for the singer in both the short and

the long term. The over activation of the sympathetic nervous system by performance nerves is something that all singers need to control to some extent unless they are completely immune to performance nerves. Prolonged exposure to adrenaline and cortisol due to the heightened stimulation of the sympathetic nervous system has negative effects on the body (Randall, 2011). However, as Vos's (1961:64-65) explanation of the physical responses to this stimulation show, not all the responses of the sympathetic nervous system would be detrimental to the singer. For a good state of physical readiness to sing, it seems that a balance is required between the sympathetic and the parasympathetic nervous systems. According to Peifer *et al.* (2014:66), in order to achieve this state of balance for the attainment of 'flow', certain physiological mechanisms would need to be in place.

The physical state of the body is known to impact the mind itself through cardiac vagal tone (Grossmann, *et al*., 2016:1-2). Azevedo *et al.* (2017) state the importance of good vagal tone to control heart rate due to its impact on both physical and mental health. According to Moore (2016) "increasing activity level and fitness increases autonomic activity correlating with increased ability for the body to regenerate energy, repair tissue, and more capably respond to both physical and mental stress."

From the overview of the above literature, it is clear that this research study is interdisciplinary and that it is necessary to delve into the literature on neuroscience, psychology, sports science, medicine, anatomy and singing to understand the possible benefits of a Pilates warm-up specifically designed for singers. To my knowledge, there is not a Pilates warm-up created by a singer for singers. There are, however, other movement techniques applied by some professional voice users and musicians. Two examples of this are the Alexander Technique (Craze, 2003:55) and the Timani Technique (Danielsen, 2013:i; Nilssen, 2019).

1.3. Research problem and objectives

The existing literature shows the impact of the Pilates method on both the mind and the body and alludes to these benefits for singers indirectly. With very little research showing a link with the Pilates method to singers specifically, it is difficult to understand *what* the impact of Pilates on singers and the voice is and *how* a Pilates warm-up might influence them as a unique group. This study needed to *understand* how singers *experience* Pilates so that the benefits of the method might be delineated particularly for them. In other words, this study needed to provide the missing link of *researched experience* between the well-documented issues affecting singers and the phenomenon of a Pilates warm-up. Experiential research exists in the domain of a qualitative research method called interpretative phenomenological analysis (IPA) and this is discussed in section 1.4.

The research purpose in this study is to understand how a Pilates warm-up, tailored specifically for the singer could be of benefit to the singer's physical and emotional needs. This study proposes that the Pilates warm-up for singers could become a valuable tool for the singer to:

- Prepare the body as the vocal instrument by warming up the relevant musculature as well as removing and preventing muscular tensions caused by daily life and performance;
- Assist the singer mentally by preparing the nervous system to respond beneficially to the demands of voice production and performance;
- Condition the singer's body effectively to maintain good alignment and physical health.

There are therefore three points of focus, namely the singer's voice, body (which houses the instrument) and mind. I have made the presumption for this study that singers concentrate mostly on their vocal technique and singing and as such, their physical body beyond the larynx and diaphragm is paid much less attention.

The research question is: how could a Pilates warm-up influence singers? I needed to evaluate the efficacy of the Pilates warm-up in its influence on the following goals which the literature does not cover specifically for singers:

1. **Singing benefits:** how would the singer's technique be influenced by the use of a Pilates warm-up designed to strengthen and stretch the complimentary muscles used in voice production?

2. **Physical/health benefits:** how would the process of restoring physical integrity and countering the effects of physical wear and tear (from general life as well as the demands and tensions placed on a singer's body through singing and performance) assist the singer?

3. **Psychological benefits:** how could improved mindfulness through a Pilates warm-up be utilised for singers and what psychological benefits might they attain as a specific group?

1.4. Research design

I decided on a qualitative approach to the research, to gain insight into 'how' a Pilates warm-up could influence singers. I surmised that, as both individuals and as a distinct group, 'Singers' would experience Pilates with very specific objectives in mind. I therefore wanted to examine their experience of the Pilates warm-up for singers, in order to understand if the benefits I proposed from personal experience were indeed issues meriting future research and, if there was any other perceived value for singers in doing this warm-up. Ashworth (2008:25) describes qualitative research as having the ability to show the "proper awareness of the diverse ways in which individuals (perceptually or constructively) grasp their world".

With this in mind, IPA, which is a type of qualitative research that has been used in psychology for over a decade, was chosen. Although I am not a psychologist, Smith *et al*. (2009:5) explain that "[r]esearchers in other disciplines are interested in psychological questions, even if they are not formally psychologists". Also, IPA's focus on "in-depth qualitative analysis" (Smith & Osborn, 2008:54) is similar to the Pilates method's high attention to detail and focus on the individual. IPA studies seek to ascertain if a phenomenon under investigation has "relevance and personal significance" for a specific group (Pietkiewicz & Smith, 2014:10). Smith (2011:24) describes a good IPA as having the following attributes:

- Focus which is clear and detailed;
- Data which is of a high quality;
- Analysis which displays both detail and breadth with themes that are backed up by the participants own words;
- Presentation of themes and sub-themes with enough depth to be persuasive in argument;
- Double hermeneutic which is visible so that the analysis is both a description and an interpretation;
- Similarities and differences manifesting in the themes used to create an analysis with nuance;
- Care taken to structure the writing up of the study in an engaging and informative way.

Smith and Osborn (2008:55) state that research using IPA is typically done on a small group since "the aim of the study is to say something in detail about the perceptions and understandings of this particular group". Pringle *et al.* (2011:23) assert that IPA "recognises the central role of the analyst in understanding the experiences of participants." Smith *et al*. (2009:1,2) explain that IPA is "phenomenological in that it is concerned with exploring experience in its own terms" and that it seeks to find significance when the "flow" of an experience is brought to the participants' attention.

In this study, there was an examination of the participants' personal experiences, which enabled me to understand the participants' understanding of the influence of the Pilates warm-up. Pilates, as a mind-

body exercise method, also shares the assumption with IPA that there is "a chain of connection between people's talk and their thinking and emotional state" (Smith & Osborn, 2008:54) although Pringle *et al.* (2011:24) explain that by focusing in great depth on an individual's experience of a given phenomenon, IPA is able to provide insights that can be applicable to the greater whole.

This IPA can be summarised as follows: *the group* consists of singers; *the phenomenon* under investigation is the effect of the Pilates warm-up and *the analysis* is the experiences of the participants in their bodies, singing and mind (see Table 1.1).

Table 1.1: Framework for the IPA

The group	Singers
The phenomenon under investigation	Effects of a Pilates warm-up
Analysis of the experiences of the participants	How it effects the singer's body, singing and mind

1.5. Research methodology

My research examined the impact and experience of the use of a Pilates warm-up in five singers using IPA. It further investigated if it could improve their well-being (both physically and mentally) and assist them as vocal performers. However, to study the impact of a Pilates warm-up on singers, the singers had to first learn a Pilates warm-up. The warm-up was broken down into three sections and taught over a study period of six weeks. The exercises were taught during three workshops. These comprised an hour's group lesson per day for five consecutive days. This resulted in a total of 15 lessons over the duration of the study. The participants were asked to practice what they had learnt in each workshop till the next workshop was convened. Each workshop developed the Pilates warm-up further. This enabled the participants to develop the strength, flexibility and understanding required to perform the exercises. Each participant was interviewed individually (using a semi-structured interview approach) during each workshop cycle, to provide the data set for the IPA. A focus group was held at the end of the final workshop to ascertain if any new information would come to light, to assist in the development of the IPA themes which had emerged in the analysis of the interviews and for purposes of triangulation.

In starting this thesis I had anticipated that through a Pilates warm-up, the singers would gain the ability to activate both the parasympathetic and the sympathetic nervous systems (which together make up the autonomic nervous system) through working on the central nervous system, to attain a state of physical and psychological readiness for singing and performance. While the psychological impact is something that a singer may well be able to express in words, I was curious to know if the effects of the warm-up on the nervous system would be reflected if measured using a basic measurement method, namely, by taking a pulse. These readings can be used to assess levels of parasympathetic stimulation. In neuroscience, heart rate variability (HRV) is used as a tool to gauge the state of balance between the sympathetic and the parasympathetic nervous systems. So, although I would be unable to measure HRV directly (as I did not have access to the equipment used by neuroscientists), I could use the literature on HRV and the influence of the warm-up on the pulse to infer and understand what the Pilates warm-up was doing to the participants in the study. Seeing what was happening to their heart rate and thereby their nervous system during the warm-up, provided a deeper layer of data that I could use to inform the IPA.

According to Pietkiewicz and Smith (2014:11), the data that is collected in an IPA undergoes three specific stages of analyses in order to enable the researcher to "develop higher levels of theories and insights". Pietkiewicz and Smith (2014:12) define these stages as follows:

- firstly, thoroughly reading and making noted commentary on transcribed interviews;
- secondly, finding common themes in these commentary notes;
- finally, recognising groups of similar important themes and naming them as well as assigning them with importance or relevance to the research.

In addition to the interviews and heart rate measurements, the participants were also given an application form, the same as would be used in a Pilates studio, outlining their goals and physical concerns (see Appendix 1) as well as questionnaires that assessed certain psychological traits. These questionnaires would help me to understand the participants and provide an objective 'before and after' data set to further the analytical process. The questionnaires used in this study assessed (see Appendices 2, 3 & 4):

- levels of depression using the Beck's Depression Inventory (Beck, 2018);
- levels of anxiety using the GAD-7 instrument (Spitzer*, et al*., 2006);
- quality of life using the RAND 36-Item short form survey instrument (RC, 2017).

These tools provided useful information as a baseline data set for the semi-structured interviews and to assess the changes that the Pilates warm-up may have instigated. No medical diagnosis was made from these assessments. Instead they provided a starting point for teaching the warm-up and a way to quickly get to know and understand the participants. The information in the questionnaires also assisted in qualifying subjective experiences. As the various psychological benefits of the Pilates method have been documented in different population groups using similar tools (e.g. Atilgan, *et al.* (2017), Resende da Costa *et al.* (2016) and Vancini *et al.* (2017)), the emphasis of the data collection in my research was to see how/if at all, any of these documented benefits affected them as singers.

Observations and notes taken during the lessons and the interviews were also used to create as full a picture of the participants as possible. There were five participants in this IPA. Four were advanced singing students at university level and the fifth was a seasoned professional opera singer. They were recruited through advertising at a music department and for the professional singer, through her interest in my work (see Appendix 5). Their participation was voluntary, and they all understood that they could leave the project at any time. The only requirement was that they were singers. They were informed of the purpose of the study and what was expected of them should they participate (see Appendix 6). They had to complete various administrative forms (see Appendix 7) and were assured of anonymity in my write up of their experiences.

My role as the researcher is recognised as an integral part of a successful IPA, as I provide the lens through which the participants' experiences are seen by the reader. Also, I had three distinct roles in this study, namely, Pilates Teacher, Singer and Researcher. These three roles provided very different insights into the analysis of the data and are crucial to this study. For example, my understanding of singing influenced how I taught the participants and corrected them which in turn affected their experience and therefore my research and analysis. In an IPA the results which emerge as themes are recognised as being an interpretation and therefore how I decided on these themes is important. Again, my three roles played a part, as for example, being a singer meant that I could ask pertinent questions about singing in the interviews. In the subsequent analysis of the data, I started by looking for repetition of words and commonalities that I could then label Singing. As a teacher, I could recall the process of how the participants learnt the exercises and where they struggled or excelled in the execution thereof. This invariably had an impact on my understanding of their process and therefore my interpreting their words as positive or negative in meaning or as showing progression in the themes that were emerging. Lastly, as a researcher, all these roles become intertwined in the cyclical process of an IPA and the quest for understanding. Therefore, the analysis develops beyond a study of words used in the interviews. Less quantifiable themes such as Well-being and Resilience emerge, and these are enhanced by the data from the psychometric questionnaires. Thus, as Figure 1.1 illustrates, the data informs the analysis which re-informs the data which provides further meaning as

I gain insight into the participants' understanding, through my own lens of understanding the subject matter.

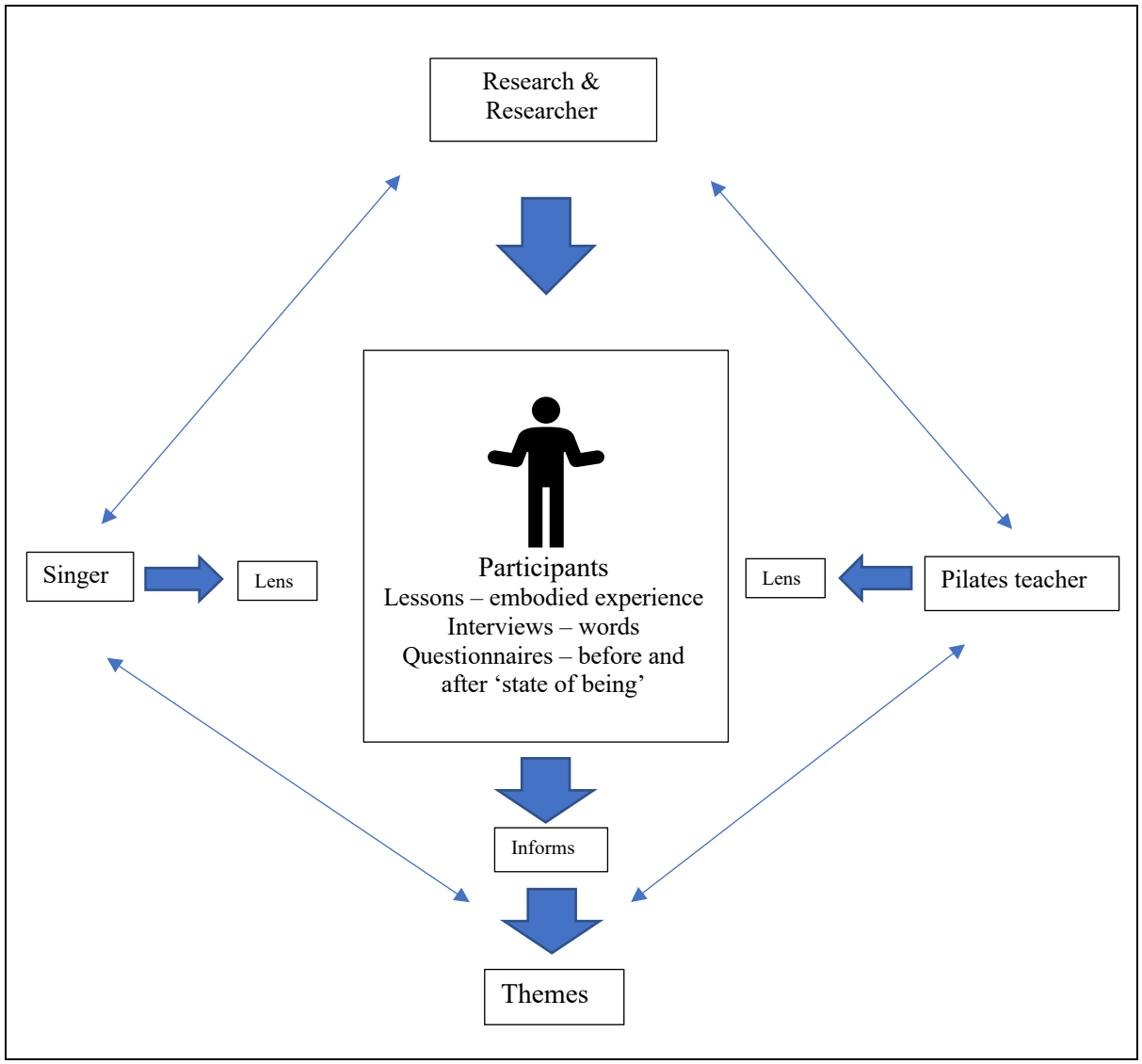

Figure 1.1 The cyclical IPA process and my three roles

1.6. Terminology used

Acronyms (see List of acronyms) and Latin anatomical names (put in italics in the text when I have used them but not when quoted from other research which has not used them or when the names have become known through common usage e.g. vertebrae) are used in this study as well as words less commonly used by singers and therefore some of the main terms (presented in alphabetical order) are described here:

Fascia: The myofascial web is a layer of connective tissue in the body which connects the muscles, tendons, ligaments and even the organs and nerves. It is now understood to provide sensory information and renders the concept of different muscles and parts of the body redundant as the fascia effectively connects all the parts and so turns it into one unit. It responds to the demands of the tensions placed on the body and provides a type of adaptive structural framework (MHF, n.d.:13-15).

Flow: This alludes to a balanced state of mind while performing, during which time there is little negative reflection on the self, coupled with a feeling of competence and clear mental focus on the task at hand. Peifer *et al.* (2014:62) explain that the "[f]low-experience is a pleasant state of absorption of a person during an optimally challenging activity".

Mindfulness: I have used this word to describe a mental state that can be focused on the present moment and physical action without judgement, so that the full experience of the present is possible without being encumbered by thoughts of the future or the past.

Nervous system: The nervous system comprises the brain and the spinal cord and the various branches of nerves that transmit information between the brain and the body. I have focused mostly on the central nervous system (CNS) and the autonomic nervous system (ANS) which is made up of the sympathetic (SD) and parasympathetic divisions (PD). The acronyms PD and PNS (parasympathetic nervous system), SD and SNS (sympathetic nervous system) are used interchangeably in the literature. I have used PD and SD as PNS can also stand for the peripheral nervous system which could then create confusion. The parasympathetic nervous system is also sometimes referred to only by way of the vagus nerve/vagal nerves, as this is the primary nerve of the PD. For singers this is an important consideration, as Dankbaar and Pameijer (2014:743) explain, that "[the] muscles that are responsible for vocal cord movement are mainly innervated by the recurrent laryngeal nerves. The recurrent laryngeal nerves are branches of the vagal nerves". The control of voluntary movement falls under the somatic nervous system (SNS) which is why I have tried to make it very clear which system is being referred to in the literature when the other acronyms have been used. For clarity when reading about these various parts of the nervous system, I have written the name out in full instead of using the acronym when it has not been used for some time. I have also used the term nervous system to refer to mental states and emotions. The nervous system is explained in Chapter 2 and Figure 2.1.

Neutral placement: This is a term used to describe an anatomically correct and balanced position of parts of the body so as to allow for optimal muscular engagements. For example, neutral spine (also called neutral pelvis) is used as the preferred position when lying semi-supine so as to provide "the most stable and optimal shock-absorbing position to be in" (Stott-Merrithew, *et al*., 2001:6). I have also used 'neutral' in reference to an anatomically correct position for the shoulders and the head.

Pilates: Pilates is a mind-body exercise method used to develop and condition the body. It is governed by certain principles which were devised by Joseph Pilates and which have subsequently been expanded upon since his death. These principles are further described in Chapter 2. It is a slow paced and focused activity carried out on a mat or on specially designed large equipment. It also makes use of 'props' to assist in maintaining alignment and specific muscular activations. The emphasis lies with the quality and accuracy of the movements rather than the quantity of the repetitions performed.

Pilates warm-up: This is the use of the Pilates method to prepare the body for an activity as opposed to a Pilates 'workout' which might have specific physical goals for the body for that particular session/s. Those goals might not take the succeeding activities into account (e.g. singing) and therefore do not guard against fatigue or muscular stiffness in general. However, the warm-up can be considered a Pilates lesson although a Pilates lesson might not be considered a warm-up. I have used the term warm-up and Pilates warm-up interchangeably when referring to my own Pilates sessions in this study. I have also referred to the process of learning the Pilates warm-up as 'lesson/s' although the exercises are the same. The difference lies in the format of the lesson/s and the explanations and physical manipulations involved in the lessons, which would not be present when the warm-up is used at home. However, for this study, the warm-up and the lessons are interchangeable when referring to the sessions taught in the study's workshops but not when referring to any other Pilates classes, for example in the literature.

Special Populations: This is Pilates jargon used to define the exercise needs of a particular group of people based on their physical activity/occupation or state of health. I have called singers a 'group' with this in mind, as I maintain that their needs are as specific as other unique Pilates groups covered under the term (e.g. professional athletes, pregnant women or golfers). Singers are distinguished by their vocalising and their needs in this regard makes them a unique or specialist group of people. However, due to Singers also being called Musicians, I have had to use all these titles interchangeably.

Prone: This is the word used to indicate that the person is lying face down on the mat.

Proprioception: This is the brain's ability to understand where it is in space. In other words, where for example your arms and legs are at any given point and what they are doing.

Singer: This is used in this study to denote a musician who is a vocalist. The literature refers to singers of different genres of singing and also to 'musicians', to which group 'singers' are assigned. In this study the word 'Singer' is also used, this is to show it as a title within a specific context. Unless stated specifically otherwise, the words singer/Singer/singing refer to classical singers and classical voice production.

Somatic or Mind-Body exercise: This is an approach that acknowledges that the whole person i.e. the body, mind and spirit, is involved in 'doing'. It recognises the two-way flow of information between the mind and the body and builds awareness thereof. It places the person inside their own bodily experiences. It is often used in the literature without a description of its meaning and is used interchangeably with the term mind-body (sometimes written as mind/body). Somatics is described as:

> study of the soma, which is not only first-person perception of the living body but is its first-person regulation. The soma is a unity of sensory-motor functions, some of which are conscious, volitional functions that have been learned and others which are unlearned and involuntary. The involuntary functions can be incorporated into the volitional system by the selective use of awareness to isolate the unlearned function and, by association, learn it – that is, make it part of the conscious functioning of the sensory-motor system (Hanna, 1991:34,35).

Supine: This is the word used to describe the way the person is lying on the mat – face up with the back on the mat and the legs down, also referred to as semi-supine when the knees are bent. These terms are sometimes used interchangeably.

Themes: There are various mentions of 'themes' in the study and these need to be differentiated from the 'Themes' which are a part of and a result of the IPA. The IPA themes and sub-themes are labelled and given appropriate names within the analytical process and results, whereas the themes within the rest of the study are general points of interest that inform rather than define. However there is some overlap between them.

Well-being: I have used this word when referring to a positive state of mind that is housed within a healthy, well-functioning and pain-free body. Wellbeing is sometimes used in the literature and is used interchangeably with well-being.

1.7. Outline of thesis

Chapter 1: Introduction

This chapter provides an overview of the study and the literature which informed my understanding of the relevance of my research. The chapter further describes the research questions and introduces the

research design and the methodology that was used. The terminology used throughout the study is explained and the layout of the chapters ahead is described.

Chapter 2: The singer's body and the Pilates method: a literature review

This is an interdisciplinary study that first investigates the many documented benefits of the somatic exercise method of Pilates in the literature and then links these benefits with the needs of the classical singer's mind, body and singing, as I understand them. Details within the varying fields of study are used to clarify and explain the processes and the effects of Pilates on the body. Particular emphasis is given to mental health with specific reference to the singer's body and nervous system. The role of the effects of stress and subsequent inflammation on the singer's body are also investigated, to highlight why the Pilates warm-up would provide benefit.

Chapter 3: The Pilates warm-up for singers examined

The Pilates warm-up itself is discussed in this chapter in anatomical detail, explaining the mechanics of the exercises and their muscular activations. This clarifies for the reader how the warm-up works and references its specific benefits for the singer. The chapter starts with the overall goals of the Pilates warm-up. The exercises are then divided according to the following functionality groupings (although these do overlap):

1. **Head and pelvic placement**: this explains how the relevant exercises in the Pilates method and the needs of the singers' vocal instrument converge. It also examines breathing for Pilates and for singers.
2. **Shoulder girdle**: the exercises which develop this region are examined. In particular, the phenomenon of the build-up of tension in the neck and shoulders of the singer.
3. **Spine**: the role of the spine and posture as well as the nervous system is explored within the relevant exercises which focus on spinal mobility and alignment.
4. **Pelvic stability and mobility of the hip**: this is explored with the singer in mind.
5. **Stretches**: the benefits of stretching and the four stretches used in the warm-up are discussed.
6. **Advanced exercises**: the use of some exercises which are not preparatory is explained.

Chapter 4: Research design and methodology

This chapter explains the research design that was used and the methodology that was followed. The central method that was used is IPA and this is explained and the choice thereof discussed. The chapter is broken down into sections, each of which examines a particular aspect of the research.

These sections cover the following:

1. The research philosophy used for this study was phenomenology as it forms the underlying philosophy in IPA due to its concern with the understanding of experience, which in this case was the experience of a Pilates warm-up. Therefore a brief introduction to phenomenology is presented.
2. Qualitative research is then introduced as the study's research approach.
3. IPA is explained and its compatibility with answering the research questions is examined.
4. The research methods are then investigated and with the aid of a diagram showing the process of data collection, the research process is described.
5. The data collection and the various instruments used are explored.
6. The process involved in the data analysis is documented.
7. Ethical considerations are discussed.

Chapter 5: Presentation of the data collected and analysed – making the case for a Pilates warm-up for singers

The results obtained from the data collected during the series of workshops in which singers learned the Pilates warm-up are reviewed as follows:

- The participants are introduced to the reader.
- The interviews are presented with an explanation of how the sub-themes of the study emerged and a table presenting these themes is displayed. Thereafter each participant's narrative is described with the IPA made visible. The emerging themes for each participant are summarised after each narrative.
- My role as researcher is then discussed and the various roles I performed in obtaining my observations are reviewed.
- The baseline data from the questionnaires and the heart rate measurements are displayed.
- The main themes of the IPA are presented in the narrative of the focus group.
- The main themes of the study, namely: Tools; Nervous System and Singing are discussed.

Chapter 6: Concluding this study, examining the shortcomings and the way forward

The findings are discussed in detail and thereafter, the conclusions are drawn. Limitations of the study to be noted and the way forward for future research is presented.

2. The singer's body and the Pilates method: a literature review

2.1. Introduction

This literature review provides an overview of Pilates, singing and performance demands as well as an understanding of the nervous system, stress and heart rate and how this relates to a Pilates warm-up for singers. A Pilates warm-up for singers is aimed at the singer's mind, body and voice. Therefore, these different aspects are linked in this study through the singer and more specifically, through the singer's body. Studies specifically on Pilates and the singer are rare, with Pilates more likely to be alluded to in a list of other somatic exercise methods (e.g. yoga and the Alexander Technique) than being the primary focus of the investigation. Therefore, this literature review has had to link literature from other disciplines to the singer and explain how these connections are pertinent. The Pilates exercises used in the warm-up are discussed in greater detail and with reference to the literature in Chapter 3.

Here, the Pilates method and the principles which underlie the method are first explained and the literature reviewing the benefits of the method discussed. An explanation of stress, the nervous system, anxiety and depression are investigated with specific reference to either singers or Pilates. Thereafter, the very limited literature available on singing technique in relation to Pilates specifically and the themes discussed in Section 2.3 is reviewed.

2.2. The Pilates method: what is it and what is it good for?

While Pilates has become familiar to the general public, it is not an easily definable exercise modality. Pilates is similar to tai chi in that the practitioner is required to move with fluidity in a slow and gentle manner. It is also similar to yoga's stretching and focus on breathing which creates a feeling of calm. It further shares the Alexander Technique's mindset of doing less and changing how a movement is approached and executed. Pilates combines all these elements. However, although the Alexander Technique is more widely used amongst musicians, the use of Pilates for musicians, and in particular for singers is limited. For example, in a review of the studies conducted on the use of the Alexander Technique for musicians, Klein *et al*. (2014:1) do not mention Pilates as a possible method for treating the musculoskeletal, respiratory and performance anxiety disorders that musicians face, although they do mention yoga. This underutilisation by the medical profession of the beneficial use of somatic movement methods for the specific ailments which are faced by performing artist is explained by Neely (2012:112) as being due to a "lack of specific training" which may also explain the paucity of research available.

The lack of use of Pilates by singers has, I believe to do with the use of Pilates by ballet dancers. This view is echoed by Neely (2012:114) who states that while Pilates is widely available, "few teachers approach […it] from a musician or singer's point of view". It was my background in ballet that led to my own discovery of Pilates. This discovery was to prove beneficial throughout my singing training and indeed ever since, as the Pilates method can address physical issues that impact the voice but which singing training does not adequately cover. While it might at first seem incongruous to have an exercise technique that is renowned for developing toned abdominal muscles, used in classical singing technique (known for abdominal breathing), there is much in both techniques which overlap.

That which today is referred to as Pilates, is an exercise method of body conditioning devised by its architect, Joseph Pilates at the turn of the previous century. According to Joseph Pilates (Pilates & Miller, 2012:24), "civilization impairs physical fitness". His thinking was much ahead of his time in that he viewed the body and its training holistically (Gallagher & Kryzanowska,1999:20). By focusing on the entire body, the mind and the person, Joseph Pilates claimed that his method could bring about fitness "by successfully countering the harmful inherent conditions associated with modern civilization" (Pilates & Miller, 2012:24). The Pilates method has grown and developed since

Joseph Pilates set up his first studio in New York in the 1920s (Robinson & Fisher, 1998:22) and it has subsequently become known around the world.

The Pilates method of body conditioning covers a vast array of exercises to be executed on a mat as well as on specialised Pilates equipment. Pilates teachers are currently taught by many different Pilates organisations, each with its own focus, due in part to the fact that Joseph Pilates did not have a teacher training programme and so his original students (each with their own experience of the method) went on to teach with their particular emphasis (Robinson, *et al.*, 2000:4; Robinson & Thomson, 1998:12). As a result, the word Pilates has become a generic term like yoga (Pilates & Miller, 2012:16) to describe a variable exercise system that has certain core principles that unite them under the name of Pilates. The Pilates systems used in this study and best known to myself are called STOTT Pilates, originating in Canada, Body Control Pilates from the U.K. and Pilates Conditioning as taught by the former Pretoria Technikon Arts Faculty (PTAF) in South Africa. These three Pilates organisations are but some of the many Pilates teacher training organisations and systems available worldwide.

The principles underlying the method, as per Joseph Pilates (Pilates & Miller, 2012:12) are as follows: "[b]reathing, [c]entering, [c]oncentration, [c]ontrol, [f]low and [p]recision". STOTT Pilates (Evans & Stott-Merrithew, 1999:1; Stott-Merrithew, *et al*., 2001:3,4) has added a modern perspective to the original method and instead "refer to a series of biomechanical body awareness issues that provide the basis for the exercises in the technique". The STOTT Pilates principles, building on the original principles (Stott-Merrithew, *et al*., 2001:3) are termed: "breathing; pelvic placement; rib cage placement; scapular movement; head & cervical spine placement" (Evans & Stott-Merrithew, 1999:1). Body Control Pilates (Robinson, *et al*., 2000:19) added two more principles to the original six principles and therefore has the following eight principles: "relaxation, concentration, alignment, breathing, centring, co-ordination, flowing movements, stamina". These principles all describe a particular way of working the body, in which the strain of any given movement is placed in the abdominal muscles, the *gluteal* muscles and the muscles of the shoulder girdle (in Pilates these three areas are commonly referred to jointly as the body's Powerhouse), as opposed to the muscles of the arms and the legs. This muscular emphasis requires a focus on breathing and continued concentration, in order to accomplish successfully.

Regardless of the modern Pilates' organisations' differences, the term Pilates is now synonymous with an exercise method that uses slow controlled movements, which are assisted by the use of specific breathing patterns. A study by Wells *et al*. (2012:259) determined that in the peer-reviewed literature, Pilates is generally understood to be "a mind-body exercise approach requiring core stability, strength, and flexibility, and attention to muscle control, posture, and breathing". Interestingly, these requirements could describe the process of singing.

The original Pilates studio was housed in the same building as the New York City Ballet (Robinson & Thomson, 1998:11) and many professional dancers were clients. Over time, Pilates became more mainstream, and the method had to change to accommodate the untrained, more sedentary body of the general public. As a result, the various stages of the Pilates method (beginners through to advanced; as broken down or adapted by the various Pilates organisations) can appear very different. This is especially true of the matwork component, which is an aspect of the method that has gained much popularity. The names of the exercises themselves have changed with each interpretation of the method and it can be confusing in the research literature to know what has actually been performed by the participants in a study, as there is no standard definition of the method (Fleming & Herring, 2018:91; Wells, *et al*., 2012:254).

However, despite this limitation, the physical benefits of Pilates are well documented. This is in tandem with ongoing research regarding the effectiveness of Pilates as a rehabilitative method (Byrnes, *et al*., 2018:192; Di Lorenzo, 2011:352). Pilates was found to be as effective as "conventional physical therapy" for "hospitalized chronic renal patients" (Sarmento, *et al*., 2017:517).

Byrnes *et al*. (2018:192,201) found that recent studies show that Pilates is effective for pain reduction. Cemin *et al*. (2017:369) found that there was moderate evidence to support the use of Pilates for neck pain. Pilates was found to improve posture awareness and aid in flexibility in a study of physical therapy undergraduate students (Atilgan, *et al*., 2017:644). Kim and Lee (2017:194) found that Pilates' emphasis on breathing "increased [the] activities of the trunk stabilizer muscles" which are important in the rehabilitation of back pain. Natour *et al*. (2015:67) concluded that Pilates was both safe and effective in the treatment of lower back pain. Pilates training was found to be beneficial in the treatment of chronic non-specific lower back pain by Mazloum *et al.* (2018:1003) in a six-week study, and by Cruz-Díaz *et al.* (2018:1252) in a twelve-week study. These findings are in line with a study by Lopes *et al*. (2017:108), who state that their study "emphasizes the importance of Pilates exercises on postural control" as part of the remedial treatment of non-specific lower back pain in young people. It was also found to be effective in "improving disability, pain, flexibility and balance" in an eight-week programme (Valenza, *et al*., 2017:753).

The Pilates method helped to "improve respiratory and cardiovascular performance" in inactive adults, thereby offering them an alternative to aerobic exercise (Tinoco-Fernández, *et al.*, 2016:270). A study by Giacomini *et al.* (2016:261), found that Pilates increased both the thickness of the abdominal wall and the respiratory strength in healthy adult women after eight weeks of training. The breathing technique used in Pilates (discussed in Section 3.3.2) was found to improve abdominal muscle activity by Barbosa *et al*. (2015:60) and to improve lung volumes (in patients with chronic obstructive pulmonary disease) in a study by Cancelliero-Gaiad *et al*. (2014:297). Furthermore, Pilates breathing was found to play a role in injury reduction of the torso (Kim & Lee, 2017:194).

Pilates has also proven to be effective in the treatment of mental health. A meta-analysis by Fleming and Herring (2018:93) found that although their study was limited and needed further investigation, the research supported the use of Pilates to improve mental health. In an eight-week study of Pilates for overweight/obese participants, it was found that Pilates was an "effective alternative approach to improve overall patient health, self-esteem, emotional and psychological state, mood and motivation" and that levels of depression and anxiety were improved (Vancini, *et al*., 2017:850). García-Soidán *et al*. (2014:846) found that Pilates improved both sleep and quality of life in middle-aged people, while a study by Roh (2018:197) found that Pilates made a positive impact on the psychological well-being of female college students.

In research examining the effects of Pilates on "psycho-motric capacity" by Iulian-Doru *et al*. (2013:662), it was found that the Pilates principles could be considered effective "psychological resources […] in the development of the psycho-motric capacity of […] adults". This mind-body communication element of the Pilates method lends itself to the development of mindfulness, which is "a mental quality associated with overall well-being" and was seen to increase with Pilates practice (Caldwell, *et al.*, 2013:141). According to Keng *et al*. (2011:1042), "current conceptualizations of mindfulness in clinical psychology point to two primary, essential elements of mindfulness: *awareness* of one's moment-to-moment experience *nonjudgmentally and with acceptance*." The focus and mind-body communication required in Pilates could be similarly described.

Rossi (1996:199) explains how over twenty years ago, the "current informational revolution in molecular biology facilitate[d] a new understanding of the phenomenology of mind, memory and behaviour". The brain is now understood to be an organ that changes "as a function of experience" and that with the learning of new motor skills, there are subsequent "plastic changes in the structure of cells in the nervous system" (Kolb, *et al*., 2003:1). According to Van Praag and Christie (2015:1), "exercise is a simple, low-cost intervention that promotes cognition and mood, [and] protects against damage associated with neurodegeneration". This links in with Joseph Pilates' consideration of the mind-body connection and belief that his exercises "build a sturdy body and sound mind" (Pilates & Miller, 2012:12).

