Factors Affecting the Establishment and Provision of an Outpatient Pulmonary Rehabilitation Programme, as viewed by Physiotherapists in the Cape Metropole

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Declaration

I, Lisa Labuschagne, hereby declare that the work on which this dissertation/thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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This work is presented

by the grace of God,

with the love, support and understanding of my family and friends,

the patience of the physiotherapy department,

and the expert guidance of the supervisory dream team.

I am so very grateful to you all

Soli Deo Gloria

Contents

Abbreviations

6MWD: 6-Minute Walking Distance

BOLD: Burden of Lung Disease

CF: Cystic Fibrosis

CHC: Community Health Centre

COPD: Chronic Obstructive Pulmonary Disease

Covid-19: Coronavirus disease 2019

CRD: Chronic Respiratory Disease

DALYs: Disability adjusted life years

EQD: Exploratory Qualitative Descriptive Design

FEV_1: Forced expiratory volume in 1 second

GOLD: Global Initiative for Obstructive Lung Disease

HRQOL: Health-related Quality of Life

ILD: Interstitial lung disease

IPF: Idiopathic pulmonary fibrosis

LMIC: Low- and middle-income countries

MDT: Multi-disciplinary team

NCD: Non-communicable disease

PAH: Pulmonary artery hypertension

PR: Pulmonary Rehabilitation

PRP: Pulmonary Rehabilitation Program

PTB: Pulmonary tuberculosis

QALYs: Quality adjusted life years

SASP: South African Society of Physiotherapy

SCT: Social Cognitive Theory

USA: United States of America

WCDOH: Western Cape Department of Health

WHO: World Health Organisation

Definition of Key Terms

BOLD organisation: An organisation which quantifies the prevalence of obstructive lung disease and identifies its risk factors across several regions in the world.

Chronic diseases: Diseases that last for a long period of time or recur over a long period of time and require ongoing medical attention or limit activities of daily living, or both.

Chronic respiratory diseases: Chronic diseases of the airways and other structures of the lungs.

Disability-adjusted life year: Measure of overall disease burden, expressed as the number of years lost due to ill-health, disability, or early death.

Global Initiative for Obstructive Lung Disease: An initiative working with health care professionals and public health officials around the world to raise awareness of chronic obstructive pulmonary disease and to improve prevention and treatment of this lung disease.

Non-communicable diseases: Chronic, non-infectious health conditions that cannot be spread from person to person.

Physiotherapy practice: A physiotherapy department in the public healthcare system, or a privately owned practice in the private healthcare system.

Private health-care setting: Health-care entities owned and run by private practitioners or corporations.

Public health-care setting: Health-care entities run by the Government of South Africa.

Chapter 1: Introduction

1.1: Researcher stance leading to her interest in this study

From my earliest memories as a physiotherapy student, I have been drawn to respiratory physiotherapy. This interest initially expressed itself in the area of Critical Care, but during my practice as a physiotherapist in South Africa and in the United Kingdom, in both public and private health care settings, my interest has broadened to include chronic respiratory care, in the form of Pulmonary Rehabilitation (PR). Although breathing is the most basic action to sustain life, it is a struggle for so many people, and it is my desire to ease that struggle where possible. In my current role as an experienced, but production level, physiotherapist, in a state-run hospital, I was encouraged to look beyond my day-to-day work at how I could improve the services offered by the physiotherapy department to the patients in our care. In doing this I developed a PR service for our department. This was not a straight-forward task, and I encountered numerous barriers during this endeavour, however there were also facilitating factors that led to some rewarding successes. This experience heightened my interest in PR in general and led me to wonder why more people are not offering these programmes. This study is my attempt to understand the landscape of Physiotherapy services for PR, and hopefully offer some insight into how we can move forward in the provision of PR.

1.2: What is PR?

Pulmonary rehabilitation is an intervention designed to be used in the management of people with chronic respiratory disease (CRD). It is defined in a consensus statement by the American Thoracic and European Respiratory Societies as "A comprehensive intervention based on a thorough patient assessment, followed by patient-tailored therapies that include, but are not limited to, exercise training, education, and behaviour change, designed to improve the

physical and psychological condition of people with CRDs" (Spruit et al., 2013, p. 13). These programmes should be individualised to each patient based on a comprehensive assessment of their specific needs (GOLD, 2020).