The study of spinal cord injury has revealed that because the vagus nerve (which is part of the parasympathetic division of the autonomic nervous system; see Figure 2.1) communicates with

numerous organs in the body, "it provides the entry point to various neuroendocrine and neurotransmitter systems" (Edgerton & Gad, 2018:1). This research paper was developed from the perspective that the Pilates method can improve so many different areas of health due to its focus on the spinal cord and breath control, and therefore on both the central and autonomic nervous systems.

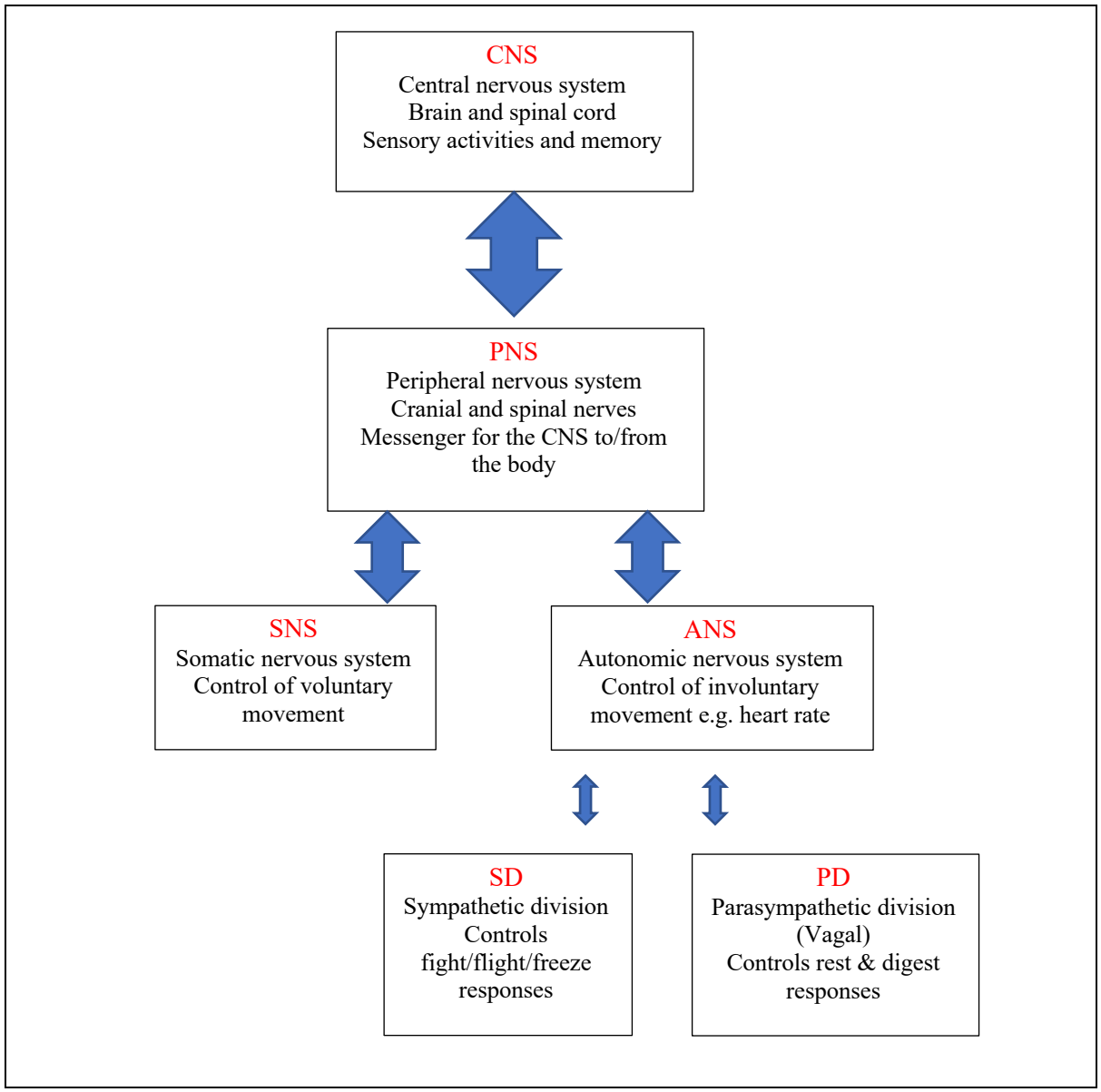

Figure 2.1 Nervous system explained

2.3. Stress, the nervous system, anxiety and depression: how must the singer cope?

De Bruin *et al*. (2016:1182) discuss how mental health issues and stress are synonymous with modern Western lifestyles. According to De Bruin *et al*. (2016:1182), "multitasking, speed, competition, and constant time pressure" can lead to stress. Kemeny (2003:124) explains that "[s]tressful life experience can have significant effects on a variety of physiological systems, including the autonomic nervous system, the hypothalamic-pituitary-adrenal axis [HPA-axis], and the immune system". This is because stress "can trigger a cascade of stress hormones that produce well-orchestrated physiological changes" (HHP, 2018). These changes start in the brain (in the *amygdala*). If required, the *hypothalamus* will activate the autonomic nervous system (ANS) which controls the body's

involuntary responses through its sympathetic division (SD) and the parasympathetic division (PD). The ANS and the HPA-axis work together to keep the body in a state of homeostasis (Gisselman, *et al.*, 2016:4). This is vital to good mental and physical health, as autonomic nervous system dysfunction is linked to depression and cardiovascular disorders (Sgoifo, *et al*., 2015:343). Roh (2016:494) found that Pilates had a positive effect on ego-resilience (the ability to adapt to stress) and depression in elderly women. Chronic stress can lead to health problems (HHP, 2018), due to the excess release of the stress hormone cortisol (Randall, 2011). Cortisol affects the immune system, blood sugar levels, ion regulation and even memory systems (Randall, 2011). If the ANS is not functioning correctly or if the HPA-axis is continually activated due to constant stress, cortisol levels will remain unnecessarily high. If the body is unable to deal with ongoing stress then a chronic inflammatory state can occur, which Liu *et al*. (2017:1,7) describe as "an essential component of chronic diseases". The sympathetic division of the ANS is an activating system (the fight or flight response) and is countered by the parasympathetic (also called the vagal) division of the ANS which is a more prohibiting system (the rest and digest response). This is too simplistic a description of this complex system according to Levenson (2014:102). However, it is sufficient for this study's basic purpose of understanding the role of the Pilates warm-up on the nervous system of the singer.

In a study of tai chi practitioners by Cole *et al*. (2016:62) it was found that tai chi "can acutely enhance vagal modulation, reduce the sympathetic modulation, and shift the sympatho-vagal balance towards enhanced parasympathetic dominance". In other words, it was found that tai chi could influence the ANS positively in favour of the PD. However, although research on the Pilates method shows that it can provide "a psychologically positive and calming effect" in elderly women (Roh, 2016:497), which suggests SD/PD balancing, I am not aware of any studies that have researched vagal modulation or increased vagal tone using heart rate (HR) monitoring or heart rate variability (HRV) testing in Pilates practice. McCraty and Shaffer (2015:58) suggest that the physiological systems which govern vagal activity can be manipulated through breathing. This could therefore be the link between the Pilates method and its value for singers.

McCraty and Shaffer (2015:47) explain that the heart rate "estimated at any given time represents the net effect of the neural output of the parasympathetic (vagus) nerves, which slow HR, and the sympathetic nerves, which accelerate it." Boudet *et al*. (2016:11) explain that "an increment in parasympathetic activity induces a decrease in heart rate". This is significant considering that in studies by Jensen *et al*. (2013:884) and Cole *et al.* (1999:1351), a high heart rate at rest or a delayed decrease after exercise showed a mortality prediction. Ogliari *et al*. (2015:E447-448) showed that "functional status decline" in older adults correlated with a "higher resting heart rate and lower heart rate variability". According to Bonaz *et al.* (2018:1) "stress inhibits the VN [vagus nerve] and has deleterious effects on the gastrointestinal tract" and according to Sgoifo *et al.* (2015:344), "several physiological systems that are important for health and disease have been linked to vagal function and HRV". In other words, these studies reveal the impacts of stress on the nervous system and why this is potentially bad for health, as well as reinforcing how both HR and HRV measurements can provide an accurate description of health status and can measure the state of the ANS.

The data retrieved from HRV studies is much more complex than HR measurements, as HRV measures the time differences in the gaps between the heart beats. The timing of these gaps is analysed and thus the variability or lack thereof is measured. This variability shows the body's ability "to adapt to environmental and psychological challenges" (McCraty & Shaffer, 2015:46). McCraty and Shaffer (2015:47) do however point out that a slower heart rate allows for a greater amount of variability to occur than a faster heart rate does. As such, cardiovascular readings in the form of HR measurements can be used to identify possible vagus nerve/PD activation, as heart rate is known to be controlled by the ANS (Ogliari, *et al*., 2015:E448; Gisselman, *et al.*, 2016:1).

Pichon and Chapelot (2009:8) suggest that there is "a close relationship between mood disturbance and parasympathetic activity". In a study looking at the vagus nerve as the intermediary and mediator of the brain-gut axis, Breit *et al*. (2018:1,2) found that there is "preliminary evidence for gut bacteria to have beneficial effect on mood and anxiety, partly by affecting the activity of the vagus nerve" and

that it provides "an important link between nutrition and psychiatric, neurological and inflammatory diseases". A study by Martens *et al.* (2008:384) suggests a link between self-esteem and cardiac vagal tone. This is similar to the findings by Fredrikson and Gunnarsson (1992:60) which show that low confidence and high HR accompany "performance related tremor" in musicians with high performance anxiety.

Music performance anxiety (MPA) is a complex issue, the exact definition of which is still unclear, but which can include a large number of negative emotional states, including trait anxiety (Kenny, 2011:48). Kenny (2016:9) has a definition of MPA which includes the presence of "persistent anxious apprehension" and which can "occur comorbidly with other anxiety disorders". A study by Nielsen *et al*. (2018:147) leans towards the classification of MPA as "a very specific form of social anxiety confined to performance situations without affecting other social situations". However, in this study, the terms 'anxiety' and 'music performance anxiety' are used interchangeably and without reference to a specific definition, as it is not within the scope of this study to differentiate between the different states. Kenny (2016:8,10,12,15) recognises that "[t]erms such as *stress, anxiety*, *arousal* and *activation* tend to be used interchangeably" and that while performance requires some activation of the nervous system, there are differing needs between individuals, as each performer's optimal state of nervous system activation is different. Kenny (2016:25) further notes that in the treatment of MPA, the physical attributes of "[p]oor control over bodily tension [and] [p]erformance related musculoskeletal disorders" should also be assessed.

The vagus nerve innervates many of the muscles in the throat (larynx and pharynx) which allow for voice production (Breit, *et al.*, 2018:2). Therefore, creating optimal vagal tone, which "has a therapeutic effect, mainly due to its relaxing and anti-inflammatory properties" (Breit, *et al.*, 2018:10), could be considered a task-specific goal for singers. This implies that the use of a Pilates warm-up for singers can have a direct influence on the quality of voice production.

2.4. Singing, the body and Pilates: how does it all fit together?

Van Mersbergen (2014:67) notes that recent times have seen a greater understanding of the voice and the science behind it but that "voice science frequently takes for granted the nerve that supplies the vocal folds with power and [which] gives them life" (i.e. the vagus nerve's role in singing). Trollinger (2010:21), in a summary of the research into the brain concerning both singing and language, states that singing is an activity which utilises the entire brain. In a study which examines the "complex inter-relationship between voice and self", O'Bryan (2015:123,124) states that "[p]erhaps the primary function of singing is communicating emotion, meaning and empathic relatedness through music and text". This is supported in the Polyvagal theory, as Porges (2001:123) explains that the "mammalian vagus is neuroanatomically linked to the cranial nerves that regulate social engagement via facial expression and vocalization". The vagus nerve can therefore be considered an important channel of communication between the brain and the body as well as between the body (the singer) and the world outside of the body, through the voice.

Sundberg (2000:183) states that "[m]usic and motion are closely related" and points to a similarity between patterns in music and movement (for example, walking and running) through both heart rate and breathing. Williamson (2012:7), an Alexander Technique instructor, states that "[*m*]*aking music and moving are inseparable*" and cautions against the idea of music as something being made outside of the body and not influenced by its state. Salonen (2018:90), for example, explains that "[p]ostural variations impair or assist breathing capacity and ease, and efficient movement with better biomechanics improves tone production in addition to being essential to injury prevention". Williamson (2012:43) points to the "necessary psycho-physical preconditions" (as understood in the Alexander Technique) required in breathing for singing. However, as Stuart (2013:317) explains, "central to the success of the Alexander Technique is that we must first become aware that our sensory appreciation of our movements may be at fault". This neurological element (mind-body communication) can be applied to the teaching of singing technique and is discussed by Juilliard

School professor Edith Wiens, in explaining how it is not only understanding that brings vocal progress but also the emotional involvement (by the student) which is an important facilitator in the vocal changes that take place in the singing student (Dunn, 2016:17).

However, the role of emotion in the voice can also be negative. In a case study of muscle tension dysphonia, Roy *et al*. (2017:184) identify that medically unexplained voice disorders can be given the psychological label of "conversion disorder". This implies that the vocal symptoms have an unresolved psychological basis which manifests as a dysphonia. Furthermore, as Roy *et al.* (2017:183) explain, the manifestation of voice is a muscular response to the instructions of the CNS and thus, while there are several theories, the true causes of dysphonia remain unknown. Other psychological models of the condition point to the fight/flight/freeze (SD) role in the inhibitory response to threat (Roy, *et al.*, 2017:184). The study by Roy *et al.* (2017:192) suggests that "emotion, arousal, or inhibitory mechanisms" are able to contribute to vocal disfunction and dysphonia. According to Levine and Frederick (1997:95), the fight/flight/freeze response is primitive and instinctive in animals (including humans), with the freeze option providing both an alternative to fighting or fleeing, as well as a possible "analgesic mechanism for minimizing the pain suffered at death". Levine and Frederick (1997:99-101) interpret that when the freeze state is not allowed to complete its natural cycle it can result in emotional trauma (a state of highly charged energy locked in the nervous system). In order to discharge this state of trauma, Levine and Frederick (1997:263-265) explain that "intolerable feelings and sensations" need to be "transformed", which happens partly through identifying and experiencing sensations in the physical body.

Being aware of physical sensations is also an important aspect of singing (Dunn, 2016:17). Asher (2009:12) states that "[t]he more we understand the neuromusculoskeletal systems involved in posture and breathing, the more efficient the training can be for students of voice performance". Asher (2009:17) further points to the use of "mind-body techniques […] for training proprioceptive control" in the singer. Asher (2009:126) concludes that "Pilates exercises have specific objectives that can directly benefit singers' objectives in their study and practice of singing" although this remains untested (Asher, 2009:127).

Influential singing teacher, William Vennard (1909–1971), recognises the "importance of incorporating anatomical and physiological research into the study of singing, as well as fostering collaboration between singers, physicists, psychologists and voice scientists" (USC, 2018). Vennard (1967:35) further points to the importance of exercise for the singer and states of singing that "[t]here is probably no other skill in which general fatigue or debility will show more plainly". However, Vennard (1967:35) also cautions the singer against the use of exercises that are potentially harmful to the voice.

In a study examining health and safety issues for musicians, Foxman and Burgel (2006:311) discuss that "[l]ittle research exists supporting warm-up exercises prior to repetitive activities preventing musculoskeletal injuries", and advise the use of bodywork programmes such as The Alexander Technique as part of a preventative programme. A study by the Royal College of Music in London in 2006, discloses that little emphasis is given towards education in the care and prevention of health issues of music students, despite growing evidence that prevention is possible (Williamon & Thompson, 2006:413). It is unclear whether any follow-up study has been done to discover if this situation has improved, but a perusal of music college websites shows that music student health is getting more attention. Conversely, Salonen (2018:11) states that, despite the advances in the field of performance art medicine, there is still resistance to embrace its application.

Singing is in itself a physical activity, which according to Kang *et al.* (2018:390) can be used to increase energy and exercise the body, and has been linked to many benefits both in terms of health and well-being. This has led to the use of singing as a therapeutic exercise for patients (Kang, *et al*., 2018:390) due to the positive physical and mental changes it is linked to and it was concluded that further studies are required in this field. Despite these health benefits, it is possible that the singer can suffer from "structural abnormalities or muscular patterns" which are beyond the scope of a singing

teacher to assist with and which could benefit from a movement therapy such as Pilates (McCarther, 2012:50). McCarther (2012:4) explains that incorrect physical alignment can adversely impact the singer due to the build-up of excess tension. However, physical tension is not the only source of concern for the singer.

A 2017 report by Help Musicians UK (Gross & Musgrave, 2017:6) identifies that, "[a]lthough the causes of mental health problems are multi-faceted, there appears to be a perceptible and uncomfortable link between the epidemic of mental ill-health amongst musicians, and the working conditions within the music industries". It is unfortunately beyond the scope of the individual singer to change the music industry, however, it is within the ability of the singer to develop positive strategies in response to stressful situations. One such strategy is the development of mindfulness which has been shown to assist the regulation of emotional arousal and improved mental health (Weinstein, *et al*., 2009:383-384). In a study exploring the benefits of Pilates on the ego-resilience of elderly women, Roh (2016:496) discovered improvements in "[s]elf-confidence, communication efficiency, optimistic trait, and anger management". I infer that if Pilates can assist in the development of ego-resilience in one 'population group', it could provide the same benefit in another (i.e. singers) and might help them change the appraisal of stressful situations. This appraisal can influence both the mental state of the singer and their ability to attain a state of flow in singing.

Peifer *et al*. (2014:66) were able to "confirm from a physiological point of view that flow-experience is characterized by a moderate level of arousal, as reflected through sympathetic and HPA-axis-activation". They further proposed that "situational demands that are appraised as challenging – and not yet as threatening – can lead to flow-experience" (Peifer, *et al.*, 2014:66). While the role of the parasympathetic nervous system was seen to be important, it was also acknowledged that too much activation of the vagus nerve might be detrimental to the flow state (Peifer, *et al.*, 2014:66-67). A state of balance in the nervous system is therefore required if a state of flow is to be achieved (Peifer, *et al.*, 2014:68). As the state of the nervous system is directly impacted by the appraisal of situations, the impact of stress on the singer therefore becomes an important consideration.

According to Randall (2011), "[p]roper stress management takes on great importance given the wide range of bodily systems impacted by stress hormones" and concludes that stress is to be expected in life and that understanding it can help to assist both the body and the mind in maintaining balanced physical systems. This is important for the singer, as stress was found to possibly "contribute to laryngeal difficulties when combined with other risk factors" (Lundy, *et al*., 1999:73). In a review of the effects of stress on the voice by Giddens *et al*. (2013:390.e22) it is argued that voice changes due to sympathetic nervous system activation of heart rate and bronchodilation could be expected, as for example in "increases in fundamental frequency (f0), sub-glottal pressure, jitter, shimmer, maximum airflow declination rate, voice onset time (VOT), vocal intensity, and speaking rate". However, although they recognise the role of the sympathetic nervous system in stage fright, they state that some activation of the HPA-axis can also improve performance due to the "mobilization of energy resources and directing attention and memory" (Giddens, *et al*., 2013:390.e24). Finally, Giddens *et al*. (2013:390.e26-27) recognise that stress manifests differently according to the individual and gender, and that increases in fundamental frequency could be explained by "stress-associated tensing of the musculature, specifically the cricothyroid muscle". Barefield (2012:61,63) points to the need to help the young singer recognise and deal with the physical tensions and stresses caused by fear. Although stress can negatively affect the voice, it also has further reaching negative health implications (Braun, *et al*., 2016:235). According to Liu *et al*. (2017:1), "[s]tress is the common risk factor of 75%–90% [of] diseases, including the diseases which cause the foremost morbidity and mortality". They found links between stress and inflammation with metabolic disease, depression, neurogenerative diseases and cancer (Liu, *et al*., 2017:4-7).

Yet, damaging as the inflammation caused by stress is, a study by Silva-Magosso *et al*. (2017:3) found that exercise (of no specific type) was more effective in countering the inflammation caused by obesity than diet alone. This impact of exercise on the body is consistent with the conclusion drawn

by Petersen and Pedersen (2005:1158) that "regular exercise protects against diseases associated with chronic low-grade systemic inflammation".

2.5. Conclusion

Melton (2001) states that "[s]elf knowledge and work on the self, [..] is the domain of Pilates training" and suggests that using a movement modality in voice work can assist in increasing the singer's awareness and "performance energy". Soprano Renée Fleming partly attributes her weight loss to Pilates, and states that "[t]he best part of it is the intense focus on core strength, which we singers need almost as much as dancers" (CFM, n.d.).

Making the argument for Pilates as a warm-up for the singer is based on the documented list of positive outcomes of the Pilates method on various population groups. The Pilates method differs from other exercise modalities in that it provides the practitioner with tools for using the body effectively. Whereas the Alexander Technique can show the practitioner where tension is being held in the body and can be of great benefit to the singer, Pilates provides both the tools for releasing this tension and a means of strengthening weaknesses or imbalances in the body that are the causes of tensing. Knowing that the body holds tension and being able to do something about it are two very different issues. The same can be said for muscular weaknesses that might be the cause of misalignment problems and pain.

Considering that pain can alter both bodily use and function, as well as influence neuromuscular input (Devasahayam, *et al*., 2016:201), the singer would be at an advantage both physically and in terms of neuromuscular activations, if the body is first warmed up (prepared) for use in singing. The benefits of exercise for health and stress control are now known, however, the singer has many issues to consider when exercising and the build-up of tension and stiffness are just some of these. In the same way that yoga prepares a practitioner for meditation, so the Pilates method prepares the practitioner's body for working (in this case, singing) and 'living'.

There are many strenuous exercises in the Pilates method which the singer might want to avoid; in the same way as a singer who enjoys running is not likely to run in the scorching sun or run a marathon and hope to sing well the next day. However, a Pilates warm-up designed for singers can circumvent these issues. Of the vast array of Pilates exercises that are available to the singer for home practice (as opposed to in a Pilates studio), I deduced that a warm-up which focuses on singers' needs is an optimal addition to a singer's routine and well-being and could therefore help the singer's physical and mental state.

The literature shows the numerous therapeutic effects of Pilates and it is my belief that a singer who is feeling physically and mentally well should be able to sing better than if they are plagued by pain or discomfort. Pain can be a limiting factor in living life optimally and can diminish the singer's quality of life, thereby further adding to the stress of being a musician. Lastly, the musculature, beyond the larynx which houses the voice, can be warmed up and prepared for optimal vocal function by using a Pilates warm-up. Saxon and Berry (2009:51) suggest that the "science of exercise physiology" can be applied to the singer and that physical conditioning can be of benefit to the singer. Sandage and Pascoe (2010:84) further this argument by stating that the available exercise science literature can be used to inform both the treatment and care of the voice.

In this chapter, the Pilates method was introduced, and its known benefits discussed. In the next chapter, the Pilates exercises used in the warm-up for singers are investigated in detail and their benefits for the singer explained.

3. The Pilates warm-up for singers examined

3.1. Introduction

In this chapter, the Pilates warm-up exercises will be explained and discussed in greater detail. The overall goals of the warm-up are discussed first. Thereafter, the main muscular activations of each exercise will be noted and specific considerations towards the singer's needs will be examined. The exercises described here were taught during one hour lessons which were presented over three five day workshops, each workshop built on the previous one and progressed in complexity and challenge to the singer.

The exercises are discussed in their own chapter subheadings, organised by exercise groupings (Sections 3.3.1–3.3.7) with various possible pseudonyms for the exercises. This is necessary as most of the exercises in this study are not the original 'classic' Pilates exercises but are derivatives thereof. The development over the years of the many international Pilates teacher training institutions (for example Body Control Pilates in the U.K. and STOTT Pilates in Canada) has resulted in the original exercises being adapted and renamed. Due to the various philosophical outlooks and the emphases in body training differing between institutions, a distinction is made between the classic and the new exercises in the Pilates method and therefore only the classic exercises are known by their original names. The newer exercises in the Pilates method have come about due to the general public being in need of substantial 'pre' body training before being able to attempt the classic repertoire of mat exercises as devised by Joseph Pilates. Hence, the various Pilates institutions have tackled this issue with different variations of the original classic exercises and named them accordingly. This can add to the confusion in the literature studying Pilates and makes replication of the findings challenging (Byrnes, *et al*., 2018:201). I have therefore tried to address this issue by providing some known pseudonyms.

3.2. Overall goals

The warm-up used in this study is one that I have put together for myself over the many years that I have been performing. It is my version of a Pilates warm-up and I present it only as an example of how Pilates exercises could be used as a warm-up by singers and for the purposes of this study. There are many other choreographic choices that might be used to warm up a singer's body but which is beyond the scope of this study to explore. I found the most benefit was gained vocally and for performance if, upon completion of the warm-up, I could feel both energised as well as relaxed, physically warm but not tired and comfortable in my movements without any aches or strains. In creating this warm-up as a Singer, I was concerned about very specific outcomes for my body, as vocalising and performing optimally were the primary goals. These singing specific goals for the body as an instrument can be described as:

- Creating a state of physical relaxation so that the voice can flow with ease;
- Warming up the body to physically support the voice;
- Releasing the neck and pelvis so as to sing without undue strain;
- Freeing the ribcage and diaphragm and strengthening the entire breathing mechanism for better breath control;
- Working on shoulders and posture due to their effects on the voice;
- Freeing the spine due to its direct influence on the nervous system and thereby pre-performance nerves; and finally,
- Promoting stability and mobility in the body so as to move with ease while singing.

The exercises I have chosen (in over two decades of using Pilates) are simple and gentle and are mostly the entry-level beginner's versions of the STOTT Pilates (Evans & Stott-Merrithew, 1999; Stott-Merrithew, *et al*., 2001), Pilates Body Conditioning (Robinson, *et al*., 2000; Robinson & Fisher,

1998; Robinson & Thomson, 1998) and Pilates Conditioning (PTAF, n.d.) methods as these constitute the bulk of my Pilates training. Effectively warming up the body's smaller internal muscles, as per the Pilates methodology of working internally and gently (Kim & Lee, 2017:195; Pilates & Miller, 2012:40) is a way of exercising that has labelled Pilates as the thinking person's exercise (Memmedova, 2015:548; Selby & Herdman, 1999:10), as it requires the practitioner to work with specific muscles which they are usually unaware of (Memmedova, 2015:545). According to PTAF (n.d.), a central component of the Pilates method is "that the body must be actively trained and controlled through the discipline of the mind". According to Park *et al.* (2018:81), "[w]arm-ups appear to provide psychological and physiological preparation for exercise performance […] they seem to have a meaningful effect on athletic performance by affording psychological stability, preparation, and confidence".

The specific goals of the warm-up of the body as a vocal instrument are noted here in anatomical terms as pertains to some of the main muscular activations of the exercises (see Table 3.1). A detailed analysis of the exercises follows in Section 3.3 which discusses both the specific needs of the singer and links these to the muscular goals of the exercises. The investigation of the exercises in Section 3.3 also gradually shifts from my voice of experience as a practitioner towards the voice of the researcher and teacher in this study.

Table 3.1: The overall anatomical goals of the warm-up exercises for singers

1.	To gently relax the myofascial tissue, *cranium*, neck and lower back.
2.	To warm up and align the spine and the nervous system.
3.	To activate and stretch the muscles of the rib cage and *thoracic* spine.
4.	To stretch, strengthen and warm up the diaphragm, abdominal muscles, the pelvic floor and the musculature of the larynx.
5.	To warm up and strengthen the *intercostal* muscles and the muscles around the rib cage.
6.	To warm up, strengthen and release the hips as well as the six internal *gluteals*.
7.	Rotation of the spine and stretch of the *pectoralis* muscles of the chest.
8.	Shoulder girdle stabilisation.
9.	To activate the *thoracic* spine in extension and strengthen the upper back, *gluteals* and back line.
10.	To stretch, strengthen and relax the spine deeply, especially the cervical spine and the cranial-cervical connection.
11.	To strengthen and stretch the primary hip flexors, hamstrings and *gluteals*.

3.3. Detailed description of the exercises, with specific reference to the singer

Subheadings 3.3.1–3.3.7 describe each of the warm-up exercises in detail. The exercises are discussed in relation to their muscular activations as well as their function. The exercises are further analysed in relation to the singer's specific requirements of the body as an instrument of voice production. The exercises are grouped together by use, explained in detail and are further linked to the specific needs

of the singer (see Table 3.2 showing how the exercises were grouped together for the purposes of linking their relevance to singers).

Table 3.2: Exercises grouped together by goals for singers

Subheading name	**Exercises**	**Goal/s discussed**
3.3.1. Relaxation	Tense and release guided exercise	Relaxation and stress
3.3.2. Head and pelvic placement	Ball Squeezes and Principles 1 and 3	Correct head placement and cervical spine release and its relevance for singing.
	Ball Squeezes and Principles 2 and 3	Correct pelvic placement in relation to the singer.
	Ball Squeezes and Principles 4	Optimal breathing
3.3.3. The shoulder girdle	Shoulder Girdle Relaxation; Arms to Overhead and Arm Circles	The correct use of the shoulders and their impact on singing. Co-ordination of strength and movement for the singer.
	Chalk Circles	Opening across the front of the chest and its impact on posture.
3.3.4. The spine	Spine Curls and Hip Rolls	The alignment of the spine and the role of a balanced nervous system.
	Side Bends and Saw combination	Strengthening the back, stretching the spine laterally and stretching the diaphragm.
	Swan Dive preparatory exercises	Understanding and creating good posture.
3.3.5. Pelvic stability and mobility of the hip	Knee Openings and One Leg Circle preparatory exercises	The hip joints mobilised and strengthened.
3.3.6. Stretches	Shell Stretch; Sitting Stretch; Hamstring Stretch and Hip Flexor Stretch	The removal of tension and the positive outcomes of stretching on the nerves explained.
3.3.7. Advanced exercises	Basic 100/Ab prep	*Cranio-vertebral* flexion
	The Roll Over	Spine and neural stretch

This study's warm-up for singers has moved away from a classic Pilates lesson plan and starts gently with the use of a relaxation exercise. Joseph Pilates started his lessons with an exercise called "The Hundred", which requires a large amount of strength, suppleness and coordination (Pilates & Miller, 2012:45). A variation of The Hundred is instead used as an advanced exercise in the warm-up and is described at the end of the chapter. Note that the Pilates exercises used here have as their focus the goals for singers and these goals therefore differ slightly in muscular emphasis to a Pilates class for the general public. Finally, the exercises and goals are linked to the general themes of the study as reviewed in Chapter 2 and their application to this study's outcomes.

3.3.1. Relaxation

As one of the primary goals of the Pilates warm-up for singers is to assist the singer in maintaining a relaxed state of mind prior to performance, a relaxation exercise was added to the start of the warm-up. Whilst not a classic Pilates exercise, I have found that it often takes a little while at the start of a Pilates session for the practitioner to become engaged with the body in a productive way and therefore this warm-up starts with a body scan 'tense and release' guided relaxation to prepare both the body and the mind for the work to come.

Body Control Pilates has a body scan exercise called "Relaxation Position" which is used to remove excess tensions in the body and the mind (Robinson, *et al*., 2000:28). The relaxation exercise used in this warm-up is called "Progressive Muscle Relaxation" (Benson, 1993:139). This exercise is one of the known triggers for something called the "*relaxation response*", which is the opposite of the 'fight or flight' response (Benson, 1993:128). As this warm-up is aimed at assisting singers to prepare for performance, it is a useful tool for keeping the 'fight or flight response' (i.e. activation of the SD) under control. HHP (2018) recognise the difficulty of reducing stress once the stress response has been triggered. However, they recommend Dr Benson's "relaxation response" as well as "[p]hysical activity" and "[s]ocial support" as effective tools for alleviating stress. Having the relaxation exercise at the start of the Pilates warm-up, would likely assist in reducing stress and inhibiting cortisol production, as well as activating the PD, thereby keeping the HPA-axis balanced (HHP, 2018). These benefits are further developed and discussed in the discussion of the spine in Section 3.3.4.

3.3.2. Head and pelvic placement

Correct alignment of the head and the pelvis are very important in the Pilates method. This placement is discovered and reinforced through an exercise sequence I have called Ball Squeezes and Principles 1-4. It is a grouping of four exercises that fit together seamlessly to create one exercise unit. The overall goals of this choreography are to gently relax the myofascial tissue, the *cranio-vertebral* junction, the neck, the lower back, and to entrench the Pilates principles in the body and mind. This is accomplished through the conscious application of the Pilates principles to the movements.

Ball Squeezes and Principles 1: Here the singer is taught to find the optimal alignment of the head (*cranium*) and neck (cervical spine) through movement. Robinson and Thomson (1998:18) state that finding correct alignment is important because the "body is a closed system – if one part is out of alignment, then the whole structure is altered".

The exercise is a variation of the STOTT Pilates exercise called "head nods" (Stott-Merrithew, *et al*., 2001:13,26) and the Body Control Pilates exercise "chin tucks" (Robinson, *et al*., 2000:50,51). The muscular activations and goals of this exercise are to stretch and strengthen the neck and the *cranio-vertebral* junction to allow for optimal head placement. Due to the small range of motion used in the gentle flexions and extensions of the head and cervical spine, the deep and intermediate posterior neck muscles are activated and stretched (see Table 3.3 which shows the muscles activated and stretched).

Table 3.3: Deep and intermediate neck muscles (Calais-Germain, 1993:67-72)

1.	*rectus capitis* posterior major and minor
2.	*obliquus capitis* superior and inferior
3.	*longissimus capitis*
4.	*iliocostalis cervicis*
5.	*spinalis capitis*
6.	*semispinalis capitis*
7.	*splenius capitis*
8.	*splenius cervicis*

The deep anterior muscles of the neck are also activated and stretched, namely: the *longus colli*; the *rectus capitis*; the *longus capitis* and the *scalenes* (Calais-Germain, 1993:75-78) as well as the large *sternocleidomastoid* muscle (Calais-Germain, 1993:80). Furthermore, the gentle rubbing motion of the back of the head on the mat throughout the sequences provides stimulation of the myofascial backline which helps to enhance proprioceptive feedback (Myers, 2011). Proprioceptive feedback is the body's ability to process sensory information in order to control and understand where it is in space (SPDA, 2018).

Head placement is especially important for singers. In a study of vocal fatigue Gilman and Johns (2017:131.e1) noted that altered head placements went in tandem with perceptions of undesirable levels of vocal effort and fatigue. Gilman and Johns (2017:131.e3) concluded that head position affects optimal laryngeal functionality. The Alexander Technique also places much emphasis on head and neck placement (Craze, 2003:22; Robinson & Fisher, 1998:20). However, bearing in mind that there are different postural types (Robinson, *et al*., 2000:13-16) and a myriad of personal variations in posture between individuals, finding the correct alignment of the head is not a simple task. According to Craze (2003:22-24) a fundamental part of the Alexander Technique called "primary control", is the process of finding the correct alignment of the head without knowing what it actually is. Ali (2002:94), states that posture "is determined by (a) the state of the spine and (b) the strain and stress that the person faces". STOTT Pilates maintains that the "cervical spine should hold its natural curve" and that in movement it should "continue the line created by the thoracic spine" (Stott-Merrithew, *et al*., 2001:12-13). Therefore, while incorrect placement of the head is easily seen, due to individual postural and physical differences, it can be difficult to self-correct as the head is not 'placed' in isolation of the rest of the body and its various flaws. Forward head posture is becoming a common modern postural problem due to the use of computers and other electronic devices, fortunately Pilates has been demonstrated to "significantly improve head posture" (Lee, *et al*., 2016:2011).

The value of this exercise lies in the proprioceptive opportunity for the singer to find an optimal alignment of the head and cervical spine in a semi-supine position. The correct muscles are stretched and strengthened, independent of vocalising and standing, and a new muscular pattern is given the opportunity to become engrained in the singer's body.

Ball Squeezes and Principles 2: This exercise aims to find correct pelvic placement. Where and how the pelvis is placed during an exercise is another fundamental part of the Pilates method. By moving the pelvis into its two extremes of placement, this exercise is therefore useful in order to find the anatomically correct neutral alignment of the pelvis to the spine, while simultaneously stretching and gently activating the *iliopsoas* and lower back (especially the *quadratus lumborum* and *erector spinae* muscles).

Joseph Pilates used the term "Spine to Mat" (Gallagher & Kryzanowska, 1999:13) as the basis for all the exercises. However, modern Pilates has moved towards the concept of a neutral spine (Evans & Stott-Merrithew, 1999:1; Robinson, *et al*., 2000:31) as it is better suited to correct postural alignment (Robinson & Fisher, 1998:29,30). This exercise is therefore devoted to finding the placement of both neutral spine and the original "Spine to Mat" position (Gallagher & Kryzanowska, 1999:13), called an "imprinted spine" by STOTT Pilates (Evans & Stott-Merrithew, 1999:1).

As mentioned, the most important muscular activation in this exercise is of the major hip flexor, the *iliopsoas*. Comprised of two muscles (the *iliacus* and the *psoas*) that share a common tendon, the *iliopsoas* acts on both the pelvis and the lumbar spine (Calais-Germain, 1993:214). The *psoas* is the primary hip flexor and "also provides postural support for the lumbar spine, sacroiliac, and hip joints" (Baracos, 2017:2). It is therefore a very important muscle. However, the *iliopsoas* is often extremely tight and overly dominant though not necessarily strong when people first start doing Pilates (personal observation). I have found that bringing this muscle to the awareness of the Pilates student through both a tactile and an anatomical exploration, is the first step in its effective use. Once the *ilispsoas* muscle has been self-located, the Pilates student can become aware of the tension that is held in it and subsequently brings the muscle under conscious control in order to strengthen it and use it effectively. Baracos (2017:2) states that "[l]ocalised psoas atrophy" can be found in lumber pain of both known and unknown origin. There is therefore a muscular balance that is required to move the pelvis in this exercise. The abdominal muscles must activate to flatten the spine towards the mat, simultaneously requiring the hip flexors to release and mobilise for the movement to occur (Mazloum, *et al.*, 2018:1002,1003).

Robinson and Thomson (1998:19,32) explain the importance of the placement of the pelvis in relation to the spine and that to achieve good posture, the pelvis' placement must be correctly 'angled'. As with the isolation of the *iliopsoas* (explained above), re-programming a body's incorrect habitual muscular preferences, requires that these preferences are first brought to attention, imbalances corrected through strengthening and stretching and a new muscular habit taught (Robinson & Fisher, 1998:23-25). Ware (1998:49) explains that the body's correct alignment "is extremely important in setting up the right conditions for coordinating the vocal process". Vennard (1967:19) states that in singing, the pelvis should be aligned under the head and chest so that the tailbone is "tucked in" and furthermore that there will be a certain amount of abdominal activation required to keep the pelvis "upright".

There is unfortunately not a standard instruction that fits all bodies. This is because different postural types (see Section 3.3.4) will have a completely different manifestation of where optimal pelvic placement lies. Understanding what a body's particular muscular preference is in relation to habitual posture (Mazloum, *et al.*, 2018:1003) will be helpful to the singer if a different placement of the pelvis is required. For example, a singer who has an excessive lordotic curvature (hollow back/over-arched lower back/anterior pelvic tilt) would benefit from advice about tucking the pelvis (Vennard, 1967:19; Ware, 1998:50). Conversely, a singer with a more flatback posture (flattened lower back with a tucked, posterior tilted placement of the pelvis due for example to tight *gluteals* and hamstrings) would find the same advice counterproductive. The singer's own postural peculiarities and muscular preferences, including the *iliopsoas* muscle could manifest as short or long or tight or weak or any combination of these, and therefore it could be a very frustrating and futile demand on the singer's physiology to expect a different pelvic placement while singing, if the muscles that control that placement are unable to deliver the required action on the bones of the pelvis. This exercise would therefore be of benefit to the singer by assisting the singer to find an optimal pelvic placement by finding and understanding the prevailing muscular preferences and then correcting and/or stretching and/or strengthening as needed.

Ball Squeezes and Principles 3: The third part of the routine combines the previous two exercises discussed above. This combination requires coordination (which is known to improve with the Pilates method (Tinoco-Fernández, *et al*., 2016:266)) and concentration and effectively activates and stretches the two extremities of the spine at the same time. For the singer to attain optimum posture

for singing might require that the pelvis and head are consciously placed in neutral while standing. Joseph Pilates (Pilates & Miller, 2012:27) explains that one of the results of his method "is gaining the mastery of your mind over the complete control of your body". By experiencing movement in these two extremities of the spine and the subtle movements required, coupled with an understanding of their personal muscular manifestations, the singer is enabled to find a neutral placement at both ends of the spine beyond the warm-up.

Ball Squeezes and Principles 4: This is the most challenging exercise of the sequence. It requires a neutral placement for both the head and the pelvis; stabilisation of the torso using a lateral breathing pattern (discussed below) concurrent with the activation of the *transversus abdominis* muscle (TAM) and the pelvic floor (Kim & Lee, 2017:194); as well as the conscious release of the *iliopsoas* muscle (PTAF, nd). This requires an immense amount of concentration, as the exercise combines all the previous placement sensations and conscious muscular activations, while introducing a new focus on breathing with the activation and strengthening of the pelvic floor and the TAM in isolation of the hip flexors. It is a variation of Body Control's "Pillow Squeeze" which aims for spinal elongation, width across the back and the release of tension (Robinson & Thomson, 1998:114-115).

Breathing is vital for singing and is a notable and beneficial feature of the Pilates method (Cruz-Díaz, *et al*., 2018:1251; Kim & Lee, 2017:195; Memmedova, 2015:545; Pilates & Miller, 2012:12; Tinoco-Fernández, *et al.*, 2016:270). According to Sundberg (1992:50) there are huge demands placed on the respiratory system when singing, which means that at any given moment in a song, the lung volumes might not be ideal for the phonatory state required and therefore the singer has to be able to maximise subglottal pressure by using the "three different forces that contribute to this volume" (Sundberg, 1992:53). Sundberg (1992:50,52) explains that these three forces are muscular, elastic and gravitational and that "subglottic pressure is dependent on the activity in different respiratory muscles plus the lung volume dependent passive elasticity forces, plus the posture dependent influence of gravitation".

At first glance, the lateral (*intercostal* muscle activation) breathing required in the Pilates method might seem incongruous to the abdominal and diaphragmatic focused breathing of singers. The diaphragm is the primary muscle of inhalation (Ratnovsky & Elad, 2005:261; Gray, 1858:240) and works in tandem with the abdominal muscles which are muscles of exhalation (Gray, 1858:236). Melton (2001) explains that the Pilates method's lateral breathing technique can be of benefit to singers as it "opens the back portion of the ribs and develops awareness and strength in that part of the body". La Pine (2008:27) cautions singers that musculoskeletal stress can build up in the chest and neck and that this stress would affect the larynx negatively. Therefore, it can be argued that the lateral breathing technique used in Pilates would help the singer to dissipate any stress manifesting in the rib cage (Stott-Merrithew, *et al*., 2001:4) and keep upper body mobility (Robinson & Fisher, 1998:31); mobility being the antithesis of tightness.

Ware (1998:85) states that a combination of the "middle and low torso breathing" is the most effective for singers. Ray *et al*. (2018:644.e26) explain that singing requires a synergistic control of the muscles of respiration, of which the *intercostals* are an important part, as they play a role in both inspiration and exhalation. If the singer is required to balance the activity of all the muscles of respiration (see Table 3.4), it follows that all of these muscles should be in good working order.

Table 3.4 Primary muscles of respiration (Calais-Germain, 1993:88; MHF, n.d:4.; Sundberg, 1992:50)

Primary Muscles of inspiration	**Primary Muscles of expiration**
Respiratory diaphragm	Internal *intercostals*
External *intercostals*	Abdominals (comprised of four layers)

As there are other muscles involved in the breathing process apart from the *intercostal*/diaphragmatic relationship discussed above, the TAM/diaphragmatic relationship will be further discussed here as it is pertinent in both singing and in Pilates. Sundberg (1992:60-61) studied two different approaches to breathing in singers. The first he called the "flaccid diaphragm technique", whereby the singer activated the diaphragm solely during the inhalation and then only intermittently as needed. The second he named the "co-contracting diaphragm technique" in which the diaphragm and abdominal muscles were used together continuously. Both of these approaches are strategies to control lung volumes and subglottal pressure. Sundberg (1992:60-61) thereby concluded that "breathing strategy affected the voice control mechanism".

During singing, the abdominal muscles and in particularly the TAM, assist in establishing pressure within the abdominal cavity, which in turn controls the lung volume levels, through the return of the upward motion of the contents of the abdominal cavity and the rise of the diaphragm (Mac Donald, *et al*., 2012:815.e14; Rubin, *et al.*, 2011:221; Sundberg, 1992:50). The TAM is vital for the control of subglottal pressure "as it is unique in structure interdigitating with the costal component of the diaphragm as it attaches onto the distal ribs" (Rubin, *et al.*, 2011:221) and is "the only muscle of the abdominal wall to enjoy such an association with the diaphragm" (Mac Donald, *et al.*, 2012:815.e14). An important point to note is that singers do not always engage the TAM predominantly, as Rubin *et al*. (2011:218) discovered in singers with muscle tension dysphonia – these singers had an over activation of the abdominal muscles called the 'internal *obliques*' (IOM), which is a muscle of expiration. In other words, these singers contracted the ribcage instead of keeping it open.

This exercise gives the singer the opportunity to both feel and strengthen the *intercostal* muscles, the diaphragm and the TAM, and to release unwanted tensions. The TAM is actively engaged and strengthened through the conscious engagement of the deep pelvic floor muscles (Stott-Merrithew, *et al*., 2001:5). The TAM is further utilised for every forced exhalation which is used as the accompaniment for all the movements in Pilates (Gallagher & Kryzanowska, 1999:13). By breathing laterally while lying in neutral spine and by activating and utilising the TAM and the pelvic floor, this exercise will also assist in developing stability of the lower back, which is a well-documented benefit of the Pilates method (Kim & Lee, 2017:194; Memmedova, 2015:545; Tinoco-Fernández, *et al*., 2016:266).

3.3.3. The shoulder girdle

The shoulder girdle comprises the 'shoulders' (*glenohumeral* joints), 'shoulder blades' (*scapulae*) and 'collar bones' (*clavicles*). It is a large area, that includes the middle and upper back, upper chest and the shoulders. As a structure, the shoulder girdle must be both flexible and stable (Calais-Germain, 1993:97). In Pilates, special attention is given to the activation and use of the shoulder girdle. In the warm-up for singers, the muscles which act on and around the shoulder girdle are first relaxed and then taken through a mobilisation and strengthening process. The muscles which act on the shoulder girdle are listed in Table 3.5.

Table 3.5: Muscles of the shoulder girdle

Posterior	Anterior
Trapezius (upper, mid and lower fibres)	*Pectoralis* (major and minor) and *subclavius*
Rhomboids (major and minor)	*Sternocleidomastoid*
Latissimus dorsi and *teres* major	*Biceps brachii* and *coracobrachialis* (arm muscles)
Rotator cuff muscles (*subscapularis; supraspinatus; infraspinatus; teres* minor)	*Deltoid* (upper arm muscle)
Levator scapulae	*Serratus anterior* (also elevates ribs in respiration)

According to Selby and Herdman (1999:24), the upper body is the location for holding the stress of daily life. For example, the upper *trapezius* and the *erector spinae* muscles can be adversely affected by the choice of carry bag/handbag and the way it is carried and this can have an influence on "musculoskeletal pain caused by asymmetrical muscle activity" (Lee, 2017:2). Rubin *et al.* (2007:479) explain that the "sternocleidomastoid, levator scapulae, trapezius, and the splenius, "bind" the neck to the shoulder girdle". Vennard (1967:27) describes the action of the shoulder muscles for singers as being "*practically all inspiratory*" and cautions that if this action of the shoulders is allowed to manifest in singing it can "easily lead to tension in the throat". In other words, there is good reason for singers to keep their shoulders 'down', alternatively described in Pilates as shoulder girdle stabilisation.

However, stability is not to be confused with tension. Tension implies overwork to the point of incapacity, whereas stability implies readily available strength. Furthermore, it is also useful to remember that some of the muscles which act on the shoulders also act on the head and neck (for example the upper fibres of the *trapezius* muscle and the *levator scapulae* muscle). The *omohyoid* muscle is a muscle that depresses the larynx due to its attachment to the *hyoid* bone and originates on the *scapulae* (Ariyasinghe, n.d.). This means that the shoulder blades and the larynx have a muscular connection. It is therefore reasonable to presume that a raised larynx can impact on the *scapulae* rising and *vice versa*.

Calais-Germain (1993:118) points to the overwork of the upper fibres of the *trapezius* muscle as often being the cause of pain and headaches. Da Silva Vitor *et al.* (2017:518.e11) found pain to be present in the neck and shoulder region of teachers (independent of voice problems) and stated that "high vocal demand, effort of speech, and muscular tension are all common factors in the appearance of musculoskeletal pain". In a review of the effects of Pilates, Cemin *et al*. (2017:369) were able to conclude that there is "moderate evidence" to support the use of Pilates for addressing neck pain, as "this method promotes […] functional improvement after a short period of time". Rounded and hunched shoulders are another common postural distortion (Atilgan, *et al*. 2017:642; Robinson & Thomson, 1998:46) which is also addressed by the correct use of and strengthening of the shoulder girdle. In other words, correct neck and head position and shoulder girdle stabilisation are inextricably linked. Subsequently, for the correct alignment of the head and neck to manifest, shoulder girdle stabilisation must be active and is therefore of the utmost importance to the singer.

The following exercises, named here as Shoulder Girdle Relaxation; Arms To Overhead and Arm Circles and finally Chalk Circles, are discussed individually. As a group, they strengthen the shoulder

girdle and relax the muscles, increase proprioception and increase the range of motion in the *glenohumeral* joint.

Shoulder Girdle Relaxation: This exercise is a variation of Body Control Pilates' "Shoulder Drops" (Robinson, *et al*., 2000:48) and STOTT Pilates' "Scapula Isolations" (Stott-Merrithew, *et al*., 2001:11). The main goals of this exercise are to locate and isolate the scapular movements in order to create a neutral position of the *scapulae* and to release tension in the muscles of the upper back, especially the upper trapezius. This is accomplished by doing protraction, retraction, elevation and depression (i.e. moving together, apart, up and down) of the shoulder blades with the arms lifted to shoulder height. The exercise ends with the *scapulae* 'held' in the newly found neutral position, which generally requires less use of the upper *trapezius* and more activation of the lower *trapezius* and the *rhomboids* (Stott-Merrithew, *et al*., 2001:10). From this neutral position of the shoulders, the next exercise commences.

Arms to Overhead and Arm Circles: Lying semi-supine, in neutral spine with a small ball between the knees for alignment and activation of the inner thighs, pelvic floor and TAM, this exercise continues the work on the *scapulae* stabilisation started in the previous exercise. It is a variation of STOTT Pilates' Arm Circles exercise (Stott-Merrithew, *et al*., 2001:25). The movement of the arms to an overhead position works on both the mobility of the shoulders and challenges the shoulder girdle's stability (as the shoulder blades' inclination is to lift with the arms). The weight of the arms requires increased activation of the abdominal muscles and the muscles of the torso (e.g. the lower *trapezius*, the *latissimus dorsi* and the *serratus anterior*) to maintain the correct alignment of the rib cage and spine (PTAF, n.d.; Stott-Merrithew, *et al*., 2001:8 & 25; Robinson & Thomson, 1998:62).

The inhale in this position creates a challenging situation, as an abdominal breath is likely to create extension in the spine at this point, which would undo the alignment of the neutral spine. A lateral breath is also difficult to accomplish, as the weight of the arms and the increased stability expected of the muscles in the rib cage, torso and abdominals almost makes the inhale impossible. It is at this point that the exercise has its highest value. This contradiction of muscular activation co-conditions to create the position, must be worked *within*, and must not be undone (i.e. *working within* the framework set up by the *opposing physical forces* creates the *strength*). By breathing laterally, the ribs are forced to expand posteriorly at the junction of the ribs to the vertebrae of the spine. The *intercostals*, the diaphragm and the abdominals must all work together against the stability that has been set up in the torso but not undo it. This creates a moment of release and stretch in the spine whilst at the same time strengthening all the muscles involved in the complex action. This is a conscious coordination of breathing muscles which can benefit the singer. The addition of the arm circles serves to increase the shoulders' mobility and range of movement, as well as to challenge the coordination and desire to grip any of the muscles involved in the movement. The ideal outcome of the exercise is movement with strength but without gripping in tension.

Chalk Circles: The "Chalk Circle" in this warm-up is a variation of Body Control's exercise of the same name (Robinson, *et al.*, 2000:136; Robinson & Fisher, 1998:122). STOTT Pilates has a variation called "Spinal Rotation" (Stott-Merrithew, *et al*., 2001:21) and Body Control has a further variation called "Arm Openings" (Robinson & Thomson, 1998:113). However, the exercise does not appear at all in the classic Pilates matwork repertoire as it is a modern addition, aimed at teaching spinal rotation (Robinson, *et al*., 2000:136; Stott-Merrithew, *et al*., 2001:21) and opening the front upper chest by stretching the *pectoralis* muscles and the *anterior deltoids* (Robinson, *et al.*, 2000:136; Robinson & Fisher, 1998:122; Robinson & Thomson, 1998:113) thereby countering an excessive postural *kyphosis* (rounding of the upper back).

It is a very relaxing exercise that requires good pelvic stability whilst at the same time allowing the spine to lengthen and release into rotation. The inhalation at the most 'open' part of the movement challenges the posterior fibres of the diaphragm as well as the external *intercostals*. These primary muscles of inspiration are thereby strengthened by the opposing forces, applied both by the stability of the lower body, as well as the engagement of the abdominals. The weight of the upper body and the

moving arm provide the stretch for the front of the chest (*pectoral* muscles). If the head is allowed to follow the line of the spinal rotation then the muscles of the neck (including the *omohyoid* muscle mentioned previously) are also provided with an opportunity to stretch.

In a study of the effects of 'spinal manual therapy' for pain in the upper body, Chu *et al.* (2014:220) state that "[p]ain in the upper quarter may result from local musculoskeletal dysfunction, peripheral nerve entrapment, or referral from the cervical or thoracic spine". It is my opinion that Pilates, through exercises such as the Chalk Circle, provides a type of self-help tool for use on the *thoracic* spine and neck, by releasing tension and concurrently stretching the anterior muscles of the torso, thereby providing relief from neck pain. Lee *et al*. (2016:2011) note that "any improvement in thoracic kyphosis is closely related to an improvement in FHP" (Forward Head Posture). According to Ghanbari *et al*. (2008:622) "[f]orward shoulder posture (FSP) or "rounded shoulders" is one of the numerous deviations from normal posture" and has a negative impact on pulmonary function. In other words, the forward and rounded placement of head and shoulders can have an impact on breathing.

Therefore, to conclude this section on shoulder girdle stabilisation and its relevance for singers, exercises that strengthen the shoulder girdle and release tension in the spine and muscles in the neck and chest will help to improve *kyphosis*, forward head posture, rounded shoulders, effective breathing, and neck pain. Furthermore, it is pertinent to note that Chu *et al.* (2014:223-225) suggest that "a mechanical stimulus at the cervical or thoracic spine in humans is capable of producing an SNS excitatory response" (Sympathetic Nervous System). It is not unreasonable to deduce therefore, that this SD response, as found by Chu *et al.* (2014:223-225), should apply to the Pilates method's 'work' on the spine. This would make the Chalk Circle exercise a useful ANS activator and it is this activation, I believe, which is of great benefit to the singer. However, further research is required to verify this.

3.3.4. The spine

The exercises used to specifically act on the spine in the warm-up are the following: Spine Curls, Hip Rolls, Side Bends and Saw combination (my own variation) and the Swan Dive preparatory exercises. They have been chosen for their focus on releasing, aligning and strengthening the spine and thus by default, working on the nervous system. These exercises are discussed in their own chapter sub-headings after the spine and the nervous system are investigated in relation to the singer.

The spine is composed of 24 bony vertebrae which are grouped into the cervical (neck)*, thoracic* (chest) and lumbar (lower back) regions, plus the sacrum which is comprised of five fused *sacral* and three or four *coccygeal* vertebrae (Calais-Germain, 1993:30; Kapit & Elson,1993:21). The spine is "the main support system for the torso and the head", but, "without […] muscles, it is not able to support internal organs" (Ali, 2002:57). The vertebrae allow for flexion, extension, and rotation of the spine and house the spinal cord (Calais-Germain, 1993:32-39). The spinal cord and the brain together form the central nervous system (CNS) (Vos, 1961:63).

The nervous system's role is to prompt the body to react to internal and external environmental changes (Vos, 1961:63). The ANS is a part of the Peripheral Nervous System (PNS) and consists of the SD and the PD. These two divisions are also known as 'Fight or Flight' and 'Rest and Digest' which simplistically depicts their reflexive functions. The relationship being antagonistic, these two divisions together create a state of balance within the body (Howse & McCormack, 2000:35). Emmons and Thomas (1998:65) highlight the importance for the performer to develop "the ability to relax the body and calm the mind" when performing under pressure, as tension and stress interfere with the singer's ability to mentally focus and vocalise optimally.

Kemeny (2003:124) explains that the term 'stress' "may refer to a stimulus, a response to a stimulus, or the physiological consequences of that response". Kemeny (2003:124) further states that 'distress' "is a negative psychological response […] and can include a variety of affective and cognitive states, such as anxiety, sadness, frustration, the sense of being overwhelmed, or helplessness". So clearly the

singer's physical, mental and nervous state (or nervous system) are inextricably linked with peak performance. Howse and McCormack (2000:35) describe how the SD of the ANS "is a stimulatory system and acts with adrenalin to prepare the body for action" and that the PD of the ANS "is inhibitory in type and tends to produce rest and relaxation in the body". Levenson (2014:100) aptly states that "[w]hen it comes to **emotion**, all roads lead to the **autonomic nervous system**", which means that emotions can cause physical reactions within the body. If this idea is reversed, in other words, if the body itself starts to become a source of 'stress' due to tensions, pain or restricted movement, then it becomes apparent that physical 'stress' can also easily become psychological 'distress' and thus a vicious cycle ensues. If one further considers this in the light of the various other stresses placed on the singer, then the importance of the ability to balance the sympathetic and parasympathetic reactions and their influence on the body through the Pilates warm-up, becomes apparent.

If it is possible to activate a nervous system reflex mechanically in one region of the spine (Chu, *et al.*, 2014:223-225) then it must be possible to both activate and soothe the nervous system by working on that area of the spine and indeed on the entire spine. Considering that the CNS consists in part of the spinal cord, it stands to reason that any tensions within the spine's intervertebral muscles (e.g. *multifidus,* rotators) could cause impingements of varying degrees. It is therefore also reasonable to conclude that any spasms/tensions within the spine would be likely to cause a negative ANS response, due to the vulnerability of the spinal cord within the vertebral column, to misalignments. I have concluded that the nervous system would be 'soothed' and thereby 'balanced' by releasing intervertebral tensions and strengthening the spinal muscles through the Pilates warm-up. According to HHP (2018), physical exercise can reduce muscle tension caused by stress and can also "stifle the buildup of stress" in the body.

Perceived stress releases first adrenaline and then cortisol into the body. Randall (2011) explains that cortisol "is the primary hormone responsible for the stress response" and that it has a homeostatic (balancing) role in the body. However, excess cortisol in the body can cause health and memory problems (King & Hegadoren, 2002:92,94). Cortisol levels increase as a result of the stimulation of the brain's HPA-axis and is a slower and longer response to stress (both in its increase and decrease) than the immediate adrenaline response of the ANS (Kemeny, 2003:125). The effect of even low level but chronic stress on the HPA-axis is likened by HHP (2018) to a "motor that is idling too high for too long" which keeps the sympathetic nervous system activated, causing health problems.

Achieving a healthy spine requires a combination of strength and flexibility coupled with a good balance of the supporting musculature. The Pilates warm-up for singers utilises the following exercises (discussed below) due to their simplicity and effectiveness in aligning, stretching and strengthening the spine without the danger of causing unwanted tension elsewhere in the body. As with all Pilates exercises, the specific muscular activations of each exercise are paramount.

Spine Curls: In the Spine Curls exercise the singer focuses attention on the spine and the vertebrae and tries to isolate and move each vertebra independently in a sequential manner. This exercise is a variation of Body Control's Spine Curls (Robinson, *et al*., 2000:45-46; Robinson & Thomson, 1998:50-51), STOTT Pilates' Hip Rolls (Stott-Merrithew, *et al.*, 2001:23) and Pilates Conditioning's Pelvic Press (PTAF, n.d.). The Spine Curl is a preparation for the Classic Pilates exercise called the Shoulder Bridge (Pilates & Miller, 2012:79; Stott-Merrithew, *et al*., 2001:58-59). The exercise mobilises and strengthens the spine, releases intervertebral tensions, strengthens the *gluteals* especially *gluteus maximus* and strengthens the hamstrings (PTAF, n.d.; Robinson, *et al*., 2000:45; Robinson & Thomson, 1998:50; Stott-Merrithew, *et al*., 2001:23).

The *gluteus maximus*, together with *gluteus medius, minimus* and the *tensor fasciae latae* muscles, act on the pelvis and legs to assist in moving or stabilising the pelvis, standing and walking (Calais-Germain, 1993:215-229; Kapit & Elson, 1993:53). *Gluteus maximus* is the body's largest muscle and is also "the major hip extensor" (Calais-Germain, 1993:228). As discussed previously, the primary hip

flexor, the *iliopsoas* muscle is often tight and dominant. Therefore, these two large muscles of opposing movements must find a working balance for correct alignment to manifest.

Hip Rolls: This exercise comes from Body Control Pilates (Robinson & Thomson, 1998:52-53) with some variations and is another spinal rotation exercise with all the same benefits of spinal rotation discussed previously. The upper body now becomes the fixed point, thereby requiring much more shoulder girdle and abdominal activation to maintain stability. As with the Chalk Circle exercise, there is an opportunity with this exercise to stretch the paraspinal muscles whilst simultaneously contralaterally stretching and strengthening the abdominals, especially the *obliques*. The chest and shoulders must remain 'open' but strong, which challenges the *pectoralis* muscles if they are used to pulling the shoulders into a forward/rounded posture. The neck muscles are also stretched, this time with greater resistance provided by the weight of the lower body's pull on the shoulder girdle's stability. Searle and Meeus (2001:88-89) explain the importance of this rotation exercise as a prophylactic against injury of the spine. It aids the release of tension in the midback region and stretches and lengthens the waist. The rotation of the ribcage causes a compression on one side and an 'opening' of the opposite side and this provides the opportunity to both stretch and strengthen the diaphragm and *intercostals* of the 'open' side (on the inhale), as there is a large amount of resistance due to the weight and shape of the position.

Side Bends and Saw combination: Most of the exercises in the warm-up are executed in a semi-supine position, however, the Side Bends and Saw are both seated exercises. I have amalgamated them into one exercise with the singer in mind. The Side Bend is a preparatory version of the classic exercise of the same name. The focus is on bending the spine laterally and strengthening the muscles of the back, namely the *lattisimus dorsi, quadratus lumborum, lower trapezius* and *serratus anterior* of the supporting side (Evans & Stott-Merrithew, 1999:17). When the Side Bend is combined with the Saw, its focus is modified to become a lateral stretch for the spine and the diaphragm. The Saw is a classic Pilates exercise (Evans & Stott-Merrithew, 1999:8; Pilates & Miller, 2012:65; Robinson, *et al*., 2000:168) which requires and encourages length in the hamstrings, strength in the paraspinal muscles (to maintain the seated position against the pull of the hamstrings) as well as length and strength in the *quadratus lumborum* and paraspinals (to rotate the spine and stretch forwards) plus good shoulder girdle stabilisation. This exercise very quickly makes any muscular deficiencies apparent and requires strong activation of the Pilates principles to accomplish successfully, thereby generating an active mind-body dialogue. The exercise can be modified (for example by placing a towel under the sitting bones) in order to aid the execution thereof. The combination of the two exercises develops in the singer, muscles that are capable of being both strong and supple at the same time. Strength in the back and torso without the build-up of tension being an important attribute in healthy vocalising.

Swan Dive preparatory exercises: The Swan Dive is another classic exercise (Evans & Stott-Merrithew, 1999:9; Pilates & Miller, 2012:67) which has been broken down into preparatory units for the warm-up. It is executed lying prone. These preparatory units require good abdominal engagement to maintain spinal support, as well as strong shoulder girdle stabilisation to support the head and keep the neck free from tension.

Posture is often a consideration for singers and is alluded to in various places in this study. A brief discussion about posture is pertinent here, as poor postural habits, especially rounding the shoulders, *kyphosis*, incorrect placement of the head and pulling the head forward (discussed previously) as well as excessive *lordosis* in the lumbar spine are brought into consciousness and rectified in this exercise.

The Alexander Technique recognises "that the relationship between head, neck and body influences the entire body posture and position" (Craze, 2003:10). In the Pilates method, Gallagher and Kryzanowska (1999:14,27) refer to posture as the "Pilates Stance" which they describe as "[s]tanding tall and lifted with your feet, heels together, in a "V" position", as well as maintaining "The Box" which is the lateral line visible from "shoulder to shoulder and hip to hip". While the term 'good posture' is often used and the lack thereof is generally visible, changing posture is difficult as there are various contributors to the emergence of 'bad posture'.

The problem surrounding the acquisition of bad posture lies in the large variety of influencers on the spine, which Robinson *et al.* (2000:13) have summarised as follows:

- Hereditary factors
- Injuries
- Illness, mental and physical
- Work-related factors
- Hobby/sport-related influences which can create muscle imbalances
- Environmental influences
- Emotional issues
- Sustained positions
- Repetitive movements
- Fashion and culture

All of these factors can play a role in the development of chronic bad posture which Ali (2002:94) states can cause muscular imbalances due to "the superficial spinal muscles permanently [engaging] in maintaining the bad posture, letting the deep muscles wither". In other words, once we start on the path towards bad posture, we are more likely to actively over-engage the wrong muscles and this causes further problems for the spine. Compression of the vertebrae for example, can lead to many different problems, like lower back pain, often described as "lumbago" (Calais-Germain, 1993:15). As mentioned, even in the absence of pain, poor posture and tensions in the spine can cause problems for the singer.

Spines exist in various forms, although all vertebral columns will have certain curves, namely (Calais-Germain, 1993:31):

- the convex curve of the *sacrum* (in the pelvis)
- the concave curve of the lumbar spine (the lower back)
- the convex curve of the *thoracic* spine (the upper back)
- the concave curve of the cervical spine (the neck)

However, Robinson *et al*. (2000:14-18) recognise that due to the stresses and strains placed on our bodies, ideal posture can turn into a combination or manifestation of the following posture types:

1. ***Kyphosis-Lordosis***: this manifests as a very curvy spine with a forward head, round upper back and hollowed lower back;
2. **The Swayback**: this is typical of a slouch which also has a forward head but with a forward placement of a tilted pelvis resulting in a flattened lower back;
3. **The Flatback**: no visible spinal curves and with a forward head and hyperextended knees.

Postural issues often require strengthening, stretching and re-education of the muscles of the spine, coupled with correcting muscular imbalances elsewhere in the body. The muscular activations required in the preparatory units of the Swan Dive include good *gluteal* engagement, required to stabilise the pelvis. The paraspinals, *latissimus dorsi* and *quadratus lumborum* are activated to "stabilize spinal extension" (Evans & Stott- Merrithew, 1999:9). According to Robinson *et al.* (2000:110), an "awareness of the scapulae moving on the ribcage" is also communicated, as well as an understanding of lengthening the spine while in extension. Considering that head placement is extremely important in the Alexander Technique and that Alexander himself "saw that his head was invariably not where he thought it was" (Craze, 2003:10), the Swan Dive preparatory exercises are ideal for understanding head placement and for strengthening and stretching the appropriate muscles which control this in the singer. In fact, the three "primary control directions" in the Alexander Technique which are "letting the neck be free, letting the head go forwards and up, and allowing the

back to lengthen and widen" (Craze, 2003:11), could be used interchangeably with the Swan Dive preparations' instructions for lifting the head off the mat in the Pilates warm-up for singers.

3.3.5. Pelvic stability and mobility of the hip

The pelvic region is comprised of various bones, ligaments and muscles which together carry the weight of the body and bear the impacts which move up the body from the feet (Kapit & Elson, 1993:29). The pelvis itself consists of two bones called the *coxal* bones (which in the adult are made up of the fused *ilium, ischium* and *pubis*) and the *sacrum*. There are two strong fibrous joints within the pelvis, namely the *sacroiliac* joint and the *symphysis pubis* (Calais-Germain, 1993:40-49).

The pelvis forms the juncture of the base of the spine and the legs at the hip joints. The hip joint is a ball and socket joint that must have a good range of movement and strength to allow for everyday movements (Calais-Germain, 1993:175). This combination of mobility and stability is essential for maintaining pain-free movement in the lower back, hips and knees (Calais-Germain, 1993:175). If the full range of movement within the hip joint is diminished, the movements required of the hip joint are compensated for by incorrect muscular engagements and movements within the lower back and knees, which can lead to wear and tear and pain (own observation).

The two exercises discussed below have been chosen for their focus on building freedom of movement within the hip whilst maintaining pelvic stability. They build on the singer's growing awareness of a neutral spine learnt earlier in the warm-up (see 3.3.2) and challenge the developing musculature by the addition of movement and weight of the leg, thereby building the strength required to maintain correct pelvic placement while singing.

Knee Openings: This is a preparatory exercise that builds pelvic stability and freedom of movement in the hips. Called "Knee Drops" by Body Control Pilates (Robinson, *et al*., 2000:39), this exercise requires maintaining stability of the pelvis while moving the leg. According to Robinson *et al*. (2000:38), learning this coordination between holding on and letting go, "is fabulous mental and physical training as it stimulates that two-way communication between the brain and the muscles: real mind-body exercises". The lower abdominals must keep the pelvis stabilised while the one leg laterally moves away from the body, thereby getting heavier and challenging the stability and placement of the pelvis. The supporting (unmoving) leg must remain still and not counterbalance to provide an external stability. This combination of movement and the prevention of counterbalancing creates an effective strengthening (without tension/gripping) of the stabilising muscles of the pelvis.

One Leg Circle preparatory exercise: This exercise has two parts, namely: 'turning in and out' and 'circles'. It is broken down in this way due to the difficulty of the classic Pilates exercise from which it is derived. The classic "One Leg Circle" (Pilates & Miller, 2012:51) is the equivalent of the *grand rond de jambe en l'air* in ballet but it is performed lying down. None the less, it requires an enormous amount of flexibility, control and strength to execute and therefore in this warm-up for singers, only the preparatory versions of this exercise were considered appropriate.

'Turning in and out' is performed with a bent leg and works through the two extremes of lateral movement in the hip socket. The pelvis must remain stable while the one hip rotates. As the leg is raised and bent, there is added weight to the leg which further challenges the pelvic stability. The deep *gluteal* muscles are required to work in order to perform the movement (Robinson, *et al*., 2000:40). According to PTAF (n.d.) this exercise is also beneficial for relieving "nerve tension and tightness in the lower back".

The 'circles' are a progression from 'turning in and out'. The 'circles' require a release of dominance of hip flexor activity and takes the hip through its wide range of motion whilst maintaining pelvic stability through abdominal control. This abdominal control versus hip flexor dominance is an important tool to master (see Section 3.3.2), because "frequently the hip flexors become overly strong as they substitute for the transversus muscle in abdominal exercises" (Robinson, *et al*., 2000:43). In

other words, substituting abdominal strength for hip flexor strength is a commonly observed fault which the singer should guard against.

3.3.6.Stretches

The warm-up ends with stretching exercises to remove any excess tensions which might remain in the body. Stretching has positive effects on the body and is used in the treatment of lower back pain as it facilitates blood flow and relieves muscle tensions (Bae, *et al*., 2017:227). Norris (1999:iv) explains that "flexibility is of vital importance, for the musculo-skeletal system in particular".