1.3: The importance of PR

CRDs are a significant world-wide cause of mortality and morbidity, carrying high costs to healthcare. The World Health Organisation (WHO) noted that especially Chronic Obstructive Pulmonary Disease (COPD) causes substantial issues in low- and middle-income countries (LMIC) (WHO, 2022d) like South Africa. Pulmonary rehabilitation has been proven to be an effective and essential part of the multifactorial management of chronic respiratory conditions (Rochester et al., 2015), improving both health related quality of life (HRQOL) and exercise capacity (McCarthy et al., 2015), as well as leading to decreased costs associated with health-care utilisation(Rochester et al., 2015). As these diseases have such significant global impact, their effective management is an important matter to address.

1.4: The current PR landscape

Globally less than 1.2% of COPD patients had PR made available to them (Desveaux et al., 2015), with extremely low referral rates internationally (Milner et al., 2018). Even in high income countries such as Norway, only 5% of their municipalities had a multi-disciplinary PR service, despite high rates of COPD in that country (Frisk et al., 2022). In the United States of America (USA) two fifths of COPD patients overall, and eight out of nine of those in rural areas, were shown to have poor geographical access to PR (Malla et al., 2022). If this is the case even in high-income countries with more money available for healthcare, then it is unlikely that low resource settings would fare any better. For example, in Chile, only 13.7% of healthcare centres approached reported that they had a PRP (Méndez et al., 2023). Unfortunately, no official statistics in South Africa or the Western Cape assessing the

availability of PRPs could be found to quantify the situation locally, but a recent multi-method study examining Africa as a whole found that PR is underutilised throughout the continent (Mamani Bilungula et al., 2022).

1.5: Purpose of the study

This study set out to understand the experiences of physiotherapists that had attempted to set up pulmonary rehabilitation programmes (PRPs), with the aim that this information could be used in the future to improve the provision of this service to all who need it. The information gained through this study will be used as an indication of the extent and types of PRPs currently available. Additionally, it will act as a starting point to promote factors that facilitate the provision of PRPs, as well as a basis to address the factors that act as barriers to provision of PRPs. It is my hope that by adding to the body of literature relating to PR, I can contribute to closing the gaps between the knowledge and the delivery of PR in our local context.

1.6: Research question, aims and objectives

As will be discussed more extensively in chapter 2, the effectiveness of PR in CRDs has been proven, and the prevalence of CRD sufferers that would benefit from PR is high, yet there is a global paucity of access to programmes. It is therefore important to understand why there is such a gap between the knowledge of the need for PR and its actual delivery in our context. This study asked the research question "What factors affecting the establishment and provision of an outpatient pulmonary rehabilitation programme are experienced by physiotherapists in the Cape Metropole?" with the aim of the research being to explore these factors. There were three proposed objectives in doing this:

1. To explore and describe current outpatient PRPs offered by physiotherapists in the Cape Metropole, using a questionnaire and semi-structured interviews.

2. To explore and describe the factors which have facilitated the establishment of the current PRPs.
3. To explore and describe the factors which have presented as barriers to the establishment of the current PRPs.

1.7: Overview of the methodology

This study made use of the interpretivist, constructivist (Dudovskiy, 2011a, 2011b) paradigm to attempt to understand and interpret the factors impacting the provision of PRPs from the perspective of the people involved, rather than evaluating the PRP itself. An exploratory, qualitative descriptive (EQD) design was used to explore factors impacting on the provision of PR, through an online screening questionnaire and semi-structured interviews. The research settings consisted of institutions or practices that could be offering PRPs in both the public and private healthcare settings, particularly focusing on physiotherapists that had endeavoured to set up PRPs either successfully or unsuccessfully.

Data collection was done via a screening questionnaire, semi structured interviews and a reflective journal, and analysed using the technique of theoretical thematic analysis (Braun & Clarke, 2006).

Throughout the study trustworthiness was ensured by addressing credibility, providing transferability, dependability and confirmability. Confidentiality was maintained in the storage of recordings and documents, with only the researcher and supervisors having access to them, and participants anonymised in the reporting and discussion of the results.