Norris (1999:72-73) further states that bad posture, or any static position which the body has to hold for an excessive amount of time, can cause nerves to stretch for an overly long period (which causes a restriction of blood flow to the nerve). This causes the blood vessels to diminish in their capacity, resulting in localised swelling, scarring and restrictive nerve mobility, as a result of which, a cycle of further damage ensues. Stretching the nerves through stretching exercises, allows the nerves to regain mobility, thereby fostering healing.

The four stretches (Shell Stretch, Sitting Stretch, Hamstring Stretch and Hip Flexors Stretch) which complete the Pilates warm-up for singers, focus mainly on the spine and the pelvic/hip region. They are discussed here individually.

Shell Stretch: The Shell Stretch (Stott-Merrithew, *et al*., 2001:35), also known as "Rest position" (Robinson, *et al*., 2000:73; Robinson & Thomson, 1998:94) is primarily a stretch for the paraspinal muscles. It is a relaxing position and facilitates lateral breathing and breathing into the back of the ribcage, all of which are beneficial for singers.

Sitting Stretch: This stretch can take on various forms, depending on the suppleness of the practitioner. The two most common variations used in the warm-up are called "Exercise 55 – Gluteals" (Norris, 1999:114) and a variation of a yoga exercise called "Spinal Twist" (Kent, 2000:65). The aim is to stretch the *gluteals*, hips and the *iliotibial* band to assist in maintaining or creating mobility in the hip joints. Vennard (1967:19) alludes to tension in the *gluteals* during "strenuous voice production". Therefore, if the singer actively relies on the *gluteals* as part of their vocal technique, the Sitting Stretch would be useful for relieving built-up tension.

Hamstring Stretch: The *semimembranosus, semitendinosus* and *biceps femoris* together make up the muscles commonly referred to as the hamstrings. These muscles are situated at the back of the leg and are used for flexing the knees, as well as extending the thighs and "retroversion of the pelvis" (tucking), due to their attachment points across both the knees and the pelvis (Calais-Germain, 1993:221-223). Hamstrings can shorten for a number of reasons. Activities such as cycling, horse riding, rowing and even lengthened periods of sitting (this includes traveling) can cause shortening of these muscles if they are not stretched. According to Robinson *et al*. (2000:82-82), weak *gluteal* muscles can cause the hamstrings to compensate and as a result overwork and tighten.

Three types of hamstring stretch were used in teaching this warm-up for singers. Hamstrings are notoriously unpleasant to stretch and are generally very tight on starting Pilates (personal observation). As the warm-up was taught over a series of three workshops interspersed with home practice, there was time to develop the length in these muscles gradually. The availability of three different options which increase in efficacy and challenge, helped to facilitate home practice.

The first hamstring stretch introduced in Workshop 1 is a variation of Norris's (1999:88) "Exercise 3. Hamstrings – long sitting". Workshop 2 uses an adaptation of Stott-Merrithew *et al*.'s (2001:55) "Double leg stretch" which is itself a reworking of the Classic Pilates exercise (Pilates & Miller, 2012:56,57). It requires the use of a theraband (a long piece of elastic latex) which assists in carrying the weight of the legs, as well as in providing further resistance to aid the stretch. The final and most challenging version is introduced in Workshop 3. It is a variation of Robinson *et al*.'s (2000:82,83)

stretch. In this exercise all three hamstrings are likely to be stretched. It also provides an added stretch of the sciatic nerve through the addition of medially rotating the hip (Norris, 1999:76).

As short hamstrings can also inhibit general flexibility and make the lumbar spine vulnerable to injury (Robinson, *et al*., 2000:82,83), it is worthwhile for the singer to actively stretch the hamstrings regularly to prevent tension and injury. It is necessary to have a hamstring stretch in this warm-up for singers, as the hamstrings have been actively worked in the Spine Curls exercise and, if left unstretched afterwards, will become tight.

Hip Flexor Stretch: In Section 3.3.2 (Ball Squeezes and Principles 2), the hip flexors were actively sought out, worked and released. The hip flexor stretches develop awareness of these muscles further by once again seeking out the relevant muscles through the sensation of their activity and intensifying it. Robinson *et al.* (2000:47) note that prolonged sitting causes hip flexors to shorten which can alter the angle of the pelvis.

Pelvic placement was discussed earlier in the chapter but it is worth mentioning here that if the singer relies only on the abdominal and *gluteal* muscles to maintain pelvic placement for the sake of correct posture (Vennard, 1967:19) it can lead to a restriction in abdominal breathing (Vennard, 1967:19) which would be counterproductive. While Vennard (1967:19) suggests that the singer forgoes posture for the sake of abdominal breathing, I would like to counter that correct pelvic placement (i.e. good posture) can be maintained without excess muscular strain if the hip flexors are not tight and tense. This state of balance can be assisted by stretching.

The primary way to stretch the hip flexors (in particular the internal *iliopsoas* and the more superficial *rectus femoris* muscles) is to place the hips into extension, as this is the opposing movement for these muscles. I have chosen a simple sequence for the warm-up, which seamlessly flows from an internal stretch into an external stretch, by using a half lunge (Norris, 1999:92) which pulls the back hip into extension and thereafter lifting up the back foot to provide an external hip flexor stretch (to the *rectus femoris* muscle), as well as stretching the *femoral* nerve (Norris, 1999:89). However, this lunge can be painful on the knees and so various adaptations are used if required, especially in the beginning stages of the Pilates training.

3.3.7. Advanced exercises

In this section, two more exercises are discussed separately. The exercises described above form the basis of the Pilates warm-up for singers. However, there were also variations to the exercises that were required due to various physical limitations of the participants. Some of these are mentioned in Chapter 5 where pertinent.

The Pilates warm-up for singers is designed to be gentle and effective in warming up the body in preparation for optimal singing performance. Therefore, strenuous or overly challenging abdominal exercises have been avoided, as tight abdominal muscles would be counterproductive to effective breathing. However, there are two exercises that were added in the third workshop, once strength had been established, which were deemed important for the singer to have. The first is the 'Basic 100/AB prep' which strengthens the abdominals and the second is The Roll Over which stretches the spine. These exercises are discussed in greater detail here.

Basic 100/AB prep: As mentioned above, Joseph Pilates started his lessons with an exercise called "The Hundred". STOTT Pilates (Evans & Stott-Merrithew, 1999:2; Stott-Merrithew, *et al*., 2001:30) introduced an exercise called the "AB prep" as a precursor to The Hundred, however they still consider it a beginner's exercise. In this warm-up for singers, "The Basic 100" (PTAF, n.d.) is considered an advanced exercise and is therefore only introduced in the third workshop. The exercise requires flexion of the upper body whilst maintaining correct *cranio-vertebral* flexion. For singers to be introduced to this exercise too early is to expose the *laryngeal* and neck area to excessive tension if

done incorrectly. Therefore, I deemed it necessary to introduce the exercise much later on in the process, once placement and strength in the shoulder girdle and abdominals had been actualised.

A flexed upper body with *cranio-vertebral* flexion (The Hundred position) forms the basis for many of the classic Pilates exercises which are not explored in this warm-up for singers. However, the exercise does effectively strengthen all the abdominal muscles and assists in controlling stability of the pelvis and *scapulae*, as well as mobility of the upper back (PTAF, n.d.; Stott-Merrithew, *et al*., 2001:30). The Hundred also actively engages the most superficial abdominal muscles, the *Rectus Abdominis* (RA) muscle. The RA superficially connects the breastbone and adjacent ribs to the pubic bone. Its function is primarily flexion (bending forward) of the torso (Calais-Germain, 1993:95) but it will also assist in intense pressurisation of the abdominal cavity when this action is required, for example in defecation and childbirth or if "the spine be fixed, […] assisting in the process of expiration" (Gray, 1858:236). It is therefore pertinent for singers that this muscle is free of tension and able to function correctly. Vennard (1967:25) explains that due to the instinctive nature of the abdominal muscles, "[t]raining these muscles consists of conditioning these reflexes into patterns which are more efficient for singing". Therefore, The Hundred has value for the singer in that the exercise focuses on bringing the RA muscle under conscious control and training it to work with the other abdominal muscles in a slow and steady manner.

The Roll Over: The Roll Over is a classic Pilates exercise (Pilates & Miller, 2012:48,49). It requires a supple spine with sequential control, abdominal strength and long hamstrings. It is considered an intermediate exercise by STOTT Pilates (Evans & Stott-Merrithew, 1999:3; Stott-Merrithew, *et al.*, 2001:60,61) but has been included in the warm-up for singers as it provides a traction type of stretch of the cervical and *thoracic* spine and spinal cord (Norris, 1999:75). This neural stretch directly stretches the central nervous system and through the cervical traction element in the movement, the vagus nerve is targeted (own observation). It therefore also provides a stretch of the nerves which act on the larynx.

As this is a challenging exercise and can only be performed if the correct physical components are present, various assistance is given in the lessons. If the exercise is too challenging, then a preparatory version (Stott-Merrithew, *et al*., 2001:61) is given until the full exercise is possible, however this does not provide the benefits of the neural stretch. Norris (1999:74) cautions that some recovery time is required after a neural stretch to allow for full blood flow to resume.

3.4. Conclusion

The Pilates warm-up for singers consists of exercises taught over three workshops, progressing in challenge and complexity. The exercises each have their own muscular activations and goals which have been discussed here in relation to the human body in general and the singer specifically.

Joseph Pilates believed that "achieving the highest accomplishments within the scope of our capabilities in all walks of life depends on constantly striving to acquire strong, healthy bodies at the same time as developing our minds to the limit of our ability" (Pilates & Miller, 2012:11). Singers place specific demands on their bodies in order to achieve optimal voice production. Therefore, applying the Pilates method to singers, requires that "we adapt and embrace what is applicable and compatible" (Melton, 2001). The Pilates method itself has changed with time and is now divided into classic and modern Pilates. The warm-up for singers is a set of basic Pilates exercises that aims to prepare the singer's body for vocalising by stretching, strengthening and aligning the body. The mind-body component of Pilates and the work on the nervous system reduces stress and strengthens the singer mentally as well as physically. A strong, healthy body with good alignment, good posture and muscular engagements which are devoid of excess tension are possible for the singer, despite the demands placed on the singer through singing, performance and the stresses of modern life.

4. Research design and methodology

The literature shows many quantitative studies on the Pilates method which have provided the scientific basis for this study. However, there is a lack of research on the use of Pilates for singers specifically. This study sought to understand *how* singers would *experience* a Pilates warm-up. Bowman (2008:5) explains that

> [t]he primary way research improves music education, then, is by helping us approach new problems more intelligently, more imaginatively, more creatively, and more flexibly. And it does this not so much by discovering and dispensing facts as by helping us better understand problems and their significance for action.

A qualitative research method was therefore deemed the most appropriate and so the central method used in this study is interpretative phenomenological analysis (IPA). Understanding the 'how' in a new light falls under the research philosophy of phenomenology from which IPA stems. Phenomenology was developed by Edmund Husserl (1859 – 1938), a philosopher whose qualitative research method has had much influence on the psychological research of "human experience and behaviour" (Wertz, 2005:167). Therefore, to fully understand IPA, this chapter first explores the philosophy which underpins this type of research. Thereafter the approach and methods used in gathering the data are discussed and an explanation is given of how the data was analysed, before the chapter concludes.

4.1. Research philosophy: phenomenology

Phenomenology is used as the primary philosophy in this study, as it "aims to produce an account of lived experience in its own terms rather than one prescribed by pre-existing theoretical preconceptions" (Smith & Osborn, 2015:41). Pietkiewicz and Smith (2014:8) explain that phenomenology aims to "recognize what essential components make a given phenomenon special (or unique)".

Influential thinking from people such as Joseph Pilates (1880 – 1967) and Frederick Alexander (1869 – 1955), amongst others, have become part of the modern understanding of the body, movement and the importance of the mind-body connection. Called 'embodiment' by philosopher Merleau-Ponty (1908 – 1961), this term brought the significance of the body into the forefront of human experience (Reynolds, n.d.). In an exploration of Merleau-Ponty's work "Phenomenology of Perception", Gallagher (2010:184) states that "[t]he real beginning, for Merleau-Ponty, however, is the body". According to Juntunen (2004:16), Merleau-Ponty's writings "are one outcome of phenomenology's criticism of the mind-body dualism". Yet, much of the dualistic thinking of mind and body remains in Western society today, if not philosophically, then at least practically, as many people's lives become more sedentary. The less the body moves, the more difficult it becomes to move the body and the more separate the mind and the body appear to be. This echoes Juntunen's (2004:16) statement that "[t]he idea that intellectual processes exist somehow apart from our bodies is deeply rooted in our culture". Yet, the advancements in the field of neuroscience continuously show that the mind and body have little separation. For example, in a paper examining how health and stress are linked, Gianaros and Wager (2015:313) state that "integrative research that cuts across historically separated disciplines may help to define the brain-body pathways linking psychological stress to physical health" with neuroimaging which maps the brain helping to further the understanding of stress reactions in the body.

With this in mind, I set out to investigate how a Pilates warm-up (the phenomenon) might impact singers. By looking at singers from the perspective of their body and how they use it, what benefit might the Pilates method provide?

4.2. Research approach and design

The approach used in this study is qualitative. It makes use of first-person experience, which is inherently highly subjective. This is typical of an IPA data set, as this type of study is concerned with "exploring meanings" (Larkin & Thompson, 2012:103-104). The reader is taken through each participant's personal story in this study (as viewed and understood by myself). Each individual journey is chronicled in great detail so that the reader is left with a sense of the participants' trials and tribulations. This experience is analysed using IPA and the addition of some psychometric tools to help inform and contextualise the participants' experiences.

According to Wertz (2005:169), the phenomenological concept of "[i]ntentional analysis begins with a situation just as it has been experienced – with all its various meaning[s] – and reflectively explicates the experiential processes through which the situation is lived". This first-person view of an experience is valuable even though it is subjective, as it requires a suspension of "scientific preconceptions" to fully understand it (Wertz, 2005:168). The understanding of individual experience is further developed in IPA, in which "the researcher is trying to make sense of the participant trying to make sense of what is happening to them" (Smith & Osborn, 2015:41). As such, my role in the interpretative process is discussed, both here (Data Collection) and in Chapter 5 (Observations).

Details, experiences and individuals are the foundations of an IPA, which involves a "dual interpretation process" (Smith & Osborn, 2008:53). It is both idiographic in its analysis, in that it is interested in "the particular, rather than the general", and hermeneutic because it is interpretative (Larkin & Thompson, 2012:102). The researcher tries to understand experiences from the individual participant's perspective, whilst at the same time acknowledging that this action is also an interpretation "because there is no such thing as an uninterpreted phenomenon" (Pietkiewicz & Smith, 2014:8). Larkin and Thompson (2012:103) explain the role of the researcher in an IPA as part of "a process of intersubjective meaning-making" in which the researcher has to both honour the views of the participants, as well as self-reflectively engage in the interpretative process. First used mainly in studies for health psychology, IPA has subsequently been used in a wider variety of fields, including education (Smith, 2017:303). For example, a study investigating how touch is experienced in the Alexander Technique used IPA to explore this sensitive issue (Jones & Glover, 2012:142).

IPA studies typically have small sample sizes which "gives an opportunity to examine similarities and differences between individuals" within a recognised group (Pietkiewicz & Smith, 2014:9). The group in this study is 'singers'. Larkin and Thompson (2012:103) point to the knowledgeability of the participants as part of the selection process for the group, as an IPA is "exploratory rather than explanatory". In this study, for example, the IPA sought to understand the impact of a Pilates warm-up on a group of singers.

Smith and Osborn (2008:54) explain that "IPA has a theoretical commitment to the person as a cognitive, linguistic, affective and physical being and assumes a connection between people's talk and their thinking and emotional state". Whereas Smith and Osborn (2008:54) use the participant's spoken word to understand their "mental and emotional state", this study goes one step further in using the participant's body and movements (i.e. bodily experiences beyond the visual cues of body language and indeed of language itself) to further understand their experience of the Pilates warm-up and its effects on them as singers.

IPA studies are useful for providing insight and as such "require[] a flexible data collection instrument" (Smith & Osborn, 2008:57). An example of this flexibility is the semi-structured interview as it allows for variations to the conversation started by the researcher's questions to arise and be explored (Pietkiewicz & Smith, 2014:10; Smith & Osborn, 2008:57). Although IPA was designed to be "rigorous and systematic" without being rigid (Smith, 2017:303), this flexibility reduces the reliability of the data collected, hence IPA's "ideographic approach is to explore every single case, before producing any general statements" (Pietkiewicz & Smith, 2014:8).

4.3. Research methods

Several research methods were used to collect the data for the IPA. Semi-structured interviews, psychometric tools and heart rate measurements were taken at various stages during the research period. To avoid confusion, the various aspects of the study and the sequence of data collection are illustrated in Figure 4.1.

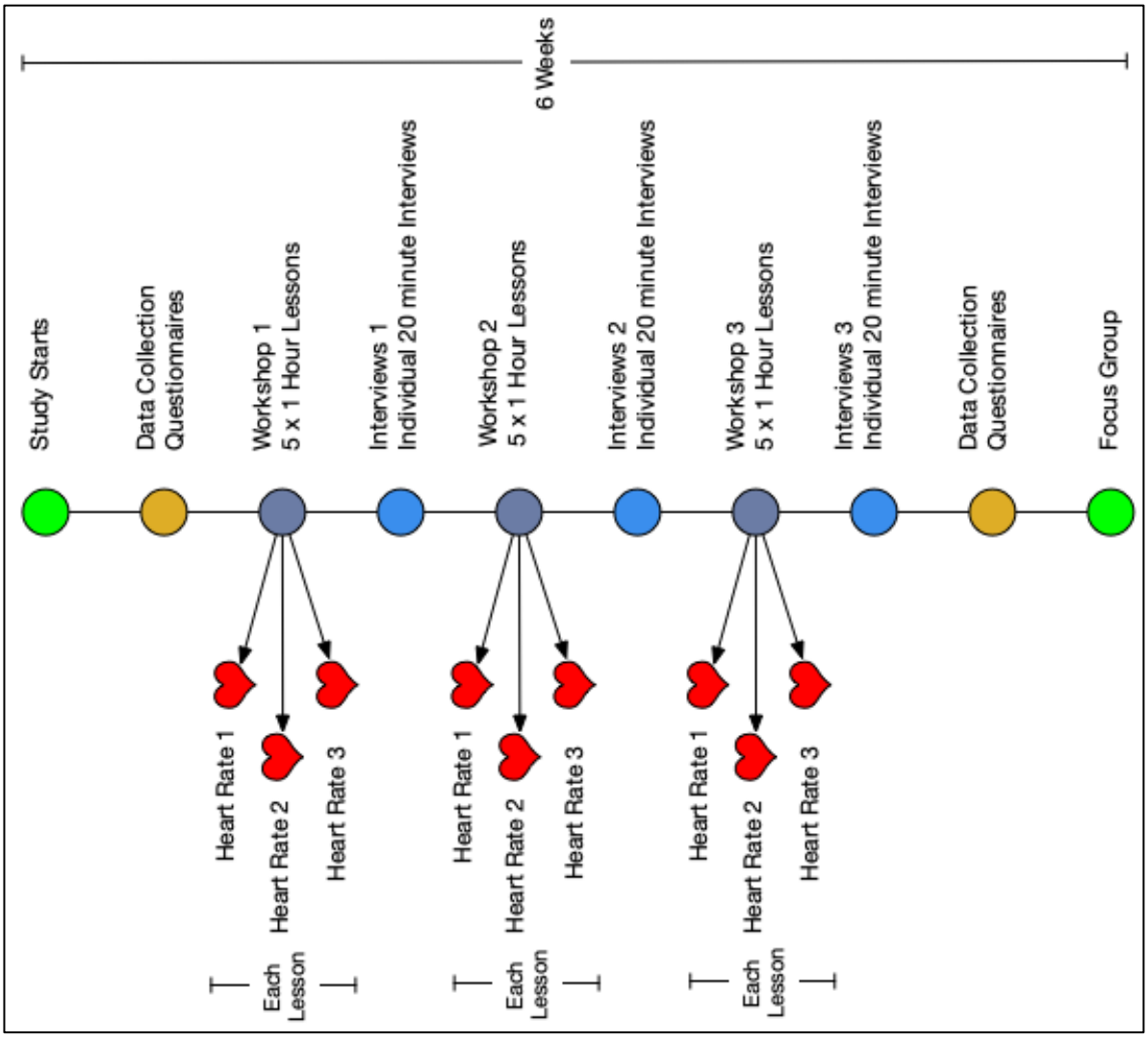

Figure 4.1 The study process showing the sequence in which the data was collected.

The research was conducted using a workshop format to teach the participants the Pilates warm-up exercises. The participants were required to attend a daily Pilates lesson of one hour's duration for five consecutive days. Thereafter, they practiced the exercises until the next workshop commenced. A specific practice schedule was not implemented, rather, it was suggested that they practice as often as possible. This cycle was repeated three times over six weeks, as shown in Figure 4.2.

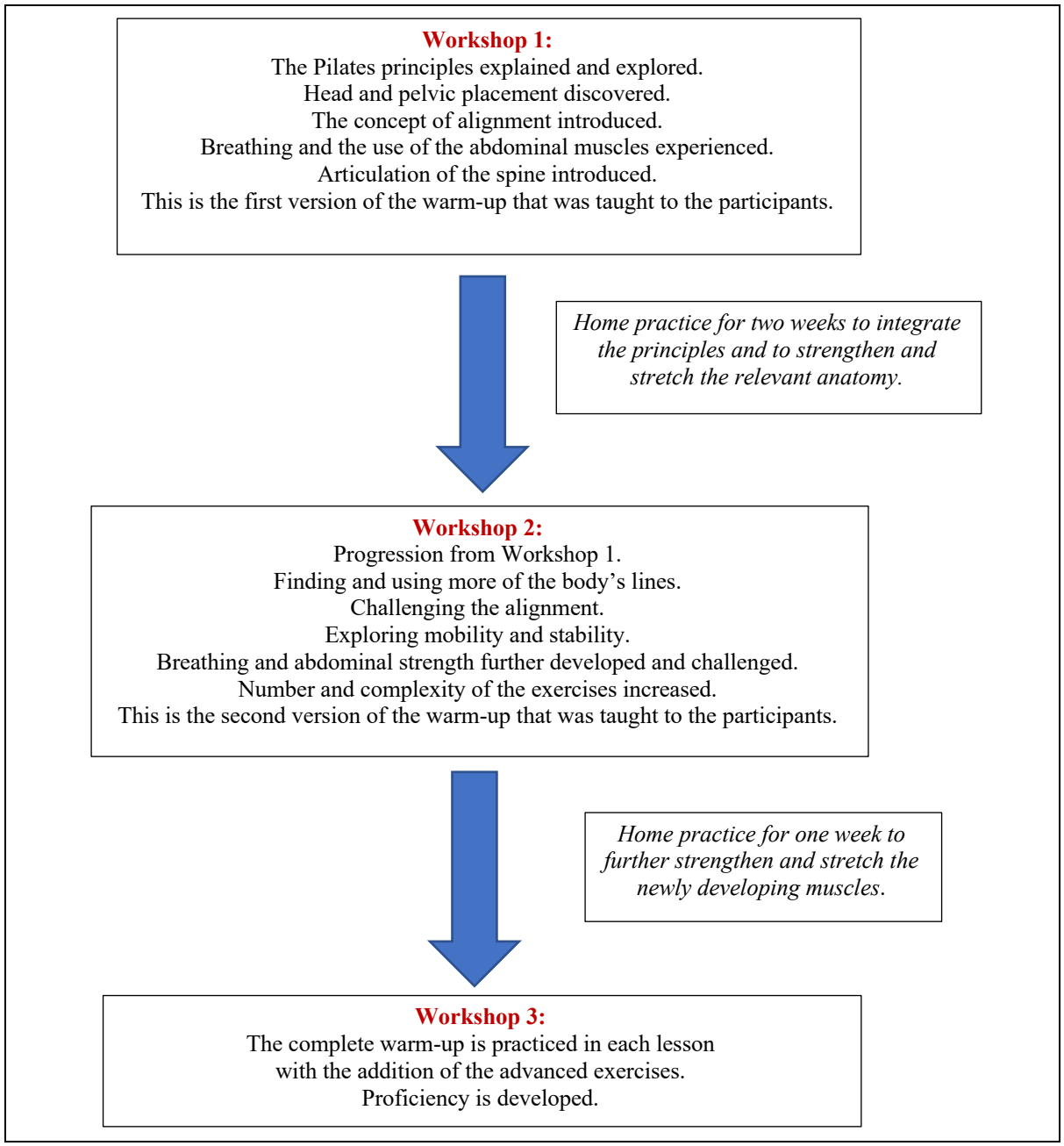

Figure 4.2 How the participants were taught a Pilates warm-up. The workshop format and the accumulative developmental process used to teach the Pilates warm-up to the participants, interspersed with home practice sessions.

At the start of the study, the participants were required to fill out a standard Pilates studio enrolment questionnaire to provide basic data (e.g. name, age, contact details, exercise history, physical issues, reason for doing Pilates). They were also required to fill out consent forms related to participation in this study (see Appendices 1 & 7).

During each workshop cycle each participant was interviewed once individually, thereby making up a total of three interviews per participant. Each interview was approximately 20 minutes (some were longer), which combined to make up a total of 60 minutes (3x20 = 60) or more per participant. Together with the recordings of the interviews, personal communications, notes taken during the interviews and observations while teaching the lessons provided the data (often as verbatim quotes) for the IPA.

Each participant filled out three psychometric questionnaires (discussed below) which formed the baseline and comparative data sets used to both inform and validate the semi-structured interviews. They completed these at the start of the study and again after the final workshop.

Heart rate measurements (HR1, HR2, HR3) were taken at the start, middle and end of each Pilates lesson as a way to link the participants' experience with the neuroscience literature available on a variety of topics pertinent to singers (see Chapter 2). Finally, a focus group was held at the end of the workshops to glean any further information, for purposes of triangulation, as well as to ascertain if data saturation had been accomplished.

4.3.1. Data collection

This study made use of three standard psychometric forms (RAND 36-Item Short Form Health Survey; GAD-7 instrument; Beck's Depression Inventory) to gather a baseline and comparative (before and after) data set. Data was further collected using heart rate measurements; observations; semi-structured interviews and a focus group. These instruments are discussed here.

The RAND 36-Item Short Form Survey Instrument: Quality of life (QoL) was measured using the RAND 36-Item Short Form Health Survey (Version 1.0), otherwise known as the SF-36. This tool is used to measure the following attributes (RC, 2017):

1) Physical functioning;
2) Bodily pain;
3) Role limitations due to physical health problems;
4) Role limitations due to personal or emotional problems;
5) Emotional well-being;
6) Social functioning;
7) Energy/fatigue;
8) General health perceptions.

This tool is freely available with the proviso that I acknowledge that the RAND 36-Item Short Form Health Survey was developed at RAND Corporation as part of the Medical Outcomes Study (RC, 2017). According to Hays and Morales (2001:350), it is one of the most widely used instruments for studying health-related quality of life. Although not definitive in its results unless used in conjunction with a "preference based measure" (Hays & Morales, 2001:355), it does, however, provide a useful guide for assessing change in this study. It can be used to measure a variety of time-periods, from short to personalised time frames. In this study, the participants were asked to answer the survey twice (i.e. before the first and after the last workshop), and with reference to the previous two weeks unless otherwise stated in the questionnaire itself.

Each item in the questionnaire is scored separately, with higher scores denoting a better health state. Items are then further added together to get the average for each section (called scales). Missing data is not accounted for in the scores.

The GAD-7 instrument: The GAD-7 is an instrument owned by Pfizer but made freely available in 2010. It has only seven questions in which the participant answers questions about their perceived levels of anxiety-related issues (e.g. worry, nervousness and anxiety). According to Williams (2014:224), it has "sensitivity of 89% and specificity of 82% for generalized anxiety disorders" and is also able to screen (less sensitively) for "other anxiety disorders". It has score limits which indicate the presence of disorders as listed in Table 4.1.

Table 4.1: Score limit indicators for anxiety disorders.

Score	Disorder
5+	Mild anxiety
10+	Moderate anxiety
15+	Severe anxiety

A score of 10 is the recommendation "for referral for further evaluation" (Williams, 2014:224). However, as caution should be used in making a diagnosis without further assessment, it was not within the scope of this study to make any assumptions about what the scores of the participants indicated, other than their level of anxiety at that time and the scores were used for comparison only.

The Beck's Depression Inventory: The Beck's Depression Inventory (BDI) used in this study is the 1961 version of the instrument which is available in the public domain (Beck, 2018). Considered to be "an acceptable objective instrument" and a "suitable screening aid" (Salkind, 1969:271), it has since been replaced by newer copyrighted versions (Jackson-Koku, 2016:174). It is a 21-item self-administered questionnaire with a scale for the most applicable statement to be chosen. The score is calculated by adding the chosen value for each question (scaled from 0 – 3). The score is then evaluated (the minimum possible score is 0, the maximum would be 63) within the totals shown in Table 4.2.

Table 4.2: Depression levels related to the Beck's Depression Inventory scores.

Score	Depression Level
1-10	Normal
11-16	Mild mood disturbance
17-20	Borderline clinical depression
21-30	Moderate depression
31-40	Severe depression
Over 40	Extreme depression

These cutoff points can vary, for example, in a study of the BDI in general practice, Salkind (1969:268) recommended the slightly different scoring shown in Table 4.3.

Table 4.3: Score versus depression level based on Salkind's scoring.

Score	Depression Level
0-10	No depression
11-17	Mild depression
18-23	Moderate depression
23 and above	Severe depression

The revised versions of the BDI (called BDI-IA and BDI-II) also have different cutoff points and suggest a score above 20 as indicative of depression in "non-clinical populations" (Jackson-Koku, 2016:174).

The scores achieved in this study were solely for tracking change and not for making any sort of diagnosis, although the cutoff points for the different categories could not be completely ignored and therefore would have had an impact on my perception of the participants' states of mind. The BDI has

been used in studies measuring the effects of exercise on depression levels (Cicek, *et al.,* 2015:671) as well as for measuring the effects of Pilates on depression levels (Vancini, *et al.*, 2017:852).

Heart rate monitoring: Each participant took their own heart rate readings. I taught the students to do this by finding a pulse (either at the neck or the wrist) and counting the number of pulses over a timed ten second period. These readings were given to me and were then multiplied by six to give a value across one minute. The participants were seated on the floor for the first reading, lying on the mat for the second reading and seated again for the last reading. There were occasions in which this format was not followed as the participants moved too quickly out of position. Some of the participants also experienced trouble finding their pulse at times. There was an occasion in which a reading was missed altogether due to a participant leaving early, as is possible in the more relaxed and natural environment of a lesson, as opposed to a clinical research setting. These results are available in Appendices 8 and 9.

Observations and notes: Throughout the workshops, notes were made about communications or pertinent moments in the lessons. This data is valuable due to its spontaneous nature and can help to inform and give insight during the data analysis. Observations were made from three different standpoints, namely as a teacher, a singer, and as a researcher, as these were the three different perspectives that I brought to the research process.

Semi-structured interviews: Larkin and Thompson (2012:104) explain that it is "the quality, rather than the quantity of data that permits insightful analysis to be developed" and that multiple interviews can assist in providing depth to the process. Each participant was interviewed three times. Interviews were held in a variety of locations, always with the goals of privacy and quietness to facilitate the process.

According to Seidman (2006:9) "[a]t the root of in-depth interviewing is an interest in understanding the lived experience of other people and the meaning they make of that experience." The questions used in the interviews were open ended so as to allow for individual experiences to be monitored within a framework that would make it possible for common themes to be displayed, as well as new themes to emerge. As such, the interviews had to be flexible to allow for new topics to be explored (Smith, 2017:303). The interview questions are available in Appendix 10. Unlike the structured interview or a questionnaire format, the participant determines the direction of the conversation in a semi-structured interview, which makes the data more difficult to analyse (Smith & Osborn, 2008:59).

The interviews followed the teaching process seamlessly, although the roles of teacher and interviewer/researcher have different connotations. The tone of the lesson prior to the interviews helped to continue the intimacy which is established in a small group teaching environment. The use of appropriate physical contact in the lessons to guide and assist the body in movement also assists in breaking down barriers in conversation. The progression of this intimacy is visible in the interviews in the ease with which the conversations flowed even though the presence of a recording device and the more formal conditions of sitting at a table establish a different rapport.

There were some issues with internet connectivity for the interviews with Participant 6 (who was taught and interviewed remotely). With Participant 6, I was unable to control the environment to allow for privacy. Despite this, the semi-structured interviews provided a wealth of narrative data from which to work.

Focus group: At the end of the workshops, the participants were invited to participate in a focus group comprised of three student participants and one professional participant. A focus group can assist in "[i]nterpreting previously obtained quantitative results" (Stewart & Shamdasani, 2015:45), as well as in ascertaining "the potential problems with a new program" (Stewart & Shamdasani, 2015:44). It is also recognised as appropriate for collecting data for an IPA (Larkin & Thompson, 2012:103). The focus group was able to provide a medium for the triangulation of the data collected

in the semi-structured interviews. It also confirmed saturation as no new pertinent information was revealed. The questions used to facilitate discussion are available in Appendix 11.

According to Morgan (1997:13), "the strengths and the weaknesses of focus groups flow directly from their two defining features: the reliance on the researcher's focus and the group's interaction". Stewart and Shamdasani (2015:9-16) state that as a qualitative research method, a focus group has four distinct criteria. The first of these is that it is "focused research" with the objective of interviewing a common experience with a particularly specific focus (Stewart & Shamdasani, 2015:9). The common experience in this study was the Pilates warm-up and the effect it had on the participants. The participants were asked to discuss the Pilates workshops and the various findings and accomplishments of the group, in answer to my questions (individually, as well as in relation to each other).

The second criterion is the group interaction (Stewart & Shamdasani, 2015:10) which aims to stimulate discussion to glean further information. Grouping people can both inhibit or encourage a dynamic conducive to the researcher's quest for further data. The presence of a participant from 'outside' the student group (i.e. the professional singer) both aided and hindered the flow of conversation. The students knew each other well (especially after being in a group together for the workshops), however, the professional singer was a stranger to them, though known by reputation. This provided a new and different perspective to their own experiences but did not assist in allowing for ease of conversation, which remained largely restricted to a question and answer format instead of free discussion. The use of technology created a further barrier, as Participant 6 was not physically present in the room and unreliable internet connectivity complicated the flow of conversation.

The third criterion is in-depth data collection (Stewart & Shamdasani, 2015:12). Stewart and Shamdasani (2015:12) caution against the use of too many questions which will inhibit the participants' discussions by turning the focus group into a "within-group survey". I attempted to use questions which were pertinent to their experiences but that would allow for further insights to be gleaned. Using their own accomplishments as the entry to the conversation also helped to validate my interpretation of their experiences.

The final criterion is the "humanistic interview" which requires "some degree of immersion into individuals' lives" (Stewart & Shamdasani, 2015:13). This was easily accomplished as I had achieved this through the teaching phase of the study. There was a high level of trust and few barriers in the group, despite the addition of Participant 6.

4.4. Data analysis

According to Larkin and Thompson (2012:104), the researcher's goal is "to develop an *organized*, *detailed*, *plausible* and *transparent* account of the *meaning* of the data". This is accomplished in an IPA by recognising and allocating data (in this case, observations, notes and recordings of the interviews) into groups of "themes" (Larkin & Thompson, 2012:104). These themes emerge by first combing the data in detail and giving "line-by-line commentary", called "codes" (Larkin & Thompson, 2012:104). These codes can be presented to the reader in various ways and together with a narrative will provide the analysis of the data. Larkin and Thompson (2012:105) have identified a system for this type of analysis, of which the following steps are relevant to this study:

1. Line-by-line coding;
2. Identifying themes;
3. Establishing a format;
4. Validating the interpretation;
5. Presenting the narrative to the reader using visual aids to assist in understanding the interpretation;
6. Remembering the cyclical nature of the process and the researcher's role in it (reflecting).

Smith and Osborn (2008:66-67) explain that the researcher will be "engaging in an interpretative relationship with the transcript" in this idiographic type of analysis. The interviews are reviewed many times as part of the cyclical meaning finding process. Pietkiewicz and Smith (2014:12) suggest focusing on the use of language, repetition of issues and other such verbal cues as well as the influence of the relationship between the interviewer and the participant. Thereafter the emergence of themes is sought. This involves a shift to "a slightly higher level of abstraction" with the data (Smith & Osborn, 2008:68).

In this study, the focus group provided the vehicle for the transition of the data from the specific to the general. This is called clustering the themes in an IPA (Larkin & Thompson, 2012:108; Smith & Osborn, 2008:72) and is considered by Larkin and Thompson (2012:109) to be the "phenomenological core" of the analysis. At this stage, the researcher starts to zone in on the most pertinent and example-rich themes in the data and to look for patterns and differences between the participants' data sets (Smith & Osborn, 2008:72-73), although this must always be strongly rooted in the participant's experience (Pietkiewicz & Smith, 2014:12). The clusters of themes can then be described and labelled (Larkin & Thompson, 2012:108; Pietkiewicz & Smith, 2014:12; Smith & Osborn, 2008:74) and are used to inform the descriptive narrative of the analysis. This narrative can then be linked to the existing literature (Pietkiewicz & Smith, 2014:13) as was done in this study. Smith and Osborn (2008:76) point to the impossibility to truly distinguish between the analysis and the narrative process and state that the one is a continuation of the other. This proved to be the case in this study, as describing the participants and their experiences became an interpretative exercise in itself, indistinguishable from the structured separation required by the titles of a study. Verbatim quotations and the identified themes were used to construct the emergent argument that the narrative produces (Smith & Osborn, 2008:76).

Due to the interpretative nature of this type of analysis, Larkin and Thompson (2012:112) recommend "member-checking" to assure quality and credibility. This was possible for this study, as the group was small and individual interviews were conducted. The participants were each sent a copy of their own analysis for review, with the instruction to check its accuracy. Larkin and Thompson (2012:114-115) further recommend triangulation of the data, as well as familiarisation with other IPA and phenomenological studies. In this study triangulation was achieved by comparing the outcomes between the different types of data formats (e.g. interviews and observations; psychometric scores and interviews; interview and focus group responses). As the same conclusions could be drawn from each of the different data sets, methodological triangulation could be said to have been established (Guion, *et al*., 2011:2).

4.5. Ethical considerations

Ethical clearance for this study had to be obtained before the research could start. This was granted and ethical clearance number: MUS-2018-6711 was given (see Appendix 12).

The participants were recruited by sending out an email with a flyer advertising the workshops to several voice lecturers as well as to professional singers who had expressed interest in my research. Once interest in participation had been voiced, the prospective participants were sent an official consent form as well as a document outlining what to expect from the study (see Appendices 1,5,6 & 7). To ensure anonymity, pseudonyms were used throughout the study. On completion of the analysis the participants were each sent a copy of their own analysis for approval and to confirm if they were comfortable with my usage of it in this study. The participants were also reminded that they could pull out of the study at any point.

4.6. Conclusion

This study set out to examine the influence of a Pilates warm-up on singers, using interpretative phenomenological analysis. As a qualitative research philosophy, phenomenology seeks to discover

meaning in human experience. Understanding that the researcher plays a part in the interpretation of findings, none the less, IPA seeks to understand the process of experience for all involved in the phenomenon, in the hope of creating new understanding and lines of enquiry.

I taught the Pilates warm-up to the singers and then researched their experience of this movement modality and its influence on their well-being as singers and people. This merging of roles in the study lends itself to the in-depth analysis of an IPA (due to the high level of prior knowledge required to understand and fully engage in the analytical process) as well as to the intimacy required of an interview-type format which seeks to fully understand who the participants are and how they have experienced potentially sensitive conditions. Due to the subjective and interpretative nature of an analysis involving a small number of participants in a qualitative study, the design of the study included the use of recognised and objective questionnaires. The SF-36, the GAD-7 and the BDI provide an objective before and after analysis, which grounds the findings beyond my interpretation.

These findings are discussed in Chapter 5 where I have presented the data in a particular way to replicate both the process that the participants and myself went through, as well as the IPA process itself. Therefore, the reader is first introduced to each of the participants and their individual narratives are presented in detail showing the IPA. My observations are discussed before the data from the questionnaires and the heart rate measurements are outlined. This informed the final phase of the IPA, which is the development and discussion of the main themes of the study, and these I have delivered in the analysis of the focus group.

5. Presentation of the data collected and analysed – making the case for a Pilates warm-up for singers

5.1. Introduction

In this chapter, the participants are described individually, and their narratives are constructed and analysed. This is a cyclical process, which has inherent analysis within each section, but which reaches its final conclusions at the end of the chapter. According to Wertz (2005:169), "[i]ntentional analysis begins with a situation just as it has been experienced – with all its various meanings – and reflectively explicates the experiential processes through which the situation is lived".

The analysis is first presented as my understanding of each participant (their introduction) in the overview (5.2) which also refers to their initial questionnaire scores as this is how I was first introduced to them. Thereafter, the analytical process used in an IPA is explained and their narratives are presented (5.3). This describes their experience of the study in their own words and shows the development of our relationship and their process of understanding the effects of the Pilates warm-up. The narratives also show the IPA cyclical process in action, with the addition of the emerging themes shown in brackets and summarised for each participant. These themes are explained in a table for reference. The participants' own words are used as reference for their experience. Observations made during the workshops are also presented and discussed, as my role in the interpretative process is an important variable in the outcomes (5.4). Thereafter (5.5) the quantitative data and heart rate measurements are displayed which reveal the before and after results which helped to inform the final analysis which is presented last (5.6 and 5.7) where I discuss the final themes that emerged in the IPA, using the focus group to unite the various data sets before the chapter concludes (5.8).

5.2. Overview of the participants

The study consists of five participants who have been renamed and given a participant number (Participant 1–6, there is no number 5 as this participant left at the start of the study) to ensure anonymity. Participants 1–4 are all singing students studying at university level and Participant 6 is a professional opera singer. They are each named with a pseudonym and described here.

Participant 1, renamed Agatha, is 24 years old and is a singing student in her final year of study. She teaches voice at a school part-time and has had to do an extra year at university to complete her course, as she had been prescribed voice rest due to muscle tension dysphonia and therefore could not complete her studies. This condition was unfortunately not relieved by vocal rest and persisted at the onset of the study. Her vocal problems did not manifest while teaching her students, unless she was "tired or stressed". At the onset of the study, Agatha was pushing through the pain of singing so that she could complete her exams. She had been receiving professional support for her vocal issues from a psychologist and a voice therapist. She had given herself an ultimatum to sort out the vocal condition or stop singing at the end of the year. Concerns about her future career and her ability to earn a living were a source of anxiety for her. She took part in the study for many reasons, notably as a possible solution to her vocal problems, but also as a potential emotional release and to be involved in her physical health. She has a very active exercise regime.

It was of interest to discover that she had previously suffered from a chronic inflammatory over-reactive condition called Complex Regional Pain Syndrome (CRPS), which is thought to originate in the peripheral and central nervous systems (NINDS, 2018). This had caused debilitating pain in her one arm when playing the piano. This appears to have cleared and in general no longer re-occurs when playing the piano for her students. However, the pain does manifest if she overexerts herself but it then clears overnight. CRPS appears to have a link to other "inflammatory and autoimmune conditions" (NINDS, 2018).

Her questionnaire responses pointed to heightened anxiety levels. Her SF-36 score suggested room for improvement, with pain and restrictions of both a physical and emotional nature seemingly the biggest contributors to these results. Her general health and physical functioning scored as very good. She did not display an elevated depression rating. It seemed to me that she was in a 'catch-22 situation', both vocally and for her quality of life.

Participant 2, renamed Beth, is 22 years old and is a singing student. She suffers from depression and anxiety disorders and has recently been diagnosed as being on the Autism Spectrum Scale. She is on seven different medications to help her cope with daily life. She has professional support to assist her psychologically and medically. Beth has many injuries from her childhood and teenage years, for which she received medical treatment but no rehabilitative support. She has an attitude of carrying on regardless of her physical state, by being able to "tune out pain". She also danced a lot in the past, often with injuries. She still dances at present, as her vocal focus is on musical theatre. Her application form indicated neck and shoulder strain. She took part in the study in the hope of improving her physical strength and to improve her alignment.

Her questionnaires displayed high levels of anxiety and depression (despite the high volume of medication) and a very low score for quality of life. This data highlights that everyday life is a battle for Beth, however, Beth always smiles and finds a way to cope.

Participant 3, renamed Carol, is 21 years old and is a singing student. She is asthmatic and took part in the study to improve her physical support for her voice, which she felt to be lacking in stamina, causing her to strain (which she would not normally do otherwise). She suffers from headaches constantly, to the extent that there is "no day without a headache", there is only a different type (of two distinct sorts) or severity of headache each day. She also struggles with maintaining her energy levels. She has a good understanding of how her body is meant to work and regularly seeks out professional help in the form of physiotherapy. She is, however, aware that her understanding of the concept and the putting it in to practice do not seem to correlate well enough.

Her questionnaires revealed a low quality of life and high score levels for anxiety and depression. Health and emotional issues were inhibitive for her, although she pushes through and functions physically despite pain (from headaches but also from her lower back) and asthma. Her application form stated no exercise regime at present but that she was very active in the past. In conversation, she stated a desire to be able to be more active and productive.

Participant 4, renamed Diana, is a final year singing student who at the time of the study had just won a place to audition for study at a prestigious overseas institution. She is 22 years old and joined the study as she was interested to see the effects of Pilates on her singing. She has an active lifestyle and tries to keep fit by going to the gym, walking and yoga. Her previous exercise history revealed many sports, as well as ballet and Pilates. She has no physical issues and her questionnaires showed an excellent quality of life and very low anxiety and depression levels.

Participant 6, renamed Francis, is a professional opera singer with a busy international career. She is 42 years old and took part in the study to improve her posture and muscle tone, in order to improve her singing. She wanted to be able to use her whole body to support her voice. On commencing the workshops, she had mild lower back and neck pain problems which she attributed to excessive stress caused by poor posture. She would go to a chiropractor to relieve the pain. Her previous fitness routine was varied and seemingly sporadic and included doing some weights exercises in the gym, some Wii-Fit and occasional jogging. Her questionnaire scores showed within normal range for depression and moderate anxiety. While her SF-36 questionnaire had a very high score, there was room for improvement for pain as well as general health. Francis is currently going through the stress of a divorce and has been taking antidepressants for the past three years.

Francis had a minor accident early on in the research process. She fell off her bicycle and badly bruised her ribs. Her ribs were not broken, nevertheless, she had to go to hospital due to the pain and

haematomas were discovered in her right breast as a result of the fall. She was able to continue with the study, although the fall would have an impact on her body during the study period, how she was taught and the outcomes experienced by her.

5.3. Interviews presented as narratives

Each participant took part in a twenty-minute semi-structured interview during each of the three workshops cycles. This meant that each participant had approximately one hour of interview time dedicated to them and their experience of the Pilates warm-up over the study period of six weeks. According to Seidman (2006:9), "[a]t the root of in-depth interviewing is an interest in understanding the lived experience of other people and the meaning they make of that experience." The questions for this study were open-ended to allow for different thought directions to be followed as participant experience dictated. The five participants were very different in personality and body type and each experienced the process differently. Hence various sub-questioning derived from of each of the main questions.

The interviews are discussed here in detail and presented as each participant's narrative. The main themes that emerged for each participant were first identified after reviewing the interview recordings, from notes taken during the interviews as well as from the questionnaires. Quotations from the interviews are used to show and explain the participants' experiences and they are assigned to a theme category. These emergent themes each have an abbreviation and a colour code for simplification (see Table 5.1). It is first necessary to understand how these themes emerged and so this has been explained before the narratives are presented.

The discovery and analysis of themes is the primary aspect of an interpretative phenomenological analysis (Larkin & Thompson, 2012:104). The interviews described in this chapter take the reader through the process and development of each participant during the workshops. In an IPA, the interviews as a source of data undergo different stages of analysis, which Reid *et al*. (2005:22) state "is underpinned by a process of coding, organising, integrating and interpreting of data" which seeks to group together the shared experiences of the participants as well as honouring their differences (Reid, *et al*., 2005:23). Therefore, my first task was to find the common points in all of the interviews. After the analysis of each interview, common themes were identified and named. The themes were then re-applied to the initial analysis in a cyclical process of engagement with the interviews. These themes are listed in Table 5.1 and later became the sub-themes of the IPA as the study evolved after the analysis of the focus group was conducted.

Some of the common themes were immediately obvious, e.g. Singing, as all the participants were singers and wanted to improve their singing or aspects of themselves for their singing and voice production. Therefore, any mention in their interviews of singing or vocalisation or singing technique was given this label. The same was apparent for the common theme of Pilates Breathing. This theme was first named Breathing with another emerging theme named Pilates Breathing but later I changed them both to Pilates Breathing as there were numerous breathing references and also, as the workshops and interviews continued, these became interchangeable references and comments by the participants. The themes of Singing and Pilates Breathing both show and describe the process of my analysis using the participants' own words.

However, the psychometric tests, teaching, engaging with and reviewing the interviews in-depth and multiple times, led me to interpret and decide on themes in ways that are not linked only to words. For example, the theme of Well-being included visible signs of being upset in discussion. The lessons provided the opportunity to witness and investigate the presence of pain or not being able to fulfil true potential or an inability to perform a movement. These were pertinent issues that deserved being labelled in some way although they rely on my perception and knowledge base rather than line by line coding of words.

The participants' physical and emotional reactions to certain movements provided me with an understanding of their experience which goes beyond words but is inherent in my choice of emerging themes. For example, all of the participants knew what their problems were and had a good theoretical understanding which they were unable to utilise in practice. The process of finding solutions is nebulous but visible when seeing the Pilates exercises performed and then later applied to other situations. Therefore, the heading of Tools was assigned to the participants' process of discovery and mastery throughout the workshops.

The literature review for this study raised issues relating to the nervous system and its link to emotions and physical states which further influenced my choice of (sub) theme labels. The focus of Pilates on the CNS and its effect on the ANS that is discussed in the literature becomes visible and tangible in the lessons and tone of the interviews. Therefore, I assigned the label of Nervous System to aspects of the interviews which I felt reflected the influence of the work being done on the nervous system. Finally, I had to consider the investigation of the participants' emotional state through the psychometric tools in the analysis. Knowing their state of anxiety, depression and quality of life, enabled me to witness changes in them which I might otherwise not have been aware of. The themes of Resilience and Mindfulness reflect my observation of their experience and personal growth.

It must be borne in mind, however, that as this is a cyclical process, none of the emerging themes discussed are labelled to the exclusion of other possible headings. Indeed, many of the points that are highlighted in the interviews below are given more than one label and the labels given to the themes themselves, sometimes overlap. This is addressed in the analysis process when these emergent common themes (sub-themes) are grouped together into the main themes of the study.

Table 5.1: Emergent themes from the interviews

Theme name and description	**Abbreviation**
Singing – includes any reference to singing, the voice, vocalising and technical issues.	(S)
Well-being – includes all references to the presence of pain, illness and physical problems as well as negative mental states. Also refers to an improvement in these.	(W)
Preparation for Singing/Preparing the Body to Sing – includes vocal warm-up and performance preparation.	(PS)
Tools – knowing what to do to fix a problem, having a solution that can be applied. Also refers to a lack/absence of ability to fix a problem.	(T)
Resilience – both the mental and physical capacity to adapt and react positively under stress; or the lack of this facility.	(R)
Mindfulness – being aware of oneself in the moment, being fully focused in the present. Also refers to the absence thereof.	(M)
Mind-Body Communication – feeling what is happening in one's body, knowing which muscles are engaged. Also refers to the lack of this capacity.	(M/BC)

Nervous System – this refers to CNS and ANS or any reference to a nervous/emotional state both positive and negative.	(NS)
Strengthening the Body – all references to capabilities previously experienced with difficulty. Also with reference to the need to strengthen.	(SB)
Relaxation through Movement – this overlaps with Tools but refers to the process rather than the conscious use of a Tool.	(RM)
Pilates Breathing – includes all breathing references	(PB)

The themes that emerged are shown in brackets in the narratives, as per the code for the abbreviations of the themes as described in Table 5.1 above. My interpretation is discussed after each narrative and the reader is briefly guided through some of this cyclical interpretative research process, to show how the themes emerged from and were a part of each participant's narrative.

5.3.1. Agatha (Participant 1) narrative

Agatha began the study with grave concerns about her future due to her existing vocal problems (W, S). At our first meeting to co-ordinate the workshop timetable, she alluded to the presence of pain in her throat (W, S). At her first interview, she stated that she wanted to be involved in her physical health and hoped that the Pilates warm-up could provide a solution to her vocal problems (T, S). She wanted an emotional release from the stress caused by her vocal problems (T) which resulted in anxiety about her future career and having to investigate alternatives should her voice not recover (S). She also had concerns about money and continuing down a path that showed no progress (W). Even though the first lesson gave her discomfort in her tail-bone, inner thighs and hamstrings (M/BC), she stated that she found the initial process of learning the Pilates warm-up exciting and appreciated the holistic approach (SB). Agatha remarked that routine and control were both important to her (R).

In the first workshop's lessons, I focused on the physical and emotional 'blocks' she was experiencing (i.e. aspects she felt unable to resolve despite the professional help she was receiving) and the theory that if they could be overcome, then she would experience lower anxiety and voice issues. This was executed, for example, by giving her a customised variation of an exercise called Half Roll Back (Stott-Merrithew, *et al.*, 2001:39) to release tension in her upper back.

Agatha's second interview was very different in tone. At this interview she stated that by this stage in the study she had had no pain in her throat for some weeks (S; W; T; RM; R). One of her voice teachers had also remarked on a difference in her singing. She had practiced the Pilates warm-up regularly (except on weekends) with the biggest inhibiting factor being how to dress appropriately for work versus exercising and how to fit this into her schedule. However, she was able to overcome this by either practicing in her pyjamas first thing in the morning or in her work clothes in the privacy of her university's practice rooms before her vocal warm-up for her lessons (R). She found that she had heightened awareness if she first did the Pilates warm-up before she sang (PS; M/BC). This heightened awareness provided her with new tools to understand what she was doing with her body and to become aware of tension and how to release it (RM; M/BC; T; PB).

Her mood had changed with the improvement in her singing and voice (R; S) and her work stress had also lessened (R; W; NS; S). She revealed that she had experienced some discomfort in her *thoracic* spine in an area where she had a displaced vertebra (M; M/BC; NS). This displacement was something that she had not mentioned until that day. We had already started working on releasing that specific area of her spine as a possible physical 'block' to her vocalising (NS; PS; S; RM; SB; T) in the first workshop, as it had appeared very tight and completely without a kyphotic curve (NS; SB).

She had been given an adaptation to the Shell Stretch to facilitate this shape (i.e. to bring her out of spinal extension and into greater flexion in this region) as well as an extra exercise (mentioned above), to assist in relieving the tension that was present (T; SB; PS; NS; RM). It made sense that she now had discomfort in this region as it was actively being manipulated (NS; M/BC). As there was no more pain in her throat, the discomfort in her *thoracic* spine was not a block to her vocalising (as the tension but absence of pain in that region appears to have been) and I was confident that it would pass once it had regained alignment and flexibility. Agatha had a trusting attitude that what she needed to do "[would] come" if it was not "there already" (R). She was satisfied that the new experiences made sense to her.

During the third interview I experienced a new Agatha. Where before she had felt desperate, now she felt "re-empowered" and had regained "hope" for her future as a singer (S; R). She was feeling good although she was still under stress with lots of deadlines looming (R; RM; W; NS). Vocally, she was still without pain (W; NS; RM; S) and was preparing for auditions and her future as a singer (W; S). Agatha had a new sense of "ownership" and "control over [her] muscles" (T; M/BC; R; SB). She used the Pilates lateral breathing (T; PB) and was working "with gravity" as it could encourage working in a relaxed state (RM; PS; T). She also realised how mindfulness and her thought processes could control her muscles (M; M/BC; T). She noted how each exercise in the warm-up "speaks to a different part" of the body (M/BC; T; RM) and that she enjoyed the movements in general. She stated that her expectations of the process had indeed been met in terms of her physical health (W) and as a solution to her voice issues (S; W; T) as well as providing an emotional release (NS; RM; R). Ironically her least favourite exercise was the guided relaxation at the start of the warm-up as she experienced cramps in her foot. I subsequently provided her with a variation so that she could enjoy the benefits of the exercise.

5.3.2. Agatha (Participant 1) summary of the emerging themes

The main themes which emerged in Agatha's first interview related to her sense of self as a singer, as she was at that point a singer in deep vocal trouble with no workable solutions. With her future career as a singer hanging in the balance, the themes most pertinent to her were her lack of Well-being and Singing which were intertwined. The presence of the theme of Tools together with Mind-Body Communication and Strengthening the Body led me to believe that she had some hope left in her ability to tackle her problems if she could work out how. This led me to the theme of Resilience as she could still remain positive about the potential outcome of our work together even though she had almost given up.

Agatha's second interview saw many themes emerge and group together with a positive trajectory. The theme of Nervous System appeared the most times (six) in the analysis of her second interview. With the pain in her throat having left her, she was able to focus on the experiences in her body and linked her voice and her misplaced vertebra without realising that she had overlooked it before. The two issues had appeared separate to her prior to the study as she had focused on the pain in her throat when she sang, forgetting that there could be an anatomical link to her old spine injury.

The third interview saw an increase in the Well-being and Resilience themes for Agatha. With her voice improving and an eye to her future as a singer, the theme which dominated the last interview was Tools (it appears six times) as well as Relaxation through Movement which is itself a tool for relieving tension in the body. It brought her process round perfectly to her starting point where the theme of Tools had emerged (as a lack thereof) and the hope of gaining one in the study. Therefore, in this process, I felt that she had utilised a tremendous amount of mental resilience by creating physical resilience through the development of physical tools with which to work. The outcome of this being the improvement in her singing, well-being and her identity as a singer.

5.3.3. Beth (Participant 2) narrative

Beth began the study with a long list of injuries and medications (W). She experienced a lot of physical pain (W) and wanted to strengthen her body (her joints and "sensitive places") for her singing (SB; S; PS; T) and to be able to dance and sing in musicals without pain (SB). She hoped the Pilates warm-up would tone her body and improve her alignment (SB; PS). She expressed that she was loving the process and found it reassuring to feel her body and be present in it (M; M/BC). She liked the specificity of the exercises and the step by step instructions. She particularly enjoyed the feeling of releasing the spine in spinal rotation (in the Hip Rolls exercise) which she struggled to communicate in greater detail but managed to imply that she liked feeling her spine and felt safe in the movement when she experienced her spine releasing (RM; NS; T).

Interview 2 revealed that Beth had managed to practice on her own for the first week after the workshop. She found that she was no longer held back by physical strain in her singing (PS; S; SB; RM). She also felt less physically tired (W; SB; R; RM) and enjoyed the opportunity in the exercises to be able to feel open across the chest (T), as an alternative to being otherwise hunched or closed. Her calves had toned and she felt safe to sit how she wanted to in lectures, without the fear of causing tension problems (W; SB; R). Her mind-body communication had improved markedly (M/BC; M; T) and she was feeling present in her body (M) and listening to her body that was now "talking louder" (M/BC). This was a big change from her previous interview where she had stated that she tuned out her pain and just carried on regardless (M). However, despite feeling more "awake" in her university lessons (which she attributed to greater blood flow through her body) and having greater clarity and more sense of being present (M; T; NS; W), Beth found herself unable to practice at all in her second week of home practice (R). She had over-worked on the weekend (she has a temporary job to earn money) and the tiredness had a snowball effect on her, making her unable to sleep (W; R; M). All of this made her extra susceptible to the impact of a slew of bad news which she built up emotionally until she was unable to do anything at all (including her academic homework and singing) (NS; R; T). However, despite her fears of "melt[ing] down" in class (personal communication) she bravely started the second workshop and coped very well and without incident (R; RM). In her second interview, I challenged her to set up and communicate her personal 'time capacity' boundaries (by pointedly thinking of her own needs first) and enforcing them, both with others and with herself so that she could prevent herself from getting into a downward spiral (T; M/BC; M; NS). I asked her to use the need to practice her Pilates warm-up as both an excuse and a reason to set boundaries on her time (T; M/BC; M). She accepted the challenge.

Beth's third interview explored a new "levity" in her (R; W). She felt more capable of dealing with the year-end exams and deadlines (R). She had discovered that she could dissipate tension through humour (R). She was implementing the challenge that had been set and revealed that this was similar to what her therapist had asked of her (M; T). She found that doing the Pilates warm-up was a better start to her day (T; R; W) and that her mind and body were both stimulated (M/BC; NS) but that the warm-up "gives rather than drains" (SB; NS; W; RM). Her usual pains were "no longer there" (SB; W; R) and when she sang there was "less strain in [her] back, neck and jaw" (PS; S; T; SB). She found "relaxing easier" (NS; R) and that she had a "head start" (R). She appreciated how slow preparation of the body provided benefit (M/BC; T). Beth found that, due to the reduction in strain (SB), she was more confident and relaxed when she sang (NS) and could, therefore, access the healing benefits of singing (PS; S). She felt that the Pilates warm-up had benefitted her body more than her singing (SB; S). She found that her "basic physical activities [had] improved" (W; SB) and that the warm-up "wakes you up" (NS; M; T). Beth felt that her nervous system had a "release" (NS; T) and better "communication" (M/BC) and that the "Roll Over" was helping her nervous system through the traction type stretch through her spine (RM; SB; NS; T). She felt that overall she was more in control (R; T; W).

5.3.4. Beth (Participant 2) summary of the emerging themes

Having been newly diagnosed as being on the Autism Spectrum Scale, I viewed Beth's participation in the study as part of her journey of self-discovery. Her diagnosis had provided her with a new framework within which to understand and define herself. She had no vocal difficulties per se but everyday life provided countless struggles for her and this was evident in her lack of Well-being (despite being on a stringent drug regime throughout the study) and physical discomforts to which I applied the theme of Strengthening the Body and Preparing the Body to Sing. Her first interview showed me how much she needed and valued the communication she was experiencing with her body, to which I applied the themes of Mindfulness and Mind-Body Communication in the analysis. While she did not necessarily mention it often, I felt the themes of Nervous System and Relaxation through Movement to be particularly pertinent to her and her enjoyment of the exercise Hip Rolls (which actively engages the Central Nervous System) provided her with her first Tool.

Beth's second interview was interesting because it showed a contradiction in her process. The major theme which emerged in her second interview was Resilience (both the presence and lack thereof). Her physical Well-being had improved with increases in both Mindfulness (it is applied six times in the analysis) and Mind-Body Communication (which appears three times). As her body strengthened, she displayed greater physical Resilience and although she had suffered a breakdown of sorts (which showed low mental Resilience) she had overcome this and gathered herself effectively enough to continue with the workshop, despite her fears to the contrary. To me, this showed enormous courage and mental strength which suggested to me that her Resilience was improving, although she needed my help to encourage her to use the Pilates warm-up as a Tool in this regard, as I could see that she was already developing Tools in other areas (both themes appear six times).

Beth's third interview was very positive in tone and showed that her Resilience (eight allocations) had improved with the number of Tools (seven mentions) she had developed and recognised over the study period. With a stronger body (references to Strengthening the Body appear seven times) and a Nervous System (seven references) which seemed to be less volatile, Beth's sense of Well-being (six mentions) had improved. While there was less reference to her voice and singing than I expected, her sense of increased control over herself had allowed her to enjoy her singing more broadly.

5.3.5. Carol (Participant 3) narrative

Carol began the study with chronic asthma and pain as a result of constant headaches and tension in her body and she had scored high for both anxiety and depression in her questionnaires (W). Her first interview revealed that she wanted to have increased physical support for her voice (S) as she experiences drops in energy which prevent her from supporting her voice properly (PS; SB; R). She felt that she was unable to develop the correct muscles she needed for support (SB; PS; T; S), even though she has an understanding of which ones they are (M/BC). Questioning revealed that Carol battled with tiredness, causing muscles to tense up (R; W). She can recognise this build-up of tension (in place of support) while it is happening (M), however, she feels unable to do anything about it (T; S). Although strongly built, Carol experiences a general misuse of her musculature when playing instruments, which causes tension (M/BC; T). Therefore, she has to be very careful when exercising that she does not exacerbate this situation and as a result she stays away from physical exercise (SB; T; W).

The first two lessons revealed to her that it is possible to focus on specific muscles and use them because of an increased awareness (M/BC; T). Carol had managed to get through a busy day of instrument playing and singing (after doing the Pilates session in the morning) without building up tension (RM; R; T). It surprised her how contained the Pilates exercises were whilst still being effective (M/BC). She described the Pilates exercises, whilst small in movement, as "you definitely feel like you've worked afterwards".

Interview 1 highlighted that there was confusion and an inability for Carol to interpret what her body was experiencing (M/BC). She felt tension and discomfort but did not know how to distinguish between pain and novelty in an exercise i.e. to label the sensation as good or bad (M/BC). Possibly, because she has to live with constant pain (W), she has become tolerant of unpleasant sensations and no longer knows how to process them (M/BC). This situation would be similar to that of advanced kung fu practitioners who have been found to have low body awareness levels, because of "repressing negative bodily signals" (Tihanyi, *et al*., 2016:108) in order to tolerate pain.

Interview 2 continued exploring this concept and she recognised it as "zoning out" of her body (M/BC; M). She sensed that at this point in the study she was more aware of her body (M/BC; M) but still felt that she did not do enough of what she ought to do and "forgets" (R; NS). However, she did not need to book an appointment with a physiotherapist after an instrumental concert (T; R; SB). Before this study she would have had too much tension built up after playing a concert on the double bass and professional intervention would have been needed (W). This was a big improvement but was not immediately visible to her (M). Most of the second interview's answers began with the words "I don't know" or "I'm not sure" or even "I can't remember" which made it tricky to understand how she experiences her body but is also indicative of the trouble she has with her mind-body connection and stress (M; M/BC; NS; R; W). For example, it is the visual confirmation from a mirror which assists her to know what she is feeling and where in her body she is feeling it. Without that confirmation, she remains uncertain.

She was not confident of her improvement in the execution of the Pilates exercises in the two weeks of home practice, even though some improvement was felt (M/BC). However, there had indeed been solid improvements in that time (SB). As a result, I challenged her to "zone into" her experiences instead of "zoning out", and to give herself rest breaks throughout the day (M; M/BC; T; W). She had been challenged to remember to drink water in Interview 1 (she would forget to drink) and in Interview 2 she confirmed that she "thought" she had been drinking more water (M).

At the start of the study, Carol experienced constant continuous headaches of two different types (W). However, these headaches had changed three weeks into the study (W). By Interview 2 they were less constant. Although she still suffered daily, there appeared to be "gaps" in between the headaches. This was something she could actually feel and had become aware of (M; M/BC).

As Carol is asthmatic, I was interested in the impact of alleviating her asthma symptoms by "preventing panic in the body" through the Pilates warm-up (PB; NS; T; W). Two days into the study, the Pilates breathing technique had already made an impact on her asthma by allowing her to control the severity and duration of an attack (T; PB; SB; R). We discussed how preventing panic from controlling the body in an asthma attack was important (M/BC; M). In Interview 2 Carol described how she was not stressing as much and was "potentially more relaxed" in her approach i.e. not pre-emptively , and thereby, causing panic in her body (T; M; R; NS). She had only used her asthma pump once in four weeks as opposed to very often, especially when she was sick (as her asthma would become more severe) (R; W; SB; PB). Carol is often sick (she describes it as constantly "going into or coming out of a coldy/fluey state") and this for her is the dilemma of being asthmatic. Asthma makes her more susceptible to upper respiratory tract infections and these, in turn, bring on severe asthma attacks. However, in four weeks she had managed to first control the severity of an asthma attack and then reduce the number of attacks (T; R). It is my experience that this is a common benefit of the Pilates method for asthmatics, with the use of exercise recognised as an effective way of reducing asthma symptoms (AUK, 2019).

By Interview 3, Carol's headache "gaps" had increased in number though not necessarily in length (W; R). She found that she was working less (M; W) and that the warm-up was helping her singing (S; PS) and herself (W). She discovered that the "awareness and focus" required of the Pilates warm-up was "spilling over into [her] day" (M; T). She was starting to focus more on herself and her needs (M; R; W) and was noticing when she was thirsty and was trying to sleep more (M/BC; M; R). She had noticed that her asthma was better because she was not needing to use her asthma pump as much

(PB; W). Carol revealed that when singing or playing instruments, she was able to notice the tension "as it's starting" and not let it build up in her body to a point where she cannot do anything about it (M; M/BC; PS; T; NS). Her attitude towards her work had changed also and seemed less negative (R). Her initial expectation of improving her physical support for the voice had been met as she was not getting "so tired" (SB; PS; S; R) and she could sustain herself for longer (R; T). She was "more relaxed" (T; RM; NS; R). She had also discovered that the "zip" (pelvic floor and lower abdominal engagement) she used in Pilates could be used to help support her voice (SB; M/BC; PS; S; T). Although still cautious about her ability to interpret what her body was communicating to her, Carol was aware that she could perform movements in a new way and that she did have improved awareness. She also felt that the theory had become practice.

5.3.6. Carol (Participant 3) summary of the emerging themes

Carol's focus for the study was how to support her voice, yet it quickly became evident that she experienced a large disconnect between her mind (theory) and her body (practise/praxis). Her first interview revealed that she was aware that she was lacking in awareness (to which I applied the theme of Mind-Body Communication seven times) largely because she has the theory for what she needed to do but no Tools with which to carry out what was required of her. The lack of Tools (six applications) revolved around the build-up of tension and how to deal with it. However, all of this had to be seen in the light of dealing with almost constant headaches as well as bad asthma. Therefore, my focus with her was to improve her Mind-Body Communication whilst at the same time trying to give her the Tools to deal with her headaches and asthma, as these were understandably dominating her life and activities to the extent that I felt that in order to cope with the constant unpleasant sensations of headaches, she was numbing herself to all physical communication. The ever-present threat of an asthma attack would also be adding to her physical tension and sense of Well-being. The Pilates Breathing formed the primary Tool with which she could control her asthma and was therefore a major theme in the analysis.

Interview 2 was dominated by the theme of Mindfulness which appeared eight times in her analysis. Even though she felt that she was becoming more aware of her body, she seemed incapable of remembering to look after herself or to have any certainty of what she was experiencing. Her physical Resilience had improved even though her mental Resilience was beset with confidence and memory issues. Memory has links to stress and I interpreted her forgetfulness to look after herself as an inability to deal with stress (bad coping mechanisms) and therefore indicative of her state of mental Resilience. Her Mind-Body Communication and control of her asthma suggested improvements in this internal dialogue being heard and processed, even though she was not confident of declaring this. She also continued to display an application of the Tools being learned in the Pilates lessons although this was not necessarily clear to her.

At her third interview, I felt that Carol showed increased Resilience (it was used seven times in her analysis) both physically, manifesting as a reduction in headaches and asthma attacks and her ability to support herself for her singing as well as mentally by remembering to apply the basic pillars for health, namely eating food, drinking water and sleeping. Her Mindfulness had improved as had her sense of Well-being (both appear five times). She was using Pilates as a Tool (five references) and this was impacting her physically in terms of a reduction in tension build-up as well as helping her vocally (three Singing and four Preparing the Body to Sing allocations). I felt that she had come full circle from her first interview, as theory had become praxis, although she would need to continue on the path that she had started with me.

5.3.7. Diana (Participant 4) narrative

Diana had done Pilates prior to this study. She had not found it beneficial as it had caused her to become tight in her neck (T; PS). She joined the study because she wanted to "see the effects [of Pilates] on singing" (S). I commented that it was very brave to try again but she stated that she

thought it might be different in this study as it was being taught from a singer's perspective (S). Diana immediately found similarities in the Pilates warm-up to yoga. She described the similarities as being in the slow movements (RM) and the focus required as "having to use your intellect" (M/BC). Diana is quite active, taking part in many different fitness modalities. She commented on the negative impression that some singing teachers have of exercise for singing (S; PS). She explained that she had been warned that exercise could cause "tightness in the neck" and as this had been her experience with her previous Pilates lessons, they would be justified in stating this (S). However, she had been curious to find out how professional singers are managing to keep fit (W) and still sing well (PS; S). She had seen Youtube videos which had explained about stretching after lifting weights to keep the tension out of the neck (T; SB). She had found this to be helpful and thus she was keen to learn how to stay fit while still singing well (W; PS; S; SB).