This thesis will begin with a narrative review of the relevant literature, followed by a detailed explanation of the methodology employed during the study. The findings of the study are then reported by presenting the relevant themes that were identified. These are discussed in light of

the aforementioned literature, the participant's contexts and the researcher's interpretation through the lens of social cognitive theory. Finally, the study is concluded by acknowledging its strengths and limitations and by presenting recommendations, including for practice and for further research.

Chapter 2: Literature review

In this chapter, a narrative review of the relevant literature pertaining to PR, as related to this study will be presented. In addition, CRDs and their impact on mortality and morbidity, both globally and locally, will be discussed and a short summary of the methods of management of CRDs, including by PR, will be mentioned. The literature regarding the role, delivery and effectiveness of PR as management strategy in specific CRDs, and the barriers and facilitators to the delivery of PR that have previously been found will then be explored.

In order to compile this review, literature searches were done throughout the time that the research project was undertaken (2020-2023), using Primo, Pubmed and Google Scholar databases, as these provided a large range of articles and an acceptable ease of use. Publication dates between 2013-2023 were used, and older seminal articles were included.

Key words such as “pulmonary rehabilitation” and “chronic respiratory diseases” were searched, as well as the names of specific CRDs in relation to PR. Additionally, the reference lists of articles were used to find other articles pertaining to the information being sought.

When exploring barriers and facilitators to PR, the phrase “Pulmonary rehabilitation” was initially searched in relation to the phrases: “barriers”, “facilitators” and “enablers”. These studies were then screened with the question “do any findings in this study act as barriers and/or facilitators to PRPs?” firmly in mind, and all such studies that were found at that time were included in the review. During the later expansion of the literature review the phrases “factors”, “challenges”, “opportunities”, “uptake”, “provision”, “completion”, “participation”, “referral”, “implementation”, “enrolment’, “adherence”, “attendance”, “predictors”, “knowledge”, “perception’, “experience”, “determinants”, “attitude”, “promoting” and “promotion” were additionally searched in relation to PR. This yielded such a high number of studies that a 10-

year cut-off was used. The studies were then examined with the same question in mind and included or excluded on that basis.

The available information from organisations such as WHO, Burden of Lung Disease (BOLD) and Global Initiative for Obstructive Lung Disease (GOLD) was searched via Google and updated in November 2023. A final update of the literature search was undertaken prior to re-submission, where additional articles were included.

2.1: Non-communicable and Chronic Respiratory Diseases

Non-communicable diseases (NCDs) account for around 74% of deaths world-wide, and disproportionately affect LMIC (WHO, 2022b). Chronic respiratory diseases, defined in the WHO literature as "chronic diseases of the airways and other structures of the lungs", are rated as the third highest world-wide cause of mortality in the NCD category (WHO, 2022b) and accounted for 793 disability adjusted life years (DALYs) per 100,000 of the population in Southern Sub-Saharan Africa in 2017 (Gouda et al., 2019). Risk factors for these CRDs include, but are not limited to, tobacco smoking, occupational exposure to chemicals and dust, frequent childhood respiratory infections and air pollution (WHO, 2022a).

Globally CRDs, especially COPD, are major causes of mortality and morbidity, and carry high health-care related costs (WHO, 2022d). According to the "Global Burden of Diseases, Injuries, and Risk Factors Study 2019", it was estimated that around 454.6 million people world-wide (almost 6% of the population) were living with CRDs (Abrams et al., 2020), with 3.23 million global deaths in 2019 from COPD (WHO, 2022d). Shockingly, almost 90% of deaths from COPD, in those under 70 years of age, were in LMIC such as South Africa (WHO, 2022d). In South Africa, 4% of all deaths in 2016 were attributed to CRDs (World Health, 2018) and they were the 8th highest cause of natural deaths in 2017 (StatsSA, 2020). In the Western Cape, CRDs were 5th highest natural cause of death in 2017 (StatsSA, 2020).

The most common CRDs are COPD, asthma, occupational lung diseases and pulmonary hypertension (WHO, 2022a), with COPD presenting as the third highest cause of all deaths globally in 2019 (WHO, 2022d). Studies by GOLD put annual deaths from COPD at about 3 million (GOLD, 2023) and estimated that there were already 384 million cases of COPD world-wide in 2010 (GOLD, 2020), with a worldwide COPD prevalence of 10.3% (GOLD, 2023).

In sub-Saharan Africa, the Middle East, and North Africa CRDs not only cause death, but also have an economic impact accounting for 4.7% of DALYs, with around 60% of these being attributed to COPD, despite the probability that COPD and asthma are likely to be under-diagnosed (Ahmed et al., 2017). The third, fourth and ninth leading causes of death for White, Coloured and Indian/Asian people respectively in South Africa, in 2012, was COPD (Pillay-van Wyk et al., 2016), with asthma and COPD accounting for 12% of Community Health Centre (CHC) visits, and 21% of drug prescription in a section of the Cape Metropole in 2014 (Isaacs et al., 2014). It was reported that COPD was likely under-diagnosed in South Africa, despite the high reported prevalence, with high associated morbidity and mortality. Additionally, these authors found that access to adequate prevention and treatment was lacking (Allwood et al., 2018). A history of pulmonary tuberculosis (PTB) is associated with higher rates of COPD and bronchiectasis (Byrne et al., 2015), which is important in the South African context, where the prevalence of PTB is high, at an estimated 513 per 100, 000 population (WHO, 2022c).

It has been found that CRDs such as COPD carry significant costs to healthcare (GOLD, 2023). These costs can be regarded as direct, indirect, and intangible. Factors like hospitalisations, ambulatory oxygen, home-based care and medications contribute to direct costs, which were estimated at over 6,000 Euros per patient per year in Europe and around 9,000 US Dollars per patient per year in Asia and the USA. The inability of the patient and their caregiver to work, loss of productivity and financial stability and barriers to the

availability of generic medications are among factors that contribute to the indirect costs to the economy. Intangible costs were less often quantified, but spoke of patients spending up to nine years of their lives in disability, with poorer quality of life and higher risk of depression (Gutiérrez Villegas et al., 2021). There is a significant burden on the health status of the patient and on their quality of life, and on that of their family and caregivers (Halpin & Miravitlles, 2006). Due to many other important matters that require attention (such as poverty and sanitation) in LMIC, health care alone cannot be the only issue prioritised by decision makers, and even where healthcare is addressed, more at acute conditions receive priority (Ganju et al., 2020), leaving those with CRDs underserviced.

The efficacy of PR will be discussed at length in subsequent chapters, but it is relevant to mention here that PR has been shown to reduce hospitalisation and presentation to health care providers, thereby offsetting some of these costs, even if the patients are financially supported e.g. with transport assistance (Mosher et al., 2020; Rochester et al., 2015). Although there is much variation in funding throughout the world, the USA has shown that PR can be effectively funded by both private and public insurance if prescribed and deemed necessary (Rochester et al., 2021).

2.2: Management of CRDs

The management of CRDs is multifactorial and includes pharmacological treatments such as inhaled corticosteroids, long-acting β2-agonists and long-acting muscarinic antagonists (Singh et al., 2019). It also includes non-pharmacological management such surgical interventions, oxygen therapy, education, PR, palliative care (where necessary), and preventative strategies such as vaccination and smoking cessation (Abdool-Gaffar et al., 2019; GOLD, 2020). When used within this body of interventions, PR has been proven to be effective and integral to the management of CRDs (Rochester et al., 2015).

2.3: Defining PR

Pulmonary rehabilitation is defined in a consensus statement by the American Thoracic and European Respiratory Societies as:

> *"A comprehensive intervention based on a thorough patient assessment, followed by patient-tailored therapies that include, but are not limited to, exercise training, education, and behaviour change, designed to improve the physical and psychological condition of people with chronic respiratory disease, and to promote the long-term adherence to health-enhancing behaviours"* (Spruit et al., 2013, p. 13).