She liked the focus required in the Pilates exercises used in this study, as her previous Pilates had been too "aggressive" in its approach (M; PS; NS). She also appreciated accessing the "fine muscles" which she had never accessed before (M/BC). Although in Interview 1 she said her friends had commented that they could not see any results for her efforts, she said she was able to feel a difference which manifested in her singing (PS; S; M). She explained that she could feel a new muscle memory starting (M/BC; M) and had been able to call on her *gluteals* for support in a singing lesson which she had never tried before (T; SB; S). By Interview 2 she stated that she could see a difference in her shape in that she was more toned around the tummy and buttocks (SB).

In Interview 2, Diana revealed that she had practiced six days a week and that it had changed how she feels during the day (M; NS). She found that the Pilates lateral breathing was helping her to breathe deeper when she sang and that it had also changed her natural breathing patterns (T; PB; PS; S). She had previously locked her diaphragm in her attempts to access a deeper breath and her singing breathing had seemed unnatural (T; S; RM). Diana found that she could now combine the singing breath with the Pilates breath, to the benefit of her singing and her everyday life (PB; S). She felt more capable of dealing with the stresses that life placed on her body (T; RM; R; SB).

Outside of singing, Diana found that she could relax much more quickly after being angered or worked up (R; T; NS). She could distance herself from the moment by focusing on her breathing (M; T; PB). She also found that she was more in touch with her body than previously (M/BC). When questioned how this study's process differs from yoga (which she had previously noticed similarities with), she revealed that in yoga she was never corrected. In other words, the difference lies in the precision required in the Pilates method.

As Diana had started the study in a very "good space" after winning her overseas opportunity, she was asked at her third interview how she was feeling now that the initial euphoria had passed. She stated that she was "still on top of the world" (W; NS). She commented that singers could not be unfit or unhealthy (W) and that she was aware that the new generation of professional singers "now have this routine" (of staying fit and in shape). She felt that through the Pilates workshops she was "more in control" (T; R) and that she could be more "measured" in her energy (NS; SB). She found that she did not tire as easily (SB) and could stay relaxed throughout her day (NS). She had come to realise that she could make better muscular choices (T) through her increased physical awareness (M/BC). For example, in the past tension would creep into her back and shoulders and accumulate but with the Pilates warm-up she felt "buoyant through the day" (W; R). Vocally she was aware that tensions were kept at bay for longer (M/BC; SB; PS; S) and that she was aware of "a deeper breath releasing past the diaphragm" (PB). The Chalk Circle exercise had allowed her to open her chest (T; PS) and she felt that as a result she now had more breath capacity (PB; S). The lower breath had given her the opportunity to expand her vocal range and therefore her singing repertoire (S).

The workshops had had a positive effect on Diana, and she was going to keep up the daily practice routine to "warm up for the day" (W). She found the Pilates warm-up to be soothing and relaxing (NS; RM). Diana was able to incorporate the Pilates principles into her daily life and she was satisfied that her expectations of the study had been met.

5.3.8. Diana (Participant 4) summary of the emerging themes

Diana very quickly established herself in my mind as someone who had her sights firmly set on her future and wanted to be the best that she could be. Staying fit without jeopardising her singing was her goal and her first interview showed how she had tried to find Tools (three references) to accomplish this, as developing tension in her neck was something she wanted to avoid. Singing and the profession of singing was the dominant theme of our first interview (eight references) followed closely by Preparation for Singing/Preparing the Body to Sing (six) as I surmised that she was seeking an activity that could benefit her both physically and vocally. I allocated the theme of Strengthening the Body four times to her references to fitness and physical transformation as this seemed important to her.

Interview 2 showed that Diana had applied herself with enthusiasm to the process and was feeling the benefits broadly. Pilates Breathing had made quite an impact on her (three references) and she had quickly developed Tools (five allocations) from the lessons so that these became her major themes and I used them almost interchangeably in her analysis.

The themes of Well-being and Nervous System dominated her third interview, both appearing four times. She felt good and was relaxed and I saw that she had a strong sense of herself as being and becoming a professional singer with Tools (three references) to cope with the demands that she would face. The changes she had made as a result of the workshops and the Pilates Breathing had made a positive impact on her singing.

5.3.9. Francis (Participant 6) narrative

Francis was mostly concerned about posture and its effect on breathing (T; PB; PS). In her first interview, she stated that she was aware that she slouched and that this affected her larynx (S; SB). She was further aware that her stress response was to hunch her shoulders and take tension in her neck, jaw and upper body (NS; T). Francis suffered from pain in her neck (W) which she described as a type of repetitive strain injury caused by habitual postural patterns coupled with voice use. She had noticed that, over the years, she was developing more of a break in her voice and a tendency to jump straight into flute register when warming up (S; PS). I had given her a stretch to target the *omohyoid* muscle which she found to be painful at first (T; SB; M/BC). She had been advised by her chiropractor to strengthen the muscles in her neck as they were overstraining (T; SB). By the end of the first workshop she could feel that the deep anterior neck muscles were both "softening" and strengthening (SB; T; M/BC). She was also already aware of a change in her general strength and "move-ability" (SB; R; W) and that by session four she was "more centred" and less "stiff" (M/BC; M).

She said that her "stretched and relaxed state", which she attributed to the Pilates sessions, had prevented her "from being more injured" in the bicycle accident (NS; RM; R; W). Personal communication after the bicycle accident revealed that she had been able to utilize the Pilates lateral breathing to help alleviate tension in her ribcage (T; PB; RM), which had manifested as requiring an extra/emergency breath in an aria where ordinarily she did not need one (PB; S; PS).

Francis had made the Pilates warm-up part of her schedule as she felt that it helped her to concentrate during the evening rehearsals (T; M; R). She likened the simplicity of the Pilates exercises to singing Mozart, in other words, deceptively simple but with a lot going on. She was also more aware of different muscles being available to her, for example the *gluteals,* and that she could do "active standing as opposed to passive standing" in rehearsals (SB; T; R; M/BC). Frances felt she was more aware of how she was using her body in the Pilates sessions (M; M/BC) and felt confident she would be able to self-correct while practicing on her own (T). She attributed the slow pace of the exercises to assisting her to focus her brain completely on what she was doing in the movements (M; RM). She

particularly enjoyed the Hip Rolls exercise (she felt that the "whole tank stretches out") and appreciated the feeling of movement in the spine when doing the Spine Curls (M/BC) even though she suffered badly from cramping in the hamstrings during this exercise. She was curious to see how she could improve her "muscle tone in her neck" (SB) and what impact, if any, this would make on her pain (W) and also her singing (PS; S).

In interview 2, Francis felt that she could feel a difference in her "strength and deportment" (SB; M/BC). She stated that the home practice of the Pilates warm-up had helped her in the "recovery process" after the cycling accident (R; T; SB). She had practised regularly despite a lot of travelling and being hospitalised and diagnosed with two *haematomas* in her breast as a result of the accident (R). Francis commented that although she had pain from the injury, stiffness from the injury had not settled into her body (SB; M/BC; R; W). This she attributed to the Pilates warm-up. She reiterated that the use of the Pilates lateral breath had helped her "to open [her] chest" after the accident, so that she could breathe deeply for singing without pain (T; PB; SB; S; PS; W).

She found that when she did the Pilates warm-up, it helped her to clear her head and likened it to meditation which "calms you down" (M; RM; NS). Francis was very aware of exactly how she was doing the exercises (M; M/BC) and had slowed down the movements even more to compensate for the injury (T). She was aware that the warm-up gave her the chance to focus on herself and her body (M; T; M/BC; NS). While the warm-up calmed her in the practice sessions (NS; M; RM), she did not feel that it enabled her to be calm at other times in the day (R). However, she did allude to the need to do "my Pilates now" after arguments in order to regain a state of calm by clearing her mind (T; M; NS; RM). Personal communication later revealed that the Pilates warm-up prior to a big orchestral rehearsal had helped with focus and establishing a state of calm (T; RM; NS; R; S; PS).

Although it was difficult to separate the effects of the injury from the effects of the Pilates warm-up on her body, Francis commented that she seemed to be more aware of the space around her and where she was in it (i.e. improved proprioceptive feedback) (T; M/BC; M). She described that she was being more conscious of her movements and "less lazy" in how she used her body (M; R). However, she did not feel that the principles had become ingrained in her body yet or that the mind-body connection she established in practice was habitual (R). She found the exercises to be challenging but not impossible and understood that she was undergoing a process of physical change that would take time. She made the analogy of building something out of Lego blocks, where everything has to be put into its correct place, before you can see the final picture.

By interview 3, Francis was feeling better, stronger and more flexible with less tension in the back of her neck (SB; R; W). Her "held patterns" had released to the point of feeling "much better" (M/BC; T; R; W). Her chest felt "much more open" and she stated that she could "now see a line running through my shoulders" which made her feel "much more balanced" (SB; M; W). She felt healthier and had fewer bodily issues (SB; R; RM; W). Her lower back pain had "improved a lot" by the end of the research period (W; SB; R) and she had not needed an appointment with the doctor for pain treatment (W). She was able to see how much stronger and more flexible her body had become, including her posture (SB; PS; W).

She felt that the biggest impact was how much the warm-up helped before a performance (PS; T; NS; R). Francis described how she would naturally experience an adrenaline rush before performing but that the warm-up brought the focus back to the breathing (NS; T; PB). Although she would do the warm-up approximately two to three hours before curtain-up, she found that the effects carried through until the show began (R; NS). She noticed that her mind would stay focused and that she could rely on this to assist her when going on stage (M; R; PS; S).

How much the Pilates warm-up had helped her to focus before performance (T; NS; R) became clear to her on one occasion when she had been unable to do the warm-up uninterrupted and had only been able to focus properly by the second act (M; RM; PS). Prior performance preparation had consisted of using the makeup and hair session time to get into focus (PS). However, she felt that using a physical

warm-up gave her better "mental preparation" (T; NS; M; RM). On a personal level, she felt that the Pilates method's focus on breathing in the exercises had helped her gain a state of personal mental clarity (NS; M). She summarised her experience as leaving her mind and body more aligned and together (M/BC; T; NS; W).

Her favourite exercise was the Chalk Circle which she felt opened her chest and allowed her "to get in a lot of air" (T; PB; S). She described that she had not had the sensation of "holding my breath and then feeling that I'm almost going to get a panic attack" (NS; PB; R; W). When dealing with anger, she would normally go into a shallow breathing rhythm, but she was now able to say to herself "just breathe" (T; PB; M; R; NS).

Francis was interested to incorporate what she had learnt into her lessons with her students, as she felt that the Pilates exercises would help to teach singing anatomy in a better way (T; PS; S). She described how she was now "consciously working" with her body (M; M/BC; T) rather than "just letting things happen" (W).

5.3.10. Francis (Participant 6) summary of the emerging themes

As a professional singer, Francis provided a different perspective on the effects of the warm-up. Actively performing during the study period meant that I was able to ascertain what the effects on her performing state might be. However, while her initial concerns centred around improving her posture and strengthening her body, the themes of Tools (nine allocations) and Strengthening the Body (seven references) which I allocated to this, quickly took on a new focus after her bicycle accident. Initially she needed Tools to address her bad posture, of which she was aware, but was unable to do anything about. This changed to actively using the Pilates Breathing (three mentions) as a Tool after the accident. She also started using the warm-up as part of her daily routine as she could feel the difference in her concentration, and this showed me that she had started using the warm-up itself as a Tool. From the first interview she showed good Mind-Body Communication (six references) which assisted me in understanding her process.

While the themes of Tools (seven references) and Mind-Body Communication (six applications) continued throughout Interview 2, I noticed that there was a shift towards greater Well-being (nine allocations) and Mindfulness (seven) although I was particularly interested in the emergence of the Resilience and Nervous System themes which I saw developing in her. As her body strengthened and as she used the Pilates warm-up more like a Tool, I could hear that her mental and physical Resilience was improving (seven mentions) and I was very interested to observe the emergence and development of the mental aspects such as calmness and being able to clear her mind to which I attributed the theme of Nervous System (five times).

By interview 3, it was clear that Francis had noticed how much the warm-up could help her performance and her daily mental state and for these references I allocated the theme of Nervous System nine times. Her Well-being and Resilience references were at ten each as I perceived that she felt in control of her body and her mind and she had coped with any problems that had arisen as she had the Tools (ten applications) to do so. She had also started thinking about using what she had learnt for her singing students, which showed me that she had truly integrated the process and could apply it beyond herself.

5.4. Observations

Observations help to inform the interpretation process in qualitative research and IPA highlights the role of the researcher as part of this process. This role needs to be reflected upon, as a good IPA requires interpretation which is inherently subjective (Reid, *et al*. 2005:20). Eatough and Smith (2013:191) explain how the analysis will go through a process that while grounded in the participants' experience, is "taking us to a more interpretative stance". Recognising that interpretation is influenced

by perspective "which has its own explicit or implicit criteria for the validity of the reading" (Smith, 2004:45), it is advised that IPA takes its foundation from the data that has been gathered i.e. the participants words and their experience (Smith, 2004:46; Reid, *et al*., 2005:20; Eatough & Smith, 2013:191).

I performed three different roles in this study. My observations of the participants had to be as a Pilates 'Teacher', 'Singer' and 'Researcher'. These three roles are discussed here, although ultimately the roles were combined in order to make sense of the process that was being taught, experienced and researched simultaneously.

As Pilates Teacher, I have to observe the participants in a few different ways. Firstly, the participant has to be able to learn the exercise sequence in order to perform the exercise effectively, and so this is the Teacher's priority. Secondly, the Teacher needs to observe anatomical variations and to distinguish between those that can be corrected back towards an optimal alignment and muscular engagement, and recognising what is too challenging for the participant and requires some sort of assistance or intervention by the Teacher. This happens through demonstration, discussion, physical manipulation, the use of Pilates small equipment (props) as well as tactile or verbal reinforcement. All the participants in this study received instruction well and were receptive to correction. The inability to follow instructions can be a major obstacle to learning but in this study this obstacle was not encountered.

A third and more subtle observation proceeds throughout the lessons. The Teacher has to observe 'how' the participant moves and what the 'quality' of that movement is, as this has an impact on how the participant is taught, what type of cues need to be used and what psychological and emotional processes are active in the student.

For example, Agatha (Participant 1) works with undue tension in most of her movements. Her musculature is such that there is an abundant amount of strength available for any given exercise and so the Teacher focus with her is to be vigilant for extraneous muscle engagement and to use language and tone which is soft and yielding to facilitate this process. However, Carol (Participant 3) has the opposite situation. Her musculature is also well developed but it is underutilised. Therefore, her process requires more active physical engagement with greater energy use. This is similar to Francis (Participant 6) who initially cramped often and tended to want to work too slowly and without enough engagement of the muscles being focused on. This improved within the limited time available to the study and despite injury. Corrections and affirmations are potentially a difficult balance for the Pilates Teacher to obtain, as too much correction given too energetically due to time constraints can become demoralising for the student and deplete confidence, which would be counterproductive. Compliments without foundation or accepting of incorrect work (to facilitate the time frame of a lesson), are also counterproductive, as it creates a mistrust of the teacher. The corrections and affirmations must therefore always be carefully considered and be supported by the participant's perception. For example, with Francis, posture was one of her primary concerns and, therefore corrections relating to this were eagerly received. As there was a visible difference in posture and in the appearance of her shoulders and collar bones by the start Workshop 3, affirmations could then be given, as these were reinforced by her own perception of the improvements.

The language used in a lesson can in itself become an issue. For example, for Beth (Participant 2) verbal cueing becomes meaningless if it is not backed up with a visual cue. This is due to the way that her brain processes information. Her body, however, 'shows' correction very quickly. The mind-body connection works rapidly in her when the movements are slowed down. This is extremely interesting considering that she is on the Autism Spectrum Scale which implies that her synapses have gaps that are too long for smooth neural communication (Beth's explanation). This is in contrast to Diana (Participant 4), who worked steadily and smoothly throughout, with a good understanding of the concepts and an ability to apply them. On Diana, the physical changes manifested very subtly, but by the second interview, she was able to see a difference in her body's appearance. Vocally she also experienced changes early on in the process.

As Singer, I had to balance the requirements of the Pilates method with the demands of classical singing on the body. Much of this process had previously been assimilated into the design of the warm-up being used (see Chapter 3), most notably in the choice of beginner's level exercises and the avoidance of exercises which have overly intensive abdominal usage (e.g. the Teaser (Gallagher & Kryzanowska, 1999:66-69)) or neck and shoulder strain (e.g. Neck Pull (Stott-Merrithew, *et al*., 2001:72)). However, each participant exhibited a very different musculature and therefore my singing knowledge had to communicate the Pilates requirements to the participants in language that singers would understand. A 'marrying' of concepts and the muscular requirements of two different methods had to be explained and observed. For example, the Pilates method can become quite strenuous given its use of the body's core muscles, called the Powerhouse by Joseph Pilates (Pilates & Miller, 2012:12). The use of the Powerhouse requires the engagement of the abdominal muscles, *gluteals* and shoulder girdle, and this for the singer requires attention, as the abdominal muscles must not become tight from intense usage, as this would hamper good breath control in singing. As all the singers involved in this study were actively singing during the workshops, my role as Singer had to inform my role as Teacher as to how much abdominal use would be acceptable to keep the demands of vocalising paramount. This would not be of concern when teaching the general public. The same concern applied to the neck muscles. Some of the exercises (e.g. The Hundred and Swan Dive) are taxing on the neck in order to strengthen these muscles. However, with knowledge of singing, these muscles could be strengthened without negative after-effects. Beth, for example, has jaw issues which would be exacerbated unless given the singing instruction to 'release the jaw' by bringing it forward, before lifting the head in the Basic 100/AB prep. On doing this, she found that the exercise had the added benefit of relaxing her jaw.

As Singer, I had to inform my role as Teacher on how much muscular usage could be maintained whilst still honouring vocal demands. Diana, for example was unable to execute the Roll Over and was therefore given the exercise called Wall Curls (Robinson & Fisher, 1998:86) as a variation to enable her to experience the same benefits of "[m]obilizing, lengthening and strengthening the muscles which support the spine" but without the strain which would otherwise result from her attempting to fling herself into the position. Muscular tightness after exercise is a potential negative for Carol and therefore my knowledge as Singer had to honour her feedback of not singing well immediately after one of the workshop sessions, due to physical tiredness, and adjust the amount of physical intensity expected of her in the next session.

The last example of the requirements of my observation as Singer, is in teaching the use of Pilates lateral breathing versus singing's abdominal breathing. Marrying these two seemingly contradictory concepts requires an innate knowledge of the two different disciplines, so that the two concepts can become mutually acceptable and indeed applicable and desirable – as this study's results showed them to be. Much discussion in the Pilates sessions ensued in order to fully understand, feel and execute the two concepts, to the benefit and requirements of both (this is discussed in Section 3.3.2). This required my careful observation (as both Singer and Teacher) of each participant and their muscular usage patterns, to ensure that the demands of both methods were satisfied.

The roles of Teacher and Researcher shared some common ground which can potentially make the two roles indistinguishable. As Researcher, I had to document and note all aspects of the participants' process and progress. Psychological, physical, emotional, functional and developmental progress had to be noted in detail and analysed for common and recurring themes as well as for individual particularity. The focus of the Teacher became progressively more subjective as the study unfolded and relationships were developed with the participants. The Researcher however, had to try to maintain objectivity and view the teaching process (the 'how') as well as the participants' progress (the 'what' and the 'how'). This objectivity was aided by the psychometric tools used at the start and end of the study. The use of predetermined uniform questions for the interviews also aided objectivity, as the analysis of the participants' responses could be compared and themes discovered.

Recurring specificity of terms and words used by the participants had to be noted although these were influenced by the common process they were all part of. Understanding the participants' experience through structured interviews is a Researcher's focus and differs from a Teacher's focus, as formal semi-structured interviews are not part of Pilates teaching, even though long discussions can occur in lessons. While there is some overlap between Teacher and Researcher in this study, the depth of psychological questioning and detailed analysis of the responses lies firmly in the Researcher's domain. My observations and interpretations for the IPA can be understood to have been informed by the three different roles that I undertook in this study and my own experiences thereof and, importantly, the results have not been labelled as fact (Reid, *et al*. 2005:20).

5.5. Psychometric questionnaire results and heart rate measurements

In this section, the data from the questionnaires at the start and end of the workshops are displayed and some points of interest are noted. The SF-36 quality of life scores are presented. Thereafter the GAD-7 anxiety measurements and BDI results are listed. These psychometric tests are presented by participant. The HR measurements are discussed in general in Section 5.5.6 with the individual HR scores available in graph form by day, workshop and participant in Appendix 9.

5.5.1. Participant 1 Questionnaire results

It is possible to view the improvements that Participant 1 made during the study by referring to her "Role limitations due to physical health" and "Role limitations due to emotional problems" in particular (see Table 5.2). As can be seen in Table 5.3, her GAD-7 score reveals a change in category while the BDI score remains in the same category but with a substantial drop therein.

Table 5.2: Participant 1 SF-36 Quality of Life questionnaire. Higher scores indicate better quality of life for that category.

Category	**Start**	**End**
Physical functioning	90%	100%
Role limitations due to physical health	0%	100%
Role limitations due to emotional problems	0%	66%
Energy	55%	75%
Emotional well-being	40%	76%
Social functioning	75%	100%
Pain	67,50%	90%
General health	70%	85%
Overall score	55.8%	89.5%

Table 5.3: Participant 1 GAD-7 and BDI Scores. Lower scores indicate lower levels of anxiety or depression.

	GAD-7	**BDI**
Start	10	7
End	6	0

5.5.2. Participant 2 Questionnaire results

Participant 2 showed an overall score increase of 14,7% (see Table 5.4) with the greatest improvements visible in the categories of "Physical functioning", "Role limitations due to emotional problems" and "Social functioning". Her scores indicate a drop in energy levels which might be explained by the improvements in the other categories allowing her to be more active. Her GAD-7 scores show a change in category while the BDI changes by two categories (see Table 5.5)

Table 5.4: Participant 2 SF-36 Quality of Life questionnaire. Higher scores indicate better quality of life for that category.

Category	**Start**	**End**
Physical functioning	50%	70%
Role limitations due to physical health	25%	25%
Role limitations due to emotional problems	0%	33%
Energy	55%	45%
Emotional well-being	56%	68%
Social functioning	37.5%	62%
Pain	12.5%	55%
General health	55%	65%
Overall score	44%	58.7%

Table 5.5: Participant 2 GAD-7 and BDI Scores. Lower scores indicate lower levels of anxiety or depression.

	GAD-7	**BDI**
Start	12	20
End	9	8

5.5.3. Participant 3 Questionnaire results

Participant 3 showed improvements in every category of the SF-36 questionnaire, with a visible correlation between her physical improvements and emotional state, in particular her "Social functioning" as can be seen in Table 5.6. The GAD-7 shows a shift from the category "Severe anxiety" to the category "Mild anxiety" as well as a large jump from the BDI category "Moderate depression" to "Mild mood disturbance" as displayed in Table 5.7.

Table 5.6: Participant 3 SF-36 Quality of Life questionnaire. Higher scores indicate better quality of life for that category.

Category	**Start**	**End**
Physical functioning	75%	90%
Role limitations due to physical health	25%	50%
Role limitations due to emotional problems	33%	66.6%
Energy	20%	55%
Emotional well-being	48%	72%
Social functioning	25%	100%
Pain	32.5%	57.5%
General health	20%	45%
Overall score	42%	71.8%

Table 5.7: Participant 3 GAD-7 and BDI Scores. Lower scores indicate lower levels of anxiety or depression.

	GAD-7	**BDI**
Start	17	26
End	8	11

5.5.4. Participant 4 Questionnaire results

Participant 4's initial high scores in the SF-36 increased further to create a final score of 96% (see Table 5.8), while her GAD-7 results remained the same with a one-point increase in the BDI not changing the depression category (see Table 5.10).

Table 5.8: Participant 4 SF-36 Quality of Life questionnaire. Higher scores indicate better quality of life for that category.

Category	**Start**	**End**
Physical functioning	95%	100%
Role limitations due to physical health	100%	100%
Role limitations due to emotional problems	100%	100%
Energy	65.5%	85%
Emotional well-being	92%	96%
Social functioning	100%	100%
Pain	100%	100%
General health	70%	75%
Overall score	89%	96%

Table 5.9: Participant 4 GAD-7 and BDI Scores. Lower scores indicate lower levels of anxiety or depression.

	GAD-7	**BDI**
Start	0	1
End	0	2

5.5.5. Participant 6 Questionnaire results

The results for Participant 6 remained relatively constant with a slight increase in the overall score for the SF-36, largely due to improvements in "Physical functioning" and "Social functioning" and "Pain", however these score increases were offset by decreases in the categories pertaining to emotion (see Table 5.11). The GAD-7 scores show continued "Mild anxiety" with the BDI result remaining constant for the category "Normal" (see Table 5.11).

Table 5.10: Participant 6 SF-36 Quality of Life questionnaire. Higher scores indicate better quality of life for that category.

Category	**Start**	**End**
Physical functioning	80%	100%
Role limitations due to physical health	100%	100%
Role limitations due to emotional problems	100%	66.6%
Energy	80%	80%
Emotional well-being	84%	80%
Social functioning	75%	87.5%
Pain	67.5%	90%
General health	75%	80%
Overall score	82.85%	87.86%

Table 5.11: Participant 6 GAD-7 and BDI Scores. Lower scores indicate lower levels of anxiety or depression.

	GAD-7	**BDI**
Start	8	9
End	9	8

5.5.6. Heart rate readings

The heart rate readings were taken by the participants themselves at the start, set middle point and end of the Pilates lessons. They were instructed to find a pulse and count the number of beats in a timed 10-second window. These readings were noted and then multiplied by six to get a minute reading (see Appendix 8 for the results table and Appendix 9 for the graphs). The methods used in this study were

too simplistic to draw any firm conclusions. However, the general drop in the number of beats per minute at the second reading point suggests parasympathetic activation. The elevation of heart rate at the last reading point suggests sympathetic activation. Although inconclusive, the readings do suggest a loose pattern of activity which together with the psychometric test results warrants further study. It is unclear how the medications that Beth, Carol, and Francis were on influenced their heart rate readings. Typical resting heart rate (of on or below 70 beats per minute) is synonymous with parasympathetic dominance, as is a drop in heart rate. A high resting heart rate and an increase in heart rate suggests sympathetic activation.

5.6. Focus group presented as a narrative with the IPA sub-themes brought together as the main themes of the study

At the end of the three workshops, all five participants were invited to take part in a focus group discussion to share their experiences of the study with each other. Open-ended questions were used (see Appendix 11) to encourage conversation. It was hoped that the focus group would provide the students the opportunity to relate their experience to that of a professional singer's, as well as to one another, and to see if any new information would come to light. According to Stewart and Shamdasani (2015:45), a focus group can assist in "[i]nterpreting previously obtained quantitative results" as well as in ascertaining "the potential problems with a new program" (Stewart & Shamdasani, 2015:44).

The focus group comprised of three of the four student participants, Agatha, Carol and Diana (Beth was unable to attend). Francis (who had received private sessions) was not in the country and so had to join remotely via Google Meet using my laptop for the visual and audio and my cell phone to provide internet connection. I used a digital voice recorder and my cell phone to record the meeting.

In the cyclical analysis of the focus group as data, it was found that the eleven themes which had emerged in the individual interviews could be condensed into three main themes which had emerged across the study and appear here in the presentation and analysis of the focus group discussion. The eleven themes of the individual interviews became the sub-themes of the study once they were grouped together under three main theme headings which are displayed in Table 5.12.

Table 5.12: Main theme headings

Theme	Name	Abbr.	Description
Theme 1	Tools	T1	Having solutions. This combines Tools and Pilates Breathing (plus all references to breath).
Theme 2	Nervous System	T2	Any reference to the CNS, ANS or emotional state. This theme now includes Mindfulness, Mind-Body Communication and Resilience (both mental and physical) as well as Relaxation through Movement. It also includes the GAD-7 and BDI scores. The theme of Wellness plus the data from the SF-36 tool used at the start and end of the study is incorporated here.
Theme 3	Singing	T3	All singing references. This now includes Strengthening the Body, and Preparation for Singing.

To start, Francis was asked to give her impression of the process and "what surprises or delights" either positive or negative she had experienced. Francis answered that she felt stronger and fitter and

did not run out of breath as easily when running around (T3). She also attributed the warm-up with better focus before performance (T2). She stated that it helped her to stay calm when performing even though she would do it some hours before going on stage (T1; T2). She further alluded to the fact that it was very helpful to focus on the breathing "as breathing is the most important part of singing" (T1; T3). The only negative she had experienced was some stiff muscles occasionally.

Agatha had not performed during the study period. For her the biggest "delight" was "regaining hope in singing with the specific problems that I had" (T1; T2; T3). This was a very emotional statement to make in a group setting and so we had to move on to Carol's answer to give Agatha some time to compose herself and check the tears before talking further.

Carol stated that there had been "quite a bit for me". She felt that her body was getting stronger (T2; T3) so she could "sustain singing for longer" (T3). The "biggest surprise was that it seems to have helped my asthma" (T) and she reiterated that it "seems to have really helped" (T1). She also felt that learning to activate her lower abdominal area (T1) had helped her singing (T3) and that it was something that she "had never figured out how to do" before even though she understood its importance in singing (T1). She did not experience any negatives in the process.

Diana's big discovery was "not pushing my breath against my diaphragm" and to "let the breath flow" (T1; T2; T3). She also stated that she had "greater focus" and "a calmer presence during the day" (T2).

The group then started to discuss the concept of "space" and what this means for singers. Francis spoke about how singers think about creating space in the mouth or throat but that actually the space needs to be created in the body (T1) "so that the breath can function optimally" while "the muscles in the throat and jaw and mouth should stay as normal as possible" (T3). She went on to discuss the benefits of the Chalk Circles exercise which she "absolutely love[s]" (T1).

Diana started the discussion about the impact of the Pilates warm-up on the voice. She stated that it had given her "the opportunity to sing bigger rep [repertoire] in a more relaxed fashion" (T3) and the "opportunity to control the tension" (T1; T3) and "go into a state of relaxation" (T1; T2). She was presently more aware of her different muscles (T2) and could therefore "access these muscles to implement them into my technique" (T1; T3). Carol revealed how she was now able to release tension in her body (T2) so that playing her instruments did not impact negatively on her singing (T1; T3). Agatha and Diana spoke about tension and pain in the neck, throat and larynx (T3). A discussion about muscle tension dysphonia took place (T3), as well as a conversation about using the correct muscles for any given function (T1). Carol spoke about tension and tiredness and previously not noticing until too late that her body was overly tense (T2) and then being unable to do anything about it (T3). She found she had become able to notice tension earlier (T2) and also where the tension was specifically (T2) and due to this better body awareness she could "now decide ok I'm going to release this muscle" (T1). Francis described a similar process of having "a tool" to address tension (T1). She mentioned being aware of tension before (T2) but not necessarily knowing how to do anything about it (T1) and that having pain in the body was not conducive to optimal performance (T4) because pain causes shallow breathing due to the "body going into fight-or-flight" (T2).

After a discussion about the importance of drinking water, the conversation moved to the impact of the warm-up on the mental and emotional state of the singer (T2; T3). Agatha mentioned that she felt she could rely on the Pilates warm-up "to be a stable component" in the performance process (T3). Carol mentioned how her stress seemed "more neutral, more controlled" than it would normally be (T2; T3). She stated that the Pilates warm-up helped to "ground me in that moment" (T1) and that it "helps for my singing" (T1; T3) and therefore was not an added time strain that would detract from practicing her singing (T3).

A discussion about stress management and tension followed (T1; T2). Diana spoke about the need to "separate your mind from the chaos of life" (T2). She had found the Pilates warm-up helped her "to

digest" all the work she was memorising (T3) and to "take things one step at a time" (T1). The discussion then moved to the benefits of resting, as well as about living in the present (T2).

Francis had been complimented on how she held her body and moved during a production that overlapped with the study (T3). She spoke about how singers stand differently "to use the body optimally as a resonating space" (T3) but that due to the Pilates warm-up she had managed to do this "a little more elegantly" (T1) which was what the production had required of her. Carol discussed how she had been able to support her voice physically after the Pilates warm-up in a much healthier way (T1) on an occasion when she had had a very busy day, which had included a singing lesson and a long master class (T2, T3). She revealed that her singing lessons had recently become much more emotional (T2). A discussion about crying and emotions followed (T2).

We then talked about using the body in singing lessons and the mind-body communication that is required of the singer. Diana related her "[a]wareness of new muscles and breath" (T2; T1) and her progress vocally as a result (T2; T3). She described how in a singing lesson the breath is of major consideration although there is so much else that is also required in vocalising. It was, therefore, easier to focus on the quality of the breathing in the Pilates work (T1; T2; T3). She felt that combining the Pilates movements into singing was making singing much more natural for her (T1; T3). Agatha felt that because the breath was in place, she could now "handle the demands of singing in a higher tessitura" (T3) but that her biggest accomplishment was that she was now "singing without pain" (T3).

To conclude the focus group, the discussion revolved around continuing using the Pilates warm-up alone beyond the study period. Francis mentioned that she had coped best with the first two practice phases of the warm-up but that she was confident she would be able to continue on her own (T1). Agatha had realised that "doing something was better than nothing" and that executing the movements to the satisfaction of her perfectionism was not fundamental to the benefits she would be obtaining (T2). She had plans to schedule it into her routine as it was worthwhile (T1; T3). Carol "definitely wanted to keep using it" as she had noticed how much difference it made (T1; T3). Diana "really liked using" the warm-up and so would continue to do so (T3).

The focus group concluded the participants' involvement in the study. The cyclical analysis of the narrative gave me the opportunity to refine the themes which had emerged across the group. While the main themes have been shown in brackets here, this analysis is discussed below.

5.7. Themes and sub-themes from the analysis discussed

The themes which emerged in the analysis of the data underwent a cyclical process first with each participant on an individual level, and then also across the study, in a general way. The analysis started in the narratives, by highlighting the issues that were important for each participant. This generated many themes evolved to become the sub-themes at this point in the study. These were then grouped to form the main Themes of the study. This process was repeated as many of the sub-themes overlap in their categorisation, even when grouped together to form the Themes of the study. This is particularly true of references to breathing and/or singing as the two are quite inseparable for a singer. As is to be expected with singers, many of the references pertained to the voice, its care, and its use. The rationale behind the allocation of these Themes is discussed here.

5.7.1. Theme 1 – Tools

All the participants made references to the Pilates breathing and how it had assisted them. This became a major Theme and was given the title of 'Tools' in the analysis. The Theme of Tools is best described by Carol, who stated that the Pilates warm-up was a "goal-focused activity" and that this "awareness and focus is spilling over into my day". The thinking behind the Theme's name is that the Pilates exercises and the heightened mind-body communication and therefore control, give the singer

the ability to consciously correct themselves by either undoing tensions through the warm-up; strengthening various physical issues or by being able to apply the Pilates principles or learned sensations to a situation, to achieve a desired outcome. Diana described the Pilates warm-up as "teaching your body how to resist strain".

At the onset of the study, all the participants were aware of their own specific issues but were unable to do anything about them, despite professional input. For example, Francis recognised that she had a "tendency to slouch" which "makes my head come forward" (gave her a forward head posture) she further understood that this puts "unnecessary stress on the larynx" but she was unable to do anything about this.