As it largely addresses patient-relevant outcomes like quality of life, exercise capacity and emotional well-being, PR has been found to benefit patients with a variety of respiratory conditions, irrespective of disease severity, with special considerations for each disease informing the individualised design of the programme. Possible indications for PR in CRD patients include challenges with functional status (including activities of daily living and decreased performance in their occupation), decreased quality of life, dyspnoea, fatigue, chronic respiratory symptoms and increased frequency of exacerbations, amongst others (Spruit et al., 2013). It has been shown to be safe for patients to participate in PR, with adverse events occurring very rarely, and only a few severe conditions (for example unstable angina or active bleeding) acting as contra-indications for participation (Rochester et al., 2021).

As the consensus statement defines PR as being based on comprehensive patient assessment, and including education, behaviour change and exercise therapy, these should always be included in a PRP (Spruit et al., 2013), with the important components of PRPs shown in Table 1, below.

Table 1: Important components of a PRP

Comprehensive assessment	Medical history and condition Quality of life Symptom evaluation Depression and anxiety Functional status Exercise (performance and limitation) Knowledge about condition and self-efficacy
Exercise training	Endurance (conventional and/or interval) Strength (including both upper and lower limbs) Flexibility (Including posture and thoracic mobility) Breathing pattern retraining as appropriate
Behaviour change and collaborative self-management	Goal setting Education (topics as appropriate to the patient) Pacing Advance care planning
Re-assessment	Re-evaluate subjective and objective measures Plan post-programme follow-up

Adapted from (Spruit et al., 2013)

The comprehensive assessment should contain outcome measures, and re-assessment should be undertaken. Education focuses on improving health behaviour and self-management of the condition through understanding of respiratory function, disease pathophysiology and addressing psycho-social issues. It also includes pacing, energy conservation and breathing

techniques, with topics covered in education sessions informed by both the educators and the patients. Exercise therapy consists of an individually tailored, structured and supervised exercise programme (preferably twice a week for 6-8 weeks) which should encompass progressive strength and endurance training for upper and lower limbs, as well as home exercise and activity. Following the completion of a course of PR, continued exercise and involvement in physical activity should be encouraged, as well as the maintenance of any lifestyle changes that have been made (GOLD, 2020; Rochester et al., 2021; Rochester et al., 2015; Smith et al., 2020).

The 2013 American Thoracic Society/European Respiratory Society Statement on PR specified that programmes should be delivered by the multi-disciplinary team (MDT) including, where appropriate, a medical director, programme co-ordinator, chest physicians (also called respirologists or pulmonologists), elderly care physicians, physiotherapists occupational therapists, nurses, nutritional scientists, exercise physiologists, psychologists and behavioural experts, although the exercise component was regarded as "the cornerstone" of PR (Spruit et al., 2013). According to the Health Professionals Council of South Africa (HPCSA) scope of practice, in the South African context exercise training falls within the scope of physiotherapy, which in part is defined as "rehabilitation of the patient to his maximum potential both in work and sport including adaptation to permanent disabilities" (Health, 1976, p. 1) Therefore, physiotherapists have a foundational role to play in the delivery of this intervention.

2.4: The Current Delivery of PR

PR is included as part of "Rehabilitation 2030" (WHO, 2022d) (a WHO initiative to strengthen rehabilitation services in healthcare), and forms part of the management of COPD as per international guidelines (GOLD, 2020). On a practical level however, there is much heterogeneity in how programmes are delivered (Rochester & Spanevello, 2014; Rochester et

al., 2015; Spruit et al., 2014). This is seen in the structure and content of programmes, the types of patients that are targeted, in who runs the programmes, how referrals are made, which outcomes are measured and how this is done, and how funding and reimbursement are managed (Rochester et al., 2015). Additionally, PRPs in low resource settings may need to adapt further by considering cultural beliefs and levels of health literacy, or by including components such as medical optimisation of the condition (Habib et al., 2020). Although there is much potential for variations in delivery, in order to qualify as a PR programme, a programme must include at least a structured, supervised exercise programme, an educational or behavioural programme, an assessment, outcome measures and home exercise (Rochester et al., 2015).

Even the location at which PR is carried out can be diverse. It is usually done in an outpatient setting with centre-based programmes, but home-based versions of PR are starting to become more common, especially since the beginning of the Coronavirus disease 2019 (Covid-19) pandemic and its associated precautions and restrictions (Rochester et al., 2021). A recent meta-analysis and narrative synthesis review, using the Cochrane methodology, found that the improvements in quality of life and effort tolerance from home-based PR were comparable to centre based programmes (Uzzaman et al., 2022). Although the evidence pool is currently small, there is also a growing evidence base for the effectiveness of employing tele-rehabilitation in PR (Cox et al., 2021). Clinically significant benefits in dyspnoea and exercise capacity have been shown in comparison to control groups, and although centre-based-PR showed more benefits to dyspnoea scores, telerehabilitation showed more benefits to exercise capacity, especially at 12 month follow-up (Cox et al., 2022).

Smart phone-based PR education for family caregivers of patients with CRDs was shown to improve quality of life for caregivers and decrease caregiver burden, over face-to-face educational sessions, therefore impacting positively on the overall support of the PR patient. Interestingly, these findings were contradictory to similar studies in patients with dementia and

with breast-cancer, but the authors felt these differences were due to the different burden that dementia places on a care-giver, and the different gender profile of the care-givers of those with breast cancer (Bahadori et al., 2023). Ideally, the most appropriate location for PR to take place would be decided by considering the complexity of the patient's condition, the availability of appropriate experts, and the patient's preference of location, but this is not always possible as options are often limited (Spruit & Wouters, 2019), with numerous factors such as the availability of clinicians and difficulty with geographic accessibility contributing to these limitations (Rochester et al., 2015). Where possible, those with stable CRD should be allowed to choose between traditional and tele-based PR (Rochester et al., 2023)

2.5: The Role of PR in the Management of CRDs

Initially the evidence for the use of PR was studied in the management of COPD, with evidence for its use in other CRDs being examined later, and still being expanded (Rochester et al., 2021). The benefits of PR in COPD are well documented, and evidence suggests that these benefits can also be realised in people with a variety of other chronic respiratory conditions (Dugar et al., 2014; Holland et al., 2013). The health of those living with CRDs such as interstitial lung disease (ILD), idiopathic pulmonary fibrosis (IPF), pulmonary arterial hypertension (PAH), non-cystic fibrosis bronchiectasis, asthma, lung cancer, cystic fibrosis (CF), post-PTB lung disease, post covid-19, lymphangioleiomyomatosis, ankylosing spondylitis, and patients awaiting lung transplantation, have been shown to be positively affected by adapting existing COPD PR programmes to the specific needs of these patients, as discussed below, where a brief overview of the findings relating to PR in various CRDs will be presented.

2.5.1: Chronic obstructive pulmonary disease

Guidelines strongly recommend that patients with stable COPD should participate in PR, including after hospitalisation for an acute exacerbation (Rochester et al., 2023). A Cochrane Review of 65 randomised control trials, involving 3,822 medically optimised COPD patients, compared conventional care (defined as verbal advice) to PR (defined as at least 4 weeks of exercise training) (McCarthy et al., 2015). This review found such strong evidence of the efficacy of PR for COPD patients in the areas of exercise capacity, dyspnoea and fatigue relief, HRQOL, emotional function and participant sense of control over their disease, that no further investigation was deemed necessary. However, further investigation *was* done, with the results agreeing that PR positively affected many different aspects of COPD, leading to a decrease in symptoms and improved health status, exercise capacity, HRQOL, dyspnoea and post-completion survival time (Alfarroba et al., 2016; Houchen-Wolloff et al., 2018; Sporin et al., 2022; Zhang et al., 2022). The potential of PR to decrease inflammatory markers, thereby having a positive effect on the immune system was also described (Jenkins et al., 2020). PR was shown to be effective in improving HRQOL, strength and exercise capacity even when using minimal equipment (Alison & McKeough, 2014), which may have implications for low resource settings.