The Pilates warm-up provided the participants with specific solutions (tools) to their individual problems. Both Francis and Diana used the Chalk Circles exercise to good effect. Diana stated that she now had a "new chest" because the exercise "opens my chest to a new extent". This was echoed by Francis who also chose the Chalk Circles as her favourite exercise for the same reason. She further identified the Pilates focus on breathing to be beneficial as a pre-performance tool, allowing her to "immediately get into the character, go on stage and everything works fine" and as a personal calming tool which she found "extremely helpful to get into myself". She also had the opportunity to test out the direct application of a Pilates principle (namely lateral breathing used as a tool) on her singing of an aria in performance. Due to her bicycle injury, at that time, she had had a lot of pain but she had managed to keep herself from becoming stiff throughout her body by doing the Pilates warm-up. However, she had been worried about her breathing, as she was experiencing pain when breathing in and so she had made a conscious effort to "breathe in two stages", by first using the Pilates lateral breath to pre-empt the low singing breath and thereby avoided the pain of breathing by having opened the chest first. She described it as "making sure it's open and then going down". She had thereby successfully used a Tool to counter the tightness caused by pain.

Pertinently for singers, the breathwork provided the biggest benefits. Diana described how the focus on breath "can help you take a step back" and that it put her into a "relaxed vibe" for the day. Carol reiterated this use of the Pilates warm-up, she called it a "good start to my day". For Carol, the Pilates breathing provided her with a respite from her asthma. Carol described how previously she would instinctively "almost" breathe like this when she was having an asthma attack, as her body would be too tense to breathe any other way. Having the Pilates lateral breathing as a conscious tool to call upon, was therefore helpful and prevented her from panicking. Prior to the workshops, Carol revealed that even walking could produce tension in her body and while she had an understanding of this intellectually, as choosing "the wrong muscles", she found that she could not make her muscles "listen". Therefore, exercise had been counterproductive and did not build her strength and energy. Carol was given, as another tool, a variation of a gluteal activation exercise, called Dog (Bussell, 2007:44), to isolate, connect with and strengthen her *gluteals* (more specifically, her lower *gluteal*/hamstring connections) which were weak. She was able to build strength in this area and to call upon these muscles when needed, thereby preventing the build-up of tension in her body through the use of incorrect muscle-usage patterns.

Agatha found that the Pilates breathing was calming and that she was able to let go of tension "through the breath". For Agatha, this was particularly important in light of removing the built-up tension in her *thoracic* spine, as she had to learn to create movement in this area. Her tools for this task were a Shell Stretch adaptation, a variation of the Half Roll Back and the use of the lateral breath to encourage movement in the ribcage and spine, so as to release the tension held there. Beth was the only participant who did not allude to breathing directly as a tool in her interviews. As she had mentioned in one class that she already used lateral breathing when she sang, this was not a completely new experience for her. However, she mentioned similar sensations which the other participants had attributed directly to breathing, for example, that she would "feel better starting the day" with the warm-up and also talked about "being present" and being "mentally awake". Her heart rate scores consistently indicated parasympathetic activation between the start of the Pilates lesson and the middle and this I attributed to the slow and focused breathing of the Pilates method. Even

though Beth did not specifically mention breathing and although she felt that the Pilates warm-up had benefitted her body more than her singing, she did recognise and state that the warm-up was "helping my nervous system". Although Beth was referring to the use of a specific exercise here (the Roll Over), she is accurate in this statement in a broader sense, because slow controlled breathing can alleviate stress (Van der Merwe & Parsotam, 2012:666) because it stimulates the parasympathetic branch of the ANS. As this Theme clearly shows, breathing was quickly adopted as a recognisable Tool to activate certain behaviours and mental states.

5.7.2. Theme 2 – Nervous System

The Theme of Nervous System grouped together the many references made by the participants with regards to their emotional and mental state. It also became the umbrella term for recognising the activity of the CNS and ANS (I also included the HR measurements into this Theme as it demonstrated both sympathetic and parasympathetic activation (see Section 5.5)), as well as the concepts of Resilience, Mind-Body Communication, Mindfulness and Relaxation through Movement. Lastly, I incorporated the data from the psychometric tests for Quality of Life, Anxiety and Depression (see Section 5.5) here.

Pothoulaki *et al*. (2012:64) state that "one could argue that psychological well-being is not a permanent state and it is highly determined by uncontrollable factors in life", however, the psychometric data did mirror the participants' accounts of how they stated they felt and how I perceived their mental state to be, so it was a useful tool for the analysis.

Stress was a common theme among the participants. For Agatha, this revolved mostly around her voice and work. Her quality of life as indicated by her SF-36 scores increased from 55,8% at the start of the study to 89,5% at the end. With the largest increases in the section Role Limitations due to Physical Health (up from 0% to 100%) and Role Limitations due to Emotional Problems (up from 0% to 66%). She had sought an emotional release to her vocal issues through the warm-up and the Pilates warm-up appears to have provided it. Her depression (7) and anxiety (10) scores had dropped significantly by the end of the study (to 0 and 6 respectively). Agatha had worked directly and specifically on her *thoracic* spine (and therefore on her CNS) and this had provided her with a solution to her ongoing vocal problems. With her improved vocal health and a new sense of ownership of her body, the desperation she had felt over the past three years had been replaced by a feeling of being "re-empowered" and with hope for her future.

As mentioned, Beth credited the Roll Over with influencing her nervous system (it provides some traction to the spine). She felt that as a result of working on her nervous system, she was "more in control". At the final interview, she stated, that while she could feel "the stress of the end of year coming", she felt that she was "doing better than [her] classmates" in dealing with this. Beth showed improved physical and mental resilience by the end of the study. This was also reflected as an increase in her SF-36 score (from 44% up to 58,7%) and most notably, in her scores for Physical Functioning (up from 50% to 70%), Role Limitations due to Emotional problems (up from 0% to 33%) and her Social Functioning (up from 37,5% to 62%). Her anxiety levels had also improved (from an elevated rate of 12 down to a milder 9), with a large improvement in her depression rating (from a high of 20 down to 8).

The Roll Over was also enjoyed by Carol, who by the end of the study, although still scared about not "doing things correctly", was able to "do it differently". She found that the intensity of the hamstring stretches relieved her headache and reported a greater awareness of her body and the transition from mental concept to physical practice, both of which she had struggled with before. Carol's attitude changed by the end of the study. She had a high workload which causes her stress but because she did not want to let herself down, she was trying to "force a positive attitude" to get through it. She stated that she had changed her focus to "getting stuff done". She had also started paying more attention to what her body needed in terms of hydration and rest. Carol found that her emotions were coming out in her singing lessons, which she attributed to being "more in touch with myself". This increased

focus on looking after herself and being aware of what she was feeling was visible in her SF-36 score (up from 42% to 71.8%) which showed improvements across every category. Her anxiety levels had dropped significantly (from 17 down to 8) and there was an even more significant drop in depression levels (from 26 down to 11).

Diana had experienced benefits to her singing from the Pilates warm-up but also that it changed "how you go through the day". Her increased body awareness and strength had had an impact on her energy (she remarked that she was no longer "very tired very easily") and that she was "relaxed going to bed". Francis had felt the influence of the warm-up on her ability to focus during performance in that it helped "to bring me into a calm place before a performance". She further noted that the warm-up allowed her to focus completely "just on [her] breathing and [her] body" instead of "all 700 000 other thoughts that pass through your brain". Francis experienced an increase in her resilience to stress. She had noticed that her usual pattern of getting run down to the point of illness "every three months or so" had not happened, despite the end of a production run and she felt that she had not suffered the same number of "coughs and sniffles" that she "would normally" have done. She was also aware that she had fewer "little body aches and things" as a result of taking part in the study. Diana had experienced a similar resilience to illness during the workshops when she was coming down with a cold but it had cleared unexpectedly quickly.

Although both Diana and Francis started the study with very high SF-36 scores (89% and 82,85% respectively), they both also showed an increase in these scores (up to 96% and 87,86% respectively). Francis showed a slight decrease in her depression reading from 9 to 8 but a slight increase in her anxiety scores from 8 to 9. Diana's anxiety scores remained at 0 but her depression score went up from 1 to 2. Although these score increases do not change the score category in either case, they are unexpected and the significance (if any) of these increases is not clear.

5.7.3. Theme 3 – Singing

All the singers had joined the study to assist themselves with various aspects of voice production. For Agatha, it was a last attempt to find a solution to her muscle tension dysphonia before giving up on singing as a career. Beth was concerned about using her body while singing and wanted to strengthen her body for singing and musicals as she often felt "lopsided and sore". Carol wanted to find a way to provide more "physical support for the voice" to prevent vocal strain. Diana, who had done Pilates in the past, was interested to see Pilates "from a singer's perspective" because "singers now have this routine [of exercising … and they] can't be unfit and unhealthy". Finally, Francis was concerned about her bad posture and its effects on her voice.

As the participants learned the Pilates warm-up and began to practice it, they experienced changes in their singing. Agatha's work on releasing her upper back had a noticeable impact on her voice which at first she was cautious about, although her outlook had improved together with her voice. Near the end of the study she could state that "yes, vocally its better" until eventually she communicated that "my voice … is doing fantastic". Beth was able to notice the effects of using her body without excess tension and as a result this had assisted her in "developing my new sound". She also noticed that she was singing with less strain in her back and neck and jaw and that this "makes you confident and relaxed" which for her also allowed the healing benefits of singing to increase. Carol described how she was "being aware of tension as it starts" and had learned to prevent the build-up of tension in the wrong places which she could previously not control, by "bringing it into the body" (i.e. placing the work in the core) both when playing her instruments and when singing. As a result she was able to work for longer and was "more relaxed". Diana had noticed changes to her singing from the outset. By the end of the study she stated that her breathing was lower and was "no longer causing tension in my chest" and as a result she felt that she had been "given the opportunity to expand my range". Francis did not describe any vocal changes as a result of the Pilates warm-up. For her, the difference lay in her ability to focus on performance and she stated that it gave her the opportunity for "mental preparation". She wanted to use the Pilates exercises for her singing students.

5.8. Conclusion

The singer's instrument is the voice which is housed in the body. The larynx and the diaphragm are well known to singers within the context of voice production. However, singers are not necessarily taught a somatic movement modality as a way of dealing with the housing (i.e. the body) of their instrument and its impact on their voice. This study sought to understand the influence of a specially designed Pilates warm-up on singers and their singing. By teaching a group of singing students and a professional singer the warm-up and then interviewing them, the effects of this warm-up were examined using IPA. Data was further collected using recognised psychometric tools and this was used to help understand the participants' experiences. Heart rate measurements were also taken to understand how each participant's nervous system was affected. This research raised many questions suitable for future study, which together with the conclusions and limitations are discussed further in Chapter 6.

6. Concluding this study, examining the shortcomings and the way forward

This study set out to understand the impact of a Pilates warm-up on singers. My original research question was to see how the benefits of Pilates, and specifically a Pilates warm-up, could be used for singers. Understanding that there are known and documented benefits of Pilates in the literature, confirmed that I needed to focus on the singer specifically as a unique group. My questions were ones that had not been raised in the existing literature, namely: singing benefits, health and physical benefits for singers' specific needs and the psychological benefits of mindfulness due to Pilates, on singers and singing.

6.1. Research design

To make a valid argument for the use of a Pilates warm-up by singers, my reasoning needed to be based on logic and facts. However, with almost no existing research on the topic, the available literature only allowed me to infer the documented benefits of the Pilates methods on singers. The propositional logic required of a thesis is that fact and reason are used to develop conclusions. Yet, how was I to do this in a meaningful way that would develop an understanding of the influence of a Pilates warm-up for singers and encourage further study on this topic? The approach I used had to show that the use of Pilates could provide benefits to singers and highlight what these benefits might be.

My existing beliefs about the benefits of Pilates for singers had not been scientifically obtained, but were based on my own experience of using and teaching Pilates and this experience I could only infer to singers as a specific 'group'. While I knew the benefits of this warm-up for myself and the many benefits of the Pilates method in general, I did not know the full range of what the effect of this *Pilates warm-up for singers* on other singers would be, nor how it might *influence* them in ways unbeknown to me. I needed other singers' experiences of the warm-up to validate it and to uncover what its influence on singing might be, and I needed a research method that would specifically value *experience* as *data*. With a phenomenological approach, IPA was therefore deemed the most appropriate qualitative research method and was used to gain an insight into the experience of a group of singers who were taught and subsequently practiced the Pilates warm-up I had designed.

6.2. Research tools

The primary tool used to gather data in an IPA is the semi-structured interview, which allows the participants to relate their experience in their own words. My observations from the perspective of a singer and a Pilates teacher were used to help inform the process that the participants were undergoing in learning and using the Pilates warm-up. This is an important consideration in this study as the participants each came to the process of learning the Pilates warm-up for singers with very different bodies, personalities, emotional and mental states. While all of them were united by their study of singing and the use of their vocal instrument, it meant that the focus of the exercises for them revolved around two seemingly inseparable central points, namely, vocal health/support of the voice and personal well-being. As a singer, I could comprehend and explore this perspective.

Another area of focus for this study was the impact of a Pilates warm-up on the negative and potentially debilitating arousal of an over-activated sympathetic nervous system which can cause anxiety and tension and is particularly pertinent for the singer as a performing artist. The instrument used to measure anxiety in this study was the GAD-7 (this was discussed in Chapter 4). The participants' subjective experience of anxiety in both their lives and their singing was also investigated in the interviews. The most common concern was the manifestation of excess tension in the body which is detrimental to good voice production. The use of heart rate as a measure of

sympathetic/parasympathetic activation was the research tool I used to try to understand if the Pilates warm-up could be of benefit to the singer's nervous system prior to performance.

Personal well-being was measured using the RAND 36-Item short form survey instrument which measures quality of life (see Chapter 4). It was used as part of a before and after data set to assist with the analysis of the participants' words in both their personal interviews and in the focus group which was held at the end of the workshops. This instrument and the Beck's Depression Inventory instrument had been used in the existing Pilates research literature, although not on singers specifically. These recognised tools link my research on the use of a Pilates warm-up for singers to the existing literature.

6.3. IPA themes

While this study can only come to specific findings about the five singers who participated in the study and not about singers generally, it does however move from the specific to the general in its investigation and in the clustering of the themes which emerged in the process of the IPA. The process of understanding experience is a cyclical one that involves much revisiting of the participants' own words from the interviews. The sub-themes which emerged dealt with: Singing; Well-being (both mental and physical); Preparation for Singing/Preparing the Body to Sing; Tools (solutions to problems); Resilience (both the mental and physical ability to deal with stress); Mindfulness (the ability to focus on the present moment); Mind-Body Communication; Nervous System (emotional/mental state as well as the actual nervous system); Strengthening the Body; Relaxation through Movement and Pilates Breathing. These were then grouped together and developed further so that they became the main themes of the study, namely: Tools, Nervous System and Singing.

6.3.1. Theme 1 – Tools

In Chapter 1, I proposed that a Pilates warm-up could be used as a tool to:

- Prepare the body as the vocal instrument by warming up the relevant musculature as well as removing and preventing muscular tensions caused by daily life and performance;
- Assist the singer mentally by preparing the nervous system to respond beneficially to the demands of voice production and performance;
- Condition the singer's body effectively to maintain good alignment and physical health.

This proved to be the case as all of the singers did indeed refer to various aspects of the warm-up as a tool they could use when needed. They all developed more control over their bodies and had a greater embodied understanding of how to fix pertinent physical issues when needed. The singers all applied something they had learned in the Pilates lessons to a situation they had intuited it might help with. The singers found the Pilates warm-up to have a calming effect and noticed its value as a tool for personal and vocal relaxation. The focus on the use of breath in the Pilates lessons and the warm-up provided a new use of breathing for the singers. Used as a tool, it provided benefits that ranged from the physical to the mental. The benefits of having conscious control over a stronger body were quickly realised by all the participants in various ways. Improved posture and overall health were noted and specifically linked to the warm-up by the singers themselves. I conclude that the three points I had proposed above were independently validated by all the participants in their use of what they had learnt and their subsequent explanation of their experience in their own words.

6.3.2. Theme 2 – Nervous System

In Chapter 2, I examined the literature on stress, depression and anxiety and the neuroscience behind the functioning of the nervous system and in particular the ANS. The current research on Pilates shows its beneficial impact on various mental health outcomes but not on the singer as a specific

group of people. While the research on musicians and/or singers as a definitive group shows high levels of mental health issues, including MPA and studies on stress as well as tension, it does not have any direct links to the studying of Pilates as a possible solution for singers or musicians. This gap in the literature pointed me to the use of psychometric tools used previously in Pilates research on other population groups to measure the effects of the Pilates warm-up in singers.

However, data from psychometric tools provide only a snapshot in time. I wanted to understand 'how' the singer's nervous system might benefit and not just that it did. The vagus nerve seemed to me to be a common point between the nervous system and voice production as it is a part of both systems and linked in my mind, the mind-body method of Pilates with singing. The heart rate measurements, while not conclusive in my research, do show parasympathetic (vagal) activation which together with the literature makes an argument for why the Pilates research shows so many benefits to mental health. Hence the participants' references to their mental state, emotions and stresses as well as their psychometric test results were grouped together and with their HR scores, present a picture of a singer's nervous system being positively influenced by the Pilates warm-up.

6.3.3. Theme 3 – Singing

In Chapter 5 we met the singers who took part in this study. From their interviews it was clear to see that all of them were primarily concerned with the care and use of their voices. They had all been trained to use their bodies to vocalise but there was a disparity between their understanding of what their physical issues were and how to overcome them. From posture to dysphonia, stamina to breath support and increased vocal range to enjoyment, these issues were tackled not by focusing on the voice, but by focusing on the body. As a result of the strengthening, releasing and realignments that were taking place in their bodies as a result of the lessons and home practice, all of the singers started to notice positive changes to their particular concerns. Although they did not understand the depth of reasoning behind the chosen exercises (that were discussed in Chapter 3), the singers experienced unforeseen benefits. Some of this reasoning was shared with them as part of the teaching process so that they could have a complete understanding of what they were doing, but while there was a focus on deep understanding in lessons, the primary goal of a lesson is always to physically experience and thereby integrate the mind and the body through the movements required by the exercise choreography. This of course invariably links to Themes 1 and 2 but it is the crucial apex of this research, that the Pilates warm-up was able to assist the voice without actually using or involving the voice in any way except through the muscular and neural activations it was engaging.

6.4. Research questions answered

In Chapter 1, I outlined the research questions which were investigated in the study and which I will now answer here. They pertained to the possible benefits of using a Pilates warm-up for singers to ascertain its influence on the participants' singing, their bodies and their mental states. These outcomes were as follows:

Singing benefits: The singers all commented on vocal improvements due to the Pilates warm-up. These ranged from improved stamina, increased vocal range, decreases in tension, and improved performance state to recovery from vocal dysphonia. The student singers in particular, were able to better understand and/or implement aspects of their singing technique as a result of the study.

Physical/health benefits: All of the participants experienced physical benefits during the study especially as pertained to improved use of the body for singing. The alleviation of asthma symptoms; increased energy; improved posture; reduction in pain and the ability to overcome injury were reported, as well as an improvement in general health and recovery from illness and injury.

Psychological benefits: Increased relaxation was the most common benefit reported by the singers. Stress was reduced and depression and anxiety were improved or contained. Mentally clarity for

performance was enhanced. Overall there were feelings of being more in control and an improved sense of well-being.

6.5. Limitations and further research discussed

The positive outcomes these singers experienced and the potential for future research are discussed here. These outcomes included improvements to their singing and performance, as well as to their personal well-being. It is a shortcoming of this study and a reflection of my inexperience with interviewing, that I neglected to ask the professional singer how her improved posture had influenced her voice, as this had been her primary concern and therefore this is a question which remains unanswered. Although there is existing literature which deals with postural issues and its effect on vocalising, these benefits are inferred here but unfortunately not validated by her own words.

As the participants were all involved in the study for different reasons, this raised many varied issues to be examined and overcome in the lessons. Due to the small sample size of an IPA, the broad range of benefits that were experienced in this research cannot be used to infer the same for singers in general. This would require further quantitative studies with control groups, to ascertain if any of the specific benefits seen in this study could be replicated in a larger group of singers. Some of the findings recorded in this IPA which warrant further investigation are, for example, Agatha's vocal tension dysphonia relief. Could the use of a Pilates warm-up before vocalising assist other singers who experience pain while singing? Or, could a Pilates warm-up prevent tension-related health and voice issues? These are important lines of enquiry into the singer's vocal health and well-being to pursue. It must be noted that any future studies on the use of Pilates for singers will require the services of a Pilates teacher that is also trained as a singer as this will have an impact on the results.

The lack of health awareness courses offered in South African universities for musicians has already been raised by Salonen (2018:262). A study by Neely (2012:90), found that "[t]eachers seemed to feel more comfortable experimenting with methods like yoga, Alexander Technique, Feldenkrais, and Pilates on themselves but felt less qualified to use these methods in lessons since their own exposure was limited", might explain why movement courses and Pilates for singers are not more prevalent in South Africa and elsewhere. Neely (2012:111;109) further states that even though "Feldenkrais and Pilates have had success in the performing arts and with physical therapists like those with the Medical Program for Performing Artists at Northwestern", it is not likely to be used by singing teachers with their students, although they might recommend its use as an extramural activity. This raises an interesting possibility for the training of future singing teachers, that they be taught a somatic exercise method like Pilates to use within voice production lessons because, as Mingle (2018:ii) explains:

> [s]omatic education techniques may promote complementary skills, such as the ability to integrate the mind and body, to move with ease and efficiency, and to intervene with awareness and volition against interfering habits.

Another benefit that warrants further investigation, is the potential of the tools learned in the Pilates warm-up to be beneficial to the application of singing technique. Of the five participants, four were students and these all mentioned improvements in implementing different aspects of their singing technique. Further study could explore if singing teachers could be supported in their teaching by the implementation of a somatic exercise method like Pilates in a singing course. Unfortunately, I did not consider providing the participants' singing teachers with a questionnaire to ascertain what their impressions of the study were and if they considered it worthy of possible implementation as part of a singing course. It is therefore, a limitation of this study that any feedback received from the singing teachers about their students was either personal verbal communication, feedback via the student (both were positive) or non-existent. However, the professional singer was excited at the prospect of trying out some of the tools she had learned on her singing students. Unfortunately she was not teaching during the study period and therefore no further feedback on this could be explored.

The Pilates warm-up provided an improved ability to relax the vocal instrument for both Beth and Agatha as well as a better understanding of how to use the whole body for singing by Carol and Diana. Improved breathing was a common theme amongst all the participants regardless of experience. Francis, the professional singer felt the pertinence of the warm-up on her breathing (especially after her accident), as did Carol the asthmatic. It is interesting that singers spend a lot of time focused on breathing without reaping the same benefits of the breathing practiced in the Pilates warm-up. This suggests that while controlled breathing can stimulate the ANS, it is not sufficient in itself to bring about the same changes as shown here by the combination of ANS stimulation and the physical manipulation of the CNS in Pilates practice. This could also be verified by further research.

All of the participants found that they had an improved mood and mental state which was substantiated by the outcomes of the questionnaires. Emotional benefits were reported and this was illustrated in the elevated scores of the SF-36 as well as the lowered anxiety and depression scores (although this was not conclusive given both the one-point increased readings which did not change the cutoff point for diagnostic totals in either, but rather contained the total within the same diagnostic range). The professional singer remarked on her notably improved focus and mental state for performance due to the Pilates warm-up. It is a limitation of this study that none of the other participants performed during the study period and therefore the effects of the Pilates warm-up on performance could not be discussed with them.

The effect of the Pilates method on the nervous system was discussed in detail in Chapter 2.3, with special attention given to the vagus nerve. The inclusion of heart rate monitoring as a means of investigating potential PD activity in this study was interesting but inconclusive. The heart rate readings show an almost uniform decrease in heart rate in the middle of each Pilates lesson, which suggests vagus nerve (PD) activation. The increased heart rate at the end of each session (usually close to or back to the original heart rate recorded in each session), shows gentle SD re-activation. The final limitation of this study is, therefore, the inherent limitations of data taken by a self-recorded pulse. Had the funds been available, this could have been replaced by more sophisticated neuroscientific monitoring tools which monitor HRV rather than HR, and access to a multidisciplinary research team to fully comprehend the readings.

While these HR readings are inconclusive, they raise questions about the behaviour of HR during the practice of Pilates and how this ties in with the benefits of the method for singers. Future investigations would benefit from more sophisticated data measuring using HRV in the Pilates warm-up for singers.

6.6. Parting words

To conclude this study, it is worthwhile to consider that, despite their differences, all of the participants stated that their expectations had been met and all of them benefitted through participation in the study. They all further came to realise in their own way, that, to “breathe in for nothing” (which is an instruction that I give at the start of an exercise to establish a Pilates breathing pattern), meant they were allowing themselves to influence their nervous system, to connect mind and body, and to prepare themselves as vocal instruments.

Overall, the results exceeded my expectations in that all the singers benefitted in so many diverse ways. The research questions were answered, in that they all reported that doing a Pilates warm-up before singing had had a positive influence, as well as specific individual vocal benefits as an outcome. They were also aware of their own mental and physical improvements as a result of using the warm-up. There were some limitations in my research as mentioned in this chapter and these should be noted for future research into the use of Pilates for singers. However, there are numerous interesting lines of enquiry worth exploring as a result of understanding how a Pilates warm-up was experienced by these five singers.

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8. Appendices

Appendix 1: Pilates studio application form

PILATES
body conditioning

Application form :

Name :	
Date of birth :	
Address :	
Email :	
Phone number :	
Emergency contact :	
Reasons for joining :	
Physical issues and exercise history :	
Referred by :	

Classes are of a physical nature with appropriate physical contact by myself to correct and instruct the body.
No guarantee can be given that injury will not occur whilst exercising. While every effort will be made to ensure that injuries do not occur, I,**Marcelle Sutton**, will not assume responsibility in the event that an injury is sustained. Injuries can occur for an unlimited number of reasons and it is possible that an injury that has gone unnoticed can surface during a class but has not been caused as a result of the class itself. The onus lies with you to monitor yourself and not to unduly exert yourself in a class should you feel overly stressed or tense. Before embarking on an exercise programme, you are advised to consult your doctor. If you are unwell it is advised that you do not exercise unless you have been given permission by your doctor.

I _____ hereby agree to and understand the conditions as outlined above and in the course detail forms.

Signed:

Date:

Witness:

Marcelle Sutton BA.HDE (UCT)
Pilates Instructor
(Pretoria Tech, STOTT Pilates)
071 4076101
marcelle@zapilates.com
www.zapilates.com

Appendix 2: The Beck's Depression Inventory instrument

Beck's Depression Inventory

This depression inventory can be self-scored. The scoring scale is at the end of the questionnaire.

1.
- 0 I do not feel sad.
- 1 I feel sad
- 2 I am sad all the time and I can't snap out of it.
- 3 I am so sad and unhappy that I can't stand it.

2.
- 0 I am not particularly discouraged about the future.
- 1 I feel discouraged about the future.
- 2 I feel I have nothing to look forward to.
- 3 I feel the future is hopeless and that things cannot improve.

3.
- 0 I do not feel like a failure.
- 1 I feel I have failed more than the average person.
- 2 As I look back on my life, all I can see is a lot of failures.
- 3 I feel I am a complete failure as a person.

4.
- 0 I get as much satisfaction out of things as I used to.
- 1 I don't enjoy things the way I used to.
- 2 I don't get real satisfaction out of anything anymore.
- 3 I am dissatisfied or bored with everything.

5.
- 0 I don't feel particularly guilty
- 1 I feel guilty a good part of the time.
- 2 I feel quite guilty most of the time.
- 3 I feel guilty all of the time.

6.
- 0 I don't feel I am being punished.
- 1 I feel I may be punished.
- 2 I expect to be punished.
- 3 I feel I am being punished.

7.
- 0 I don't feel disappointed in myself.
- 1 I am disappointed in myself.
- 2 I am disgusted with myself.
- 3 I hate myself.

8.
- 0 I don't feel I am any worse than anybody else.
- 1 I am critical of myself for my weaknesses or mistakes.
- 2 I blame myself all the time for my faults.
- 3 I blame myself for everything bad that happens.

9.
- 0 I don't have any thoughts of killing myself.
- 1 I have thoughts of killing myself, but I would not carry them out.
- 2 I would like to kill myself.
- 3 I would kill myself if I had the chance.

10.
- 0 I don't cry any more than usual.
- 1 I cry more now than I used to.
- 2 I cry all the time now.
- 3 I used to be able to cry, but now I can't cry even though I want to.

11.

0 I am no more irritated by things than I ever was.
1 I am slightly more irritated now than usual.
2 I am quite annoyed or irritated a good deal of the time.
3 I feel irritated all the time.

12.

0 I have not lost interest in other people.
1 I am less interested in other people than I used to be.
2 I have lost most of my interest in other people.
3 I have lost all of my interest in other people.

13.

0 I make decisions about as well as I ever could.
1 I put off making decisions more than I used to.
2 I have greater difficulty in making decisions more than I used to.
3 I can't make decisions at all anymore.

14.

0 I don't feel that I look any worse than I used to.
1 I am worried that I am looking old or unattractive.
2 I feel there are permanent changes in my appearance that make me look unattractive
3 I believe that I look ugly.

15.

0 I can work about as well as before.
1 It takes an extra effort to get started at doing something.
2 I have to push myself very hard to do anything.
3 I can't do any work at all.

16.

0 I can sleep as well as usual.
1 I don't sleep as well as I used to.
2 I wake up 1-2 hours earlier than usual and find it hard to get back to sleep.
3 I wake up several hours earlier than I used to and cannot get back to sleep.

17.

0 I don't get more tired than usual.
1 I get tired more easily than I used to.
2 I get tired from doing almost anything.
3 I am too tired to do anything.

18.

0 My appetite is no worse than usual.
1 My appetite is not as good as it used to be.
2 My appetite is much worse now.
3 I have no appetite at all anymore.

19.

0 I haven't lost much weight, if any, lately.
1 I have lost more than five pounds.
2 I have lost more than ten pounds.
3 I have lost more than fifteen pounds.

20.

0	I am no more worried about my health than usual.
1	I am worried about physical problems like aches, pains, upset stomach, or constipation.
2	I am very worried about physical problems and it's hard to think of much else.
3	I am so worried about my physical problems that I cannot think of anything else.

21.

0	I have not noticed any recent change in my interest in sex.
1	I am less interested in sex than I used to be.
2	I have almost no interest in sex.
3	I have lost interest in sex completely.

INTERPRETING THE BECK DEPRESSION INVENTORY

Now that you have completed the questionnaire, add up the score for each of the twenty-one questions by counting the number to the right of each question you marked. The highest possible total for the whole test would be sixty-three. This would mean you circled number three on all twenty-one questions. Since the lowest possible score for each question is zero, the lowest possible score for the test would be zero. This would mean you circles zero on each question. You can evaluate your depression according to the Table below.

Total Score	Levels of Depression
1-10	These ups and downs are considered normal
11-16	Mild mood disturbance
17-20	Borderline clinical depression
21-30	Moderate depression
31-40	Severe depression
over 40	Extreme depression

Appendix 3: The GAD-7 instrument

GAD-7

Over the last 2 weeks, how often have you been bothered by the following problems? *(Use "✔" to indicate your answer)*	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3

(***For office coding: Total Score T____*** **= ____ + ____ + ____)**

Developed by Drs. Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke and colleagues, with an educational grant from Pfizer Inc. No permission required to reproduce, translate, display or distribute.

Appendix 4: The Rand 36-Item short form survey instrument

RAND HEALTH

RAND > RAND Health > Surveys > RAND Medical Outcomes Study > 36-Item Short Form Survey (SF-36) >

36-Item Short Form Survey Instrument (SF-36)

RAND 36-Item Health Survey 1.0 Questionnaire Items

Choose one option for each questionnaire item.

1. In general, would you say your health is:

- 1 - Excellent
- 2 - Very good
- 3 - Good
- 4 - Fair
- 5 - Poor

2. **Compared to one year ago**, how would you rate your health in general **now**?

- 1 - Much better now than one year ago
- 2 - Somewhat better now than one year ago
- 3 - About the same
- 4 - Somewhat worse now than one year ago
- 5 - Much worse now than one year ago

The following items are about activities you might do during a typical day. Does **your health now limit you** in these activities? If so, how much?

	Yes, limited a lot	Yes, limited a little	No, not limited at all
3. **Vigorous activities**, such as running, lifting heavy objects, participating in strenuous sports	○ 1	○ 2	○ 3
4. **Moderate activities**, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	○ 1	○ 2	○ 3
5. Lifting or carrying groceries	○ 1	○ 2	○ 3
6. Climbing **several** flights of stairs	○ 1	○ 2	○ 3
7. Climbing **one** flight of stairs	○ 1	○ 2	○ 3
8. Bending, kneeling, or stooping	○ 1	○ 2	○ 3
9. Walking **more than a mile**	○ 1	○ 2	○ 3
10. Walking **several blocks**	○ 1	○ 2	○ 3
11. Walking **one block**	○ 1	○ 2	○ 3
12. Bathing or dressing yourself	○ 1	○ 2	○ 3

During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of your physical health**?

	Yes	No
13. Cut down the **amount of time** you spent on work or other activities	○ 1	○ 2
14. **Accomplished less** than you would like	○ 1	○ 2
15. Were limited in the **kind** of work or other activities	○ 1	○ 2
16. Had **difficulty** performing the work or other activities (for example, it took extra effort)	○ 1	○ 2

During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of any emotional problems** (such as feeling depressed or anxious)?

	Yes	No
17. Cut down the **amount of time** you spent on work or other activities	○ 1	○ 2
18. **Accomplished less** than you would like	○ 1	○ 2
19. Didn't do work or other activities as **carefully** as usual	○ 1	○ 2

20. During the **past 4 weeks**, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

- ○ 1 - Not at all
- ○ 2 - Slightly
- ○ 3 - Moderately
- ○ 4 - Quite a bit
- ○ 5 - Extremely

21. How much **bodily** pain have you had during the **past 4 weeks**?

- ○ 1 - None
- ○ 2 - Very mild
- ○ 3 - Mild
- ○ 4 - Moderate
- ○ 5 - Severe
- ○ 6 - Very severe

22. During the **past 4 weeks**, how much did **pain** interfere with your normal work (including both work outside the home and housework)?

- 1 - Not at all
- 2 - A little bit
- 3 - Moderately
- 4 - Quite a bit
- 5 - Extremely

These questions are about how you feel and how things have been with you **during the past 4 weeks**. For each question, please give the one answer that comes closest to the way you have been feeling.

How much of the time during the **past 4 weeks**...

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
23. Did you feel full of pep?	1	2	3	4	5	6
24. Have you been a very nervous person?	1	2	3	4	5	6
25. Have you felt so down in the dumps that nothing could cheer you up?	1	2	3	4	5	6
26. Have you felt calm and peaceful?	1	2	3	4	5	6
27. Did you have a lot of energy?	1	2	3	4	5	6
28. Have you felt downhearted and blue?	1	2	3	4	5	6
29. Did you feel worn out?	1	2	3	4	5	6
30. Have you been a happy person?	1	2	3	4	5	6
31. Did you feel tired?	1	2	3	4	5	6

---

32. During the **past 4 weeks**, how much of the time has **your physical health or emotional problems** interfered with your social activities (like visiting with friends, relatives, etc.)?

- 1 - All of the time
- 2 - Most of the time
- 3 - Some of the time
- 4 - A little of the time
- 5 - None of the time

How TRUE or FALSE is **each** of the following statements for you.

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
33. I seem to get sick a little easier than other people	1	2	3	4	5
34. I am as healthy as anybody I know	1	2	3	4	5
35. I expect my health to get worse	1	2	3	4	5
36. My health is excellent	1	2	3	4	5

Appendix 5: Pilates advert used to recruit participants for the study

Pilates *for singers*

Pilates workshop for singers

Goals:

- Enhance singing technique by strengthening and stretching the complementary muscles
- Improve overall physical well-being by addressing the muscular imbalances in the body
- To facilitate performance by creating and enhancing freedom of movement
- Increased physical and mental relaxation prior to vocalising

Other goals include:

- Improved joint flexibility and strength
- Posture stabilisation
- Reduction of pain and headaches
- Positive body image
- Foundation for mind/body communication

Date :	tbc (3 x 5 days each)
Time :	TBC - in consultation with participants
Cost :	N/C
Venue :	[redacted]

Contact: Marcelle Sutton at marcelle@zapilates.com
BA.HDE (UCT), Pilates Instructor (STOTT, Pretoria Tech)

Appendix 6: Request for participants with an outline of the study

PILATES
body conditioning

10 March 2018

Pilates warm-up for singers – request for participants

Dear colleagues, voice faculty members and interested students,

I will be teaching a series of Pilates workshops at [redacted] in order to teach singers a specialised Pilates warm-up. This warm-up has been specifically designed for singers by a singer. The participants of the workshops will be part of a Masters research study examining the impact of this warm-up on singers.

Timeframe:

All dates and times will be confirmed in consultation with participants. Five consecutive days per workshop are required, either Monday to Friday or Tuesday to Saturday. There is some flexibility with regards to dates and times for interviews. The forum will be held either immediately after the final workshop or the following day.

Proposed dates for the workshops and interviews:

Workshop 1:	**16 April – 20/21 April 2018**
Workshop 2:	**7 May – 11/12 May 2018**
Workshop 3:	**4 June – 8/9 June 2018**

Proposed Time:	**8.00 am – 9.00 am** (except for the first and last session which will be longer)
Venue:	[redacted]
Dress:	**Comfortable but not baggy clothing**

Apart from the numerous benefits gained by Pilates practice, participants will also learn a toolset of exercises for future use and an increased awareness of their bodies and how this applies to singing.

What is expected of the participants?

There will be a total of 15 lessons divided into three workshops. Each workshop consists of five Pilates sessions of approximately one hour. Participants will also be required to complete some questionnaires on commencement and conclusion of the study and should budget an extra 30 minutes for these (outlining physical well being, emotional state and quality of life). Each participant will also be required to take part in a total of three 20 minute recorded interviews (one per workshop). The workshops will conclude with a Focus Group in which the participants will have the opportunity to discuss and share their experiences.
No previous Pilates training is needed, however, the participants will be required to master the exercises taught in the workshops and as such, will be expected to practice for the proposed time period. Each participant will be provided with a recording of the exercises so as to facilitate home practice and will be encouraged and assisted in making the warm-up a part of their daily life for the duration of the study. This means that a commitment to attending ALL the lessons and home practice is required.

Any pre-existing physical issues or concerns will not be cause for exclusion in the study and are in fact welcomed as Pilates is a therapeutic exercise method. However, diagnosed problems might require a doctor's permission if under treatment. Participants will be required to bring their own exercise mat and a hand towel to the lessons. All other small equipment will be provided for use in the lessons.
Should you have any further queries please feel free to contact me or my supervisor:
Danell Herbst "Herbst, D, Mej <danellherbst@sun.ac.za>"

Kind regards,
Marcelle

Marcelle Sutton BA.HDE (UCT)
Pilates Instructor
(Pretoria Tech, STOTT Pilates)
071 4076101
marcelle@zapilates.com
www.zapilates.com

Appendix 7: Consent form for participation

UNIVERSITEIT•STELLENBOSCH•UNIVERSITY
jou kennisvennoot • your knowledge partner

STELLENBOSCH UNIVERSITY
CONSENT TO PARTICIPATE IN RESEARCH

Dear colleagues, voice lecturers and fellow students,

My name is Marcelle Sutton and I am a Masters research student. I would like to invite you to participate in a research project entitled:

Breathe in for nothing: an interpretative phenomenological analysis exploring the influence of a Pilates warm-up in singers

Please take some time to read the information presented here, which will explain the details of this project and contact me if you require further explanation or clarification of any aspect of the study. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part. If you withdraw from the study, your data will be destroyed.

I will be teaching a series of Pilates workshops at [redacted] in order to teach singers a specialised Pilates warm-up. This warm-up has been specifically designed for singers by a singer. The participants of the workshops will be part of a Masters research study examining the impact of this warm-up on singers.

Timeframe:

All dates and times will be confirmed in consultation with participants. Five consecutive days per workshop are required, either Monday to Friday or Tuesday to Saturday. There is some flexibility with regards to dates and times for interviews. The focus group will be held either immediately after the final workshop or the following day.

Proposed dates for the workshops and interviews:

Workshop 1:	16 April – 20/21 April 2018
Workshop 2:	7 May – 11/12 May 2018
Workshop 3:	4 June – 8/9 June 2018
Proposed Time:	8.00 am – 9.00 am (except for the first and last session which will be longer)
Venue:	[redacted]
Dress:	Comfortable but not baggy clothing

Apart from the numerous benefits gained by Pilates practice, participants will also learn a toolset of exercises for future use and an increased awareness of their bodies and how this applies to singing.

What is expected of the participants?

There will be a total of 15 lessons divided into three workshops. Each workshop consists of five Pilates sessions of approximately one hour. Participants will also be required to complete some questionnaires on

commencement and conclusion of the study and should budget an extra 30 minutes for these (outlining physical well being, emotional state and quality of life).

Each participant will also be required to take part in a total of three 20 minute recorded interviews (one per workshop). The workshops will conclude with a Focus Group in which the participants will have the opportunity to discuss and share their experiences.

No previous Pilates training is needed, however, the participants will be required to master the exercises taught in the workshops and as such, will be expected to practice for the proposed time period. Each participant will be provided with a recording of the exercises so as to facilitate home practice and will be encouraged and assisted in making the warm-up a part of their daily life for the duration of the study. This means that a commitment to attending ALL the lessons and home practice is required.

Any pre-existing physical issues or concerns will not be cause for exclusion in the study and are in fact welcomed as Pilates is a therapeutic exercise method. However, diagnosed problems might require a doctor's permission if under treatment. Participants will be required to bring their own exercise mat and a hand towel to the lessons. All other small equipment will be provided for use in the lessons.

Risks:

Participants must be aware that their experiences, questionnaires and interviews will be used as data and will be analysed in depth. The interviews and focus group will be recorded and transcribed, however it will be anonymised and will be treated with sensitivity. The recordings will be stored digitally and uploaded via the internet for backup purposes and transcribing. The transcriptions will be in both digital and paper form. Questionnaires will be in paper form and will be stored at my personal residence. The workshops will be recorded for my reference only. The data will not be shared. No one will have access to the data except myself, my supervisor ~~and the transcription service~~. The data is to be used for research purposes only.

Pilates classes are of a physical nature with appropriate physical contact by myself to correct and instruct the body. No guarantee can be given that injury will not occur whilst exercising. Injuries can occur for an unlimited number of reasons and it is possible that an injury that has gone unnoticed can surface during a class but has not been caused as a result of the class itself.

Costs:

The workshops will be given at no charge to the participants. The participants cannot expect any payment for participation in the research.

Should you have any further queries please feel free to contact me (marcelle@zapilates.com) or my supervisor: Danell Herbst (danellherbst@sun.ac.za)

Kind regards,

Marcelle Sutton

RIGHTS OF RESEARCH PARTICIPANTS: You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research participant, contact Ms Maléne Fouché [mfouche@sun.ac.za; 021 808 4622] at the Division for Research Development. You have right to receive a copy of the Information and Consent form.

If you are willing to participate in this study please sign the attached Declaration of Consent.

DECLARATION BY PARTICIPANT

By signing below, I ..... agree to take part in a research study entitled: Breathe in for nothing: an interpretative phenomenological analysis exploring the influence of a Pilates warm-up in singers and conducted by Marcelle Sutton.

I declare that:

- I have read the attached information leaflet and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.
- All issues related to privacy and the confidentiality and use of the information I provide have been explained to my satisfaction.

Signed on .....

.....

Signature of participant

SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to _____ . [*He/she*] was encouraged and given ample time to ask me any questions. This conversation was conducted in Afrikaans/English and no translator was used

_____ _____

Signature of Investigator **Date**

Appendix 8: Heart rate measurement readings table

Results are shown per reading, per participant, per day and per workshop. The first result is the ten-second reading with the minute reading next to it in brackets. No reading is indicated by the symbol 'dash' (-). Readings were missed due to absenteeism or leaving before the reading was taken. Day 5 reflects my inability to teach the lesson to the group of student participants that day. Their missed lesson time was caught up by adding 15 minutes to four of the next workshop's lessons. The pulse readings were taken at the start of each Pilates session (seated), at a set point in the middle of the lesson (lying supine) and after the last exercise of the lesson (seated).

Day 1:

Workshop 1	**Participant 1**	**Participant 2**	**Participant 3**	**Participant 4**	**Participant 6**
Reading 1	10 (60)	19 (114)	14 (84)	13 (78)	16 (96)
Reading 2	10 (60)	17 (102)	12 (72)	12 (72)	13 (78)
Reading 3	11 (66)	17 (102)	12 (72)	12 (72)	14 (84)
Workshop 2					
Reading 1	10 (60)	18 (108)	15 (90)	13 (78)	15 (90)
Reading 2	9 (54)	17 (102)	14 (84)	13 (78)	14 (84)
Reading 3	13 (78)	19 (114)	14 (84)	13 (78)	13 (78)
Workshop 3					
Reading 1	12 (72)	19 (114)	16 (96)	14 (84)	12 (72)
Reading 2	10 (60)	17 (102)	15 (90)	12 (72)	11 (66)
Reading 3	12 (72)	18 (108)	15 (90)	13 (78)	10 (60)

Day 2:

Workshop 1	**Participant 1**	**Participant 2**	**Participant 3**	**Participant 4**	**Participant 6**
Reading 1	9 (54)	18 (108)	13 (78)	14 (84)	14 (84)
Reading 2	9 (54)	16 (96)	12 (72)	11 (66)	13 (78)
Reading 3	10 (60)	16 (96)	12 (72)	11 (66)	12 (72)
Workshop 2					
Reading 1	10 (60)	20 (120)	15 (90)	13 (78)	13 (78)
Reading 2	10 (60)	18 (108)	13 (78)	11 (66)	14 (84)
Reading 3	11 (66)	20 (120)	14 (84)	13 (78)	15 (90)
Workshop 3					
Reading 1	11 (66)	18 (108)	17 (102)	14 (84)	12 (72)
Reading 2	10 (60)	16 (96)	16 (96)	13 (78)	10 (60)
Reading 3	11 (66)	18 (108)	17 (102)	14 (84)	10 (60)

Day 3:

Workshop 1	**Participant 1**	**Participant 2**	**Participant 3**	**Participant 4**	**Participant 6**
Reading 1	10 (60)	18 (108)	13 (78)	12 (72)	15 (90)
Reading 2	9 (54)	16 (96)	12 (72)	10 (60)	13 (78)
Reading 3	10 (60)	19 (114)	14 (84)	-	14 (84)
Workshop 2					
Reading 1	10 (60)	19 (114)	-	15 (90)	16 (96)
Reading 2	10 (60)	17 (102)	-	12 (72)	13 (78)
Reading 3	12 (72)	18 (108)	-	12 (72)	14 (84)
Workshop 3					

Reading 1	9 (54)	18 (108)	14 (84)	13 (78)	13 (78)
Reading 2	9 (54)	17 (102)	14 (84)	13 (78)	11 (66)
Reading 3	11 (66)	19 (114)	14 (84)	13 (78)	12 (72)

Day 4:

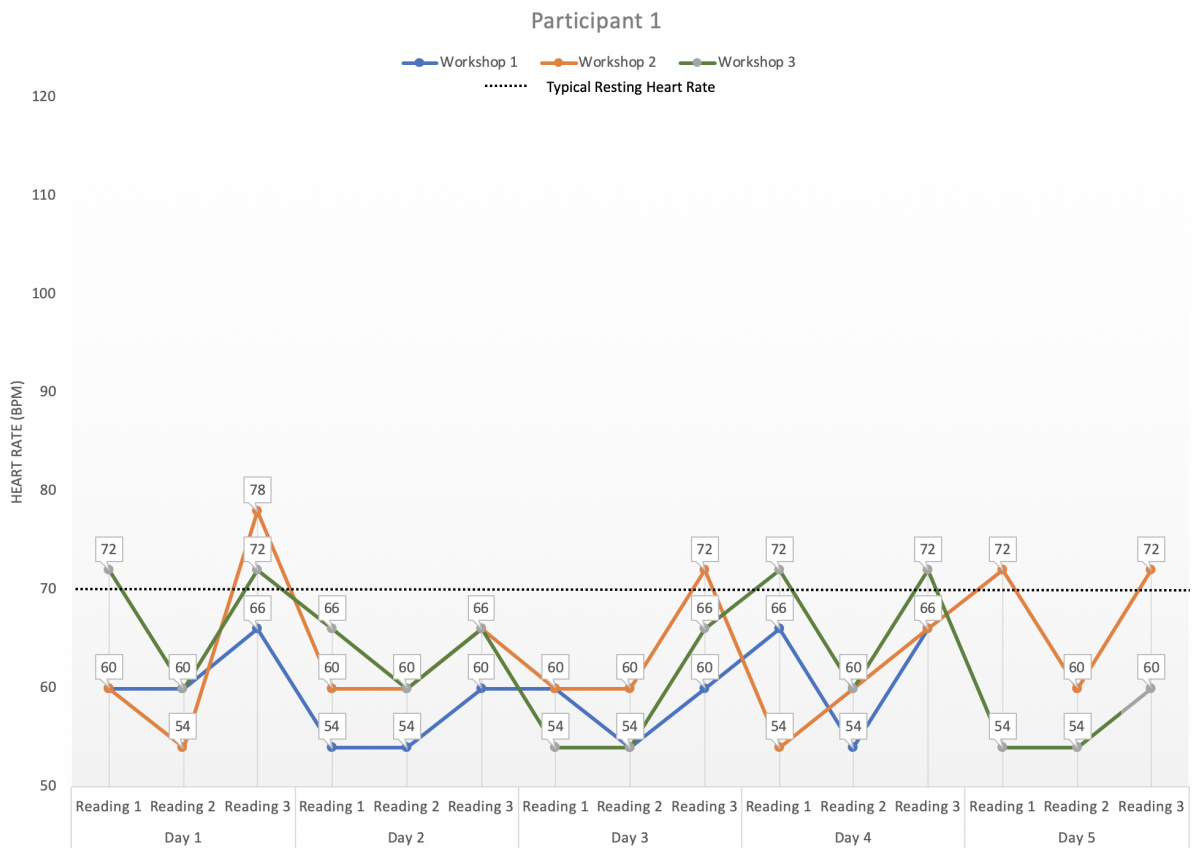
Workshop 1	**Participant 1**	**Participant 2**	**Participant 3**	**Participant 4**	**Participant 6**
Reading 1	11 (66)	17 (102)	11 (66)	-	14 (84)
Reading 2	9 (54)	14 (84)	11 (66)	-	14 (84)
Reading 3	11 (66)	15 (90)	13 (78)	-	14 (84)
Workshop 2					
Reading 1	9 (54)	18 (108)	13 (78)	13 (78)	14 (84)
Reading 2	10 (60)	17 (102)	11 (66)	12 (72)	13 (78)
Reading 3	11 (66)	17 (102)	13 (78)	13 (78)	13 (78)
Workshop 3					
Reading 1	12 (72)	20 (120)	18 (108)	14 (84)	11 (66)
Reading 2	10 (60)	18 (108)	15 (90)	13 (78)	11 (66)
Reading 3	12 (72)	20 (120)	17 (102)	15 (90)	13 (78)

Day 5:

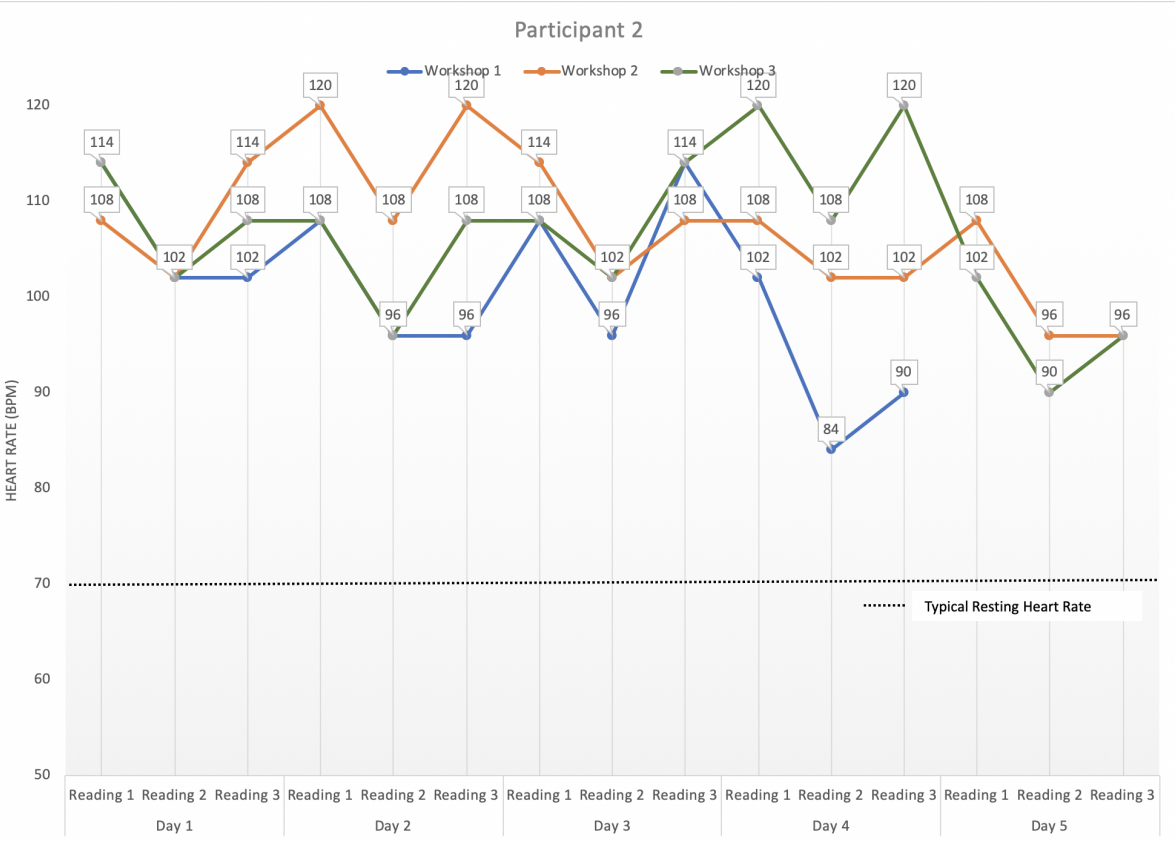
Workshop 1	**Participant 1**	**Participant 2**	**Participant 3**	**Participant 4**	**Participant 6**
Reading 1	-	-	-	-	16 (96)
Reading 2	-	-	-	-	15 (90)
Reading 3	-	-	-	-	15 (90)
Workshop 2					
Reading 1	12 (72)	18 (108)	14 (84)	14 (84)	14 (84)
Reading 2	10 (60)	16 (96)	14 (84)	13 (78)	14 (84)
Reading 3	12 (72)	16 (96)	13 (78)	13 (78)	15 (90)
Workshop 3					
Reading 1	9 (54)	17 (102)	-	14 (84)	14 (84)
Reading 2	9 (54)	15 (90)	-	12 (72)	11 (66)
Reading 3	10 (60)	16 (96)	-	13 (78)	13 (78)

Appendix 9: Heart rate measurements displayed as graphs per participant

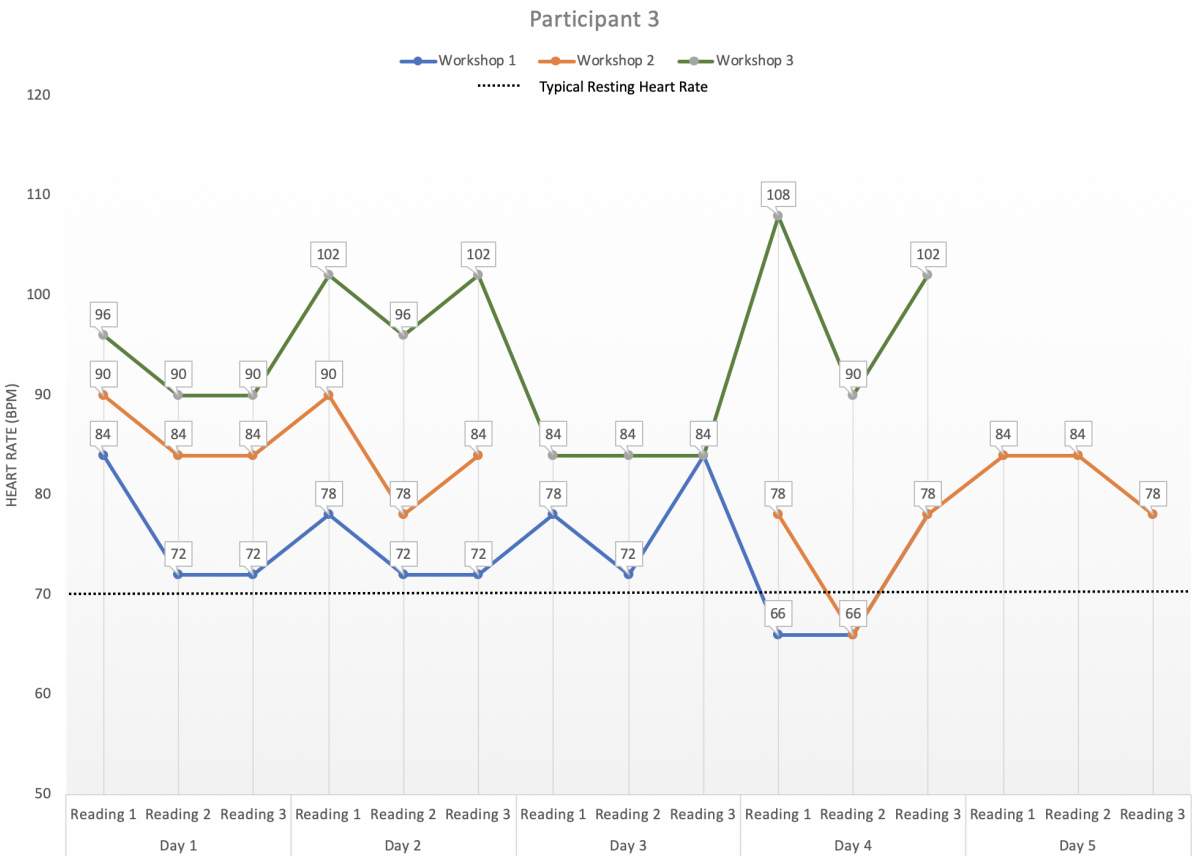
The results are displayed here as a graph per participant showing the heart rate values taken on each day of the workshop.



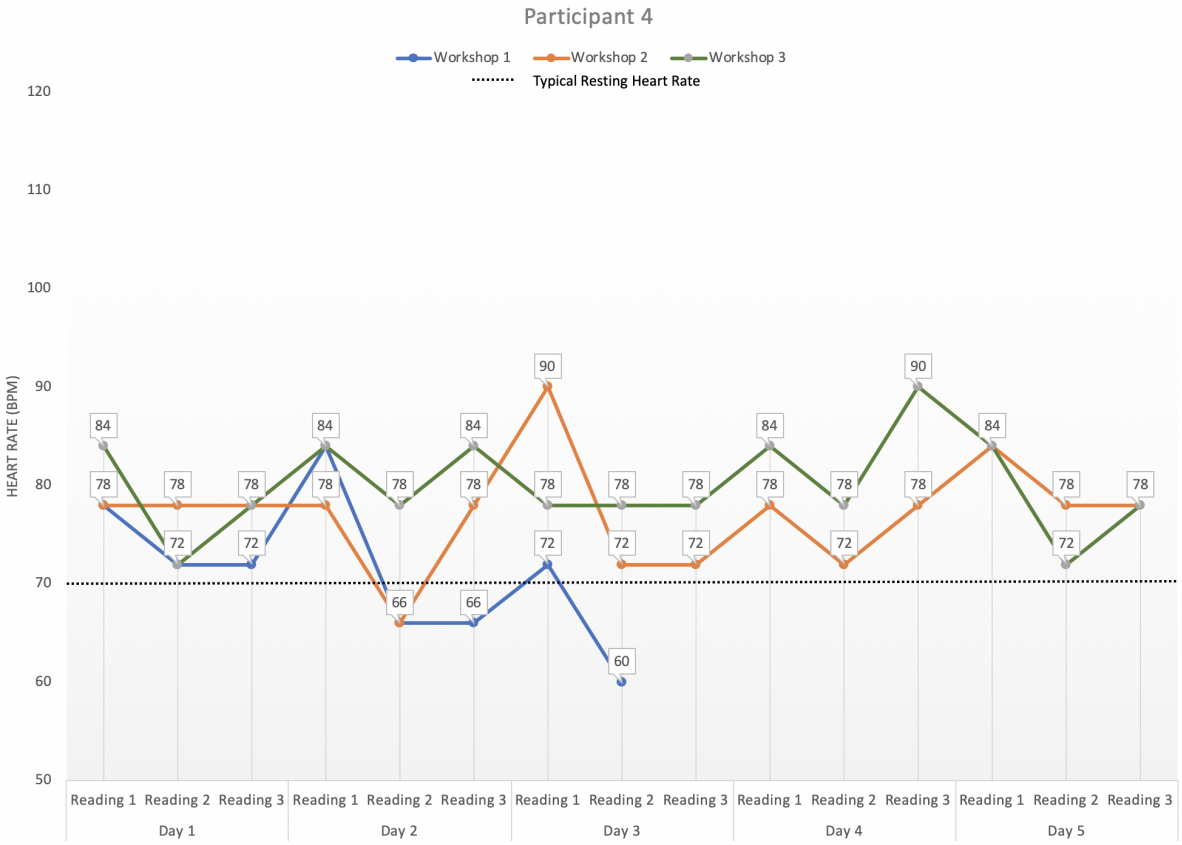
Participant 1 heart rate readings.



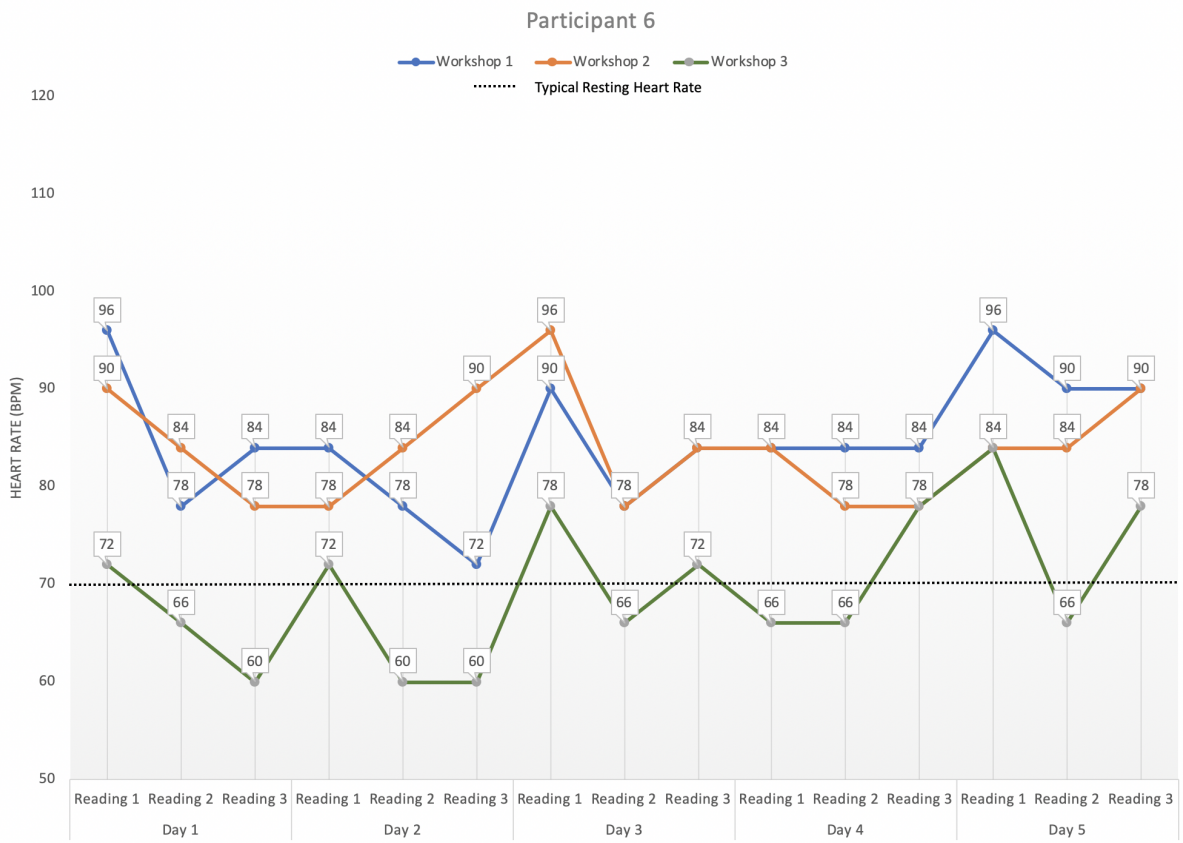
Participant 2 heart rate readings.



Participant 3 heart rate readings.



Participant 4 heart rate readings.



Participant 6 heart rate readings.

Appendix 10: Semi-structured interview questions

PILATES
body conditioning

Pilates for singers : Workshops semi-structured interview questions

Workshop 1 :
Name :

1) What are you hoping to gain through the workshops ?

2) How have you found the process so far ?

3) What do you think of the exercises ? (Ask in relation to specific issues on the application form)

4) Which movements make you uncomfortable or feel really good ?

5) Why do you think this is ?

6) Is there anything you don't understand ?

Notes :

Workshop 2 :

1) How have you managed with the exercises on your own ? What blocks did you face ?

2)What impact has there been on your singing ?

3) How has your body been affected ?

4) How has your mood been affected ?

5) Is there anything you don't understand ?

Notes :

Workshop 3 :

1) How are you feeling ?

2) What impact has this process made on you ?

3) Which is your favourite exercise ?

4) Which is your least favourite exercise ?

5) What will you take away from this process ?

6) Which of your expectations were met ?

7) What in this process has felt to be of significance for you ?

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Appendix 11: Focus group questions

PILATES
body conditioning

Pilates for singers workshops focus group :

Date :
Names :
1)
2)
3)
4)
5)

Questions :

1)What surprises or delights have you experienced in this process ?

2) What impact has this had for you vocally ?

3) What has been the impact on your body ?

4) What has been the impact on your mental or emotional state before performance ?

5) What difference has doing a Pilates warm-up made on your performances ?

6) Will you use this warm-up ? If not, then why not ?

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Appendix 12: Notice of approval – ethical clearance

UNIVERSITEIT
STELLENBOSCH
UNIVERSITY

NOTICE OF APPROVAL

REC Humanities New Application Form

22 September 2018

Project number: 6711

Project Title: Breathe in for nothing: an interpretative phenomenological analysis exploring the influence of a Pilates warm-up in singers

Dear Ms Marcelle Sutton

Your response to stipulations submitted on 26 July 2018 was reviewed and approved by the REC: Humanities.

Please note the following for your approved submission:

Ethics approval period:

Protocol approval date (Humanities)	Protocol expiration date (Humanities)
16 May 2018	15 May 2021

GENERAL COMMENTS:

Please take note of the General Investigator Responsibilities attached to this letter. You may commence with your research after complying fully with these guidelines.

If the researcher deviates in any way from the proposal approved by the REC: Humanities, the researcher must notify the REC of these changes.

Please use your SU project number (6711) on any documents or correspondence with the REC concerning your project.

Please note that the REC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

FOR CONTINUATION OF PROJECTS AFTER REC APPROVAL PERIOD

Please note that a progress report should be submitted to the Research Ethics Committee: Humanities before the approval period has expired if a continuation of ethics approval is required. The Committee will then consider the continuation of the project for a further year (if necessary)

Included Documents:

Document Type	File Name	Date	Version
Research Protocol/Proposal	MarcelleResearchProposalVFinal	14/02/2018	Final
Information sheet	RequestForParticipantsOutline	10/03/2018	1
Recruitment material	PilatesForSingersUSworkshops	24/03/2018	1
Data collection tool	SemiStructuredInterviewSheet	24/03/2018	1
Data collection tool	GAD-7_English	24/03/2018	7
Data collection tool	FocusGroupQuestions	24/03/2018	1
Data collection tool	Beck-Depression-Inventory-BDI	24/03/2018	
Data collection tool	36-Item Short Form Survey Instrument (SF-36) _ RAND	24/03/2018	
Data collection tool	PilatesForSingersComplex	24/03/2018	
Data collection tool	Exercises used in warm	01/04/2018	1
Default	PilatesForSingersUSApplicationForm2018	01/04/2018	
Informed Consent Form	SUConsentFormForParticipationInStudy4	01/04/2018	4
Default	ResponseToEthicalClearanceDoc	24/07/2018	1

If you have any questions or need further help, please contact the REC office at cgraham@sun.ac.za.

Sincerely,

Clarissa Graham

REC Coordinator: Research Ethics Committee: Human Research (Humanities)

National Health Research Ethics Committee (NHREC) registration number: REC-050411-032.
The Research Ethics Committee: Humanities complies with the SA National Health Act No.61 2003 as it pertains to health research. In addition, this committee abides by the ethical norms and principles for research established by the Declaration of Helsinki (2013) and the Department of Health Guidelines for Ethical Research: Principles Structures and Processes (2nd Ed.) 2015. Annually a number of projects may be selected randomly for an external audit.

Investigator Responsibilities

Protection of Human Research Participants

Some of the general responsibilities investigators have when conducting research involving human participants are listed below:

1.Conducting the Research. You are responsible for making sure that the research is conducted according to the REC approved research protocol. You are also responsible for the actions of all your co-investigators and research staff involved with this research. You must also ensure that the research is conducted within the standards of your field of research.

2.Participant Enrollment. You may not recruit or enroll participants prior to the REC approval date or after the expiration date of REC approval. All recruitment materials for any form of media must be approved by the REC prior to their use.

3.Informed Consent. You are responsible for obtaining and documenting effective informed consent using **only** the REC-approved consent documents/process, and for ensuring that no human participants are involved in research prior to obtaining their informed consent. Please give all participants copies of the signed informed consent documents. Keep the originals in your secured research files for at least five (5) years.

4.Continuing Review. The REC must review and approve all REC-approved research proposals at intervals appropriate to the degree of risk but not less than once per year. There is **no grace period.** Prior to the date on which the REC approval of the research expires, **it is your responsibility to submit the progress report in a timely fashion to ensure a lapse in REC approval does not occur.** If REC approval of your research lapses, you must stop new participant enrollment, and contact the REC office immediately.

5.Amendments and Changes. If you wish to amend or change any aspect of your research (such as research design, interventions or procedures, participant population, informed consent document, instruments, surveys or recruiting material), you must submit the amendment to the REC for review using the current Amendment Form. You **may not initiate** any amendments or changes to your research without first obtaining written REC review and approval. The **only exception** is when it is necessary to eliminate apparent immediate hazards to participants and the REC should be immediately informed of this necessity.

6.Adverse or Unanticipated Events. Any serious adverse events, participant complaints, and all unanticipated problems that involve risks to participants or others, as well as any research related injuries, occurring at this institution or at other performance sites must be reported to Malene Fouche within **five (5) days** of discovery of the incident. You must also report any instances of serious or continuing problems, or non-compliance with the RECs requirements for protecting human research participants. The only exception to this policy is that the death of a research participant must be reported in accordance with the Stellenbosch University Research Ethics Committee Standard Operating Procedures. All reportable events should be submitted to the REC using the Serious Adverse Event Report Form.

7.Research Record Keeping. You must keep the following research related records, at a minimum, in a secure location for a minimum of five years: the REC approved research proposal and all amendments; all informed consent documents; recruiting materials; continuing review reports; adverse or unanticipated events; and all correspondence from the REC

8.Provision of Counselling or emergency support. When a dedicated counsellor or psychologist provides support to a participant without prior REC review and approval, to the extent permitted by law, such activities will not be recognised as research nor the data used in support of research. Such cases should be indicated in the progress report or final report.

9.Final reports. When you have completed (no further participant enrollment, interactions or interventions) or stopped work on your research, you must submit a Final Report to the REC.

10.On-Site Evaluations, Inspections, or Audits. If you are notified that your research will be reviewed or audited by the sponsor or any other external agency or any internal group, you must inform the REC immediately of the impending audit/evaluation.