Regarding the influence of initial severity of COPD on outcomes, the evidence is mixed: Some studies suggested that there was only a small influence on HRQOL and walking distances in patients with non-severe COPD, defined as modified Medical Research Council Dyspnoea Scale (mMRC) of 0 or 1, leading to a weak recommendation for PR in this group (Rugbjerg et al., 2015), while other studies found that HRQOL, breathlessness and functional capacity improved regardless of the severity of the COPD (Schroff et al., 2017). In a single centre study in Turkey (a similarly resourced setting to South Africa) those with severe COPD-related hyperinflation showed improvement in airway resistance (Kiliç et al., 2023), although this

finding cannot be generalised to all COPD patients. Patients initially classified as “frail” showed more improvements in walking distances, cardio-respiratory fitness and impact scores than those classed as “not frail”, although they did not maintain their gains as effectively (Finamore et al., 2021), although there was more likelihood of increased post PR physical activity among those that initially had a higher 6MWD (classed as 350m or above) than a lower one (Osadnik et al., 2018). The benefits of PR were not influenced by age or gender (Maestri et al., 2023), and patients with cardiovascular and metabolic co-morbidities benefited similarly in both effort tolerance and quality of life scores in comparison to those without these co-morbidities (Grosbois et al., 2023).

Anxiety and depression in patients with stable COPD were improved (Gordon et al., 2019), with the greatest improvements in patients with more severe disease (Harrison et al., 2012). A Hungarian study found that beneficial effects on HRQOL and depression scores lasted at least six months, although the results were in comparison to the participant’s own baseline measurements and not a control group (Ilie et al., 2020). Improvements in anxiety levels and quality of life were even maintained at two years post programme (Yohannes et al., 2021). Additionally, PR was shown to improve cognitive impairments in patients with stable COPD (France et al., 2021), and self-reported sleep quality in those with COPD (Soler et al., 2013), but did not improve objective measures of sleep quality in these patients (Cox et al., 2019).

Even after acute exacerbations, PR was shown to improve HRQOL, exercise capacity and patients’ symptoms (Puhan et al., 2016). There is not yet clarity on the optimal time to start PR, as early PR, (defined as started in hospital with a first outpatient appointment within 72 hours of discharge), showed improvements in mMRC scores, 6MWD and HRQOL compared to usual care (Du et al., 2022) but was found to be less effective in improving dyspnoea during ADL, exercise capacity, functional status, or HRQOL, in comparison to PR started one month after exacerbation (Güell-Rous et al., 2021). There was a decreased mortality rate at one year

post hospital discharge (Lindenauer et al., 2020) and fewer rehospitalisation over one year if PR was started within 90 days of discharge from hospital (Stefan et al., 2021), with completion of a PRP leading to significantly fewer severe exacerbations and hospitalisations in the year following PR (Katajisto & Laitinen, 2017; Wageck et al., 2020). Cumulatively, these benefits led to decreased health-care utilisation and cost to healthcare, shown by a decrease in the frequency that health care services are utilised (Rochester et al., 2015), less exacerbations, less visits to health-care providers, less respiratory related admissions and less hospital and Intensive Care Unit days in the year following PR, than the year before (Raskin et al., 2006; van Ranst et al., 2014; Walsh et al., 2019). Cost effectiveness when considering quality adjusted life years (QALY) was also demonstrated (S. Liu et al., 2021).

2.5.2: Interstitial lung disease

PR is also strongly recommended for patients with ILD (Rochester et al., 2023). It was found to be safe, and brought improvements in HRQOL, exercise capacity, dyspnoea (Dowman et al., 2021; Reina-Gutiérrez et al., 2021; Rickards et al., 2021) and lung function, including in post covid-19 ILD (Reina-Gutiérrez et al., 2021). PR showed similar benefits for patients with ILD as it did for those with COPD that had similar levels of dyspnoea (Pedro et al., 2019). Although there was no control group, ILD patients undergoing PR in a resource constrained setting did significantly improve their exercise capacity and dyspnoea (although not lung function parameters), showing that expensive resources were not needed to improve patient outcomes (Rastogi et al., 2015). Regardless of the aetiology of their ILD, patients with more limited exercise capacity at baseline showed bigger improvements in both exercise capacity (Brunetti et al., 2021; Tonelli et al., 2017) and HRQOL (Tonelli et al., 2017). PR also improved depression (Wong et al., 2021), effort tolerance, fatigue scores, resting blood oxygen levels (Fuschillo et al., 2018) and maximum inspiratory pressures (Alsomali et al., 2022).

Improvements in effort tolerance, quality of life, dyspnoea and depression score were maintained at six months according to one study (Ryerson et al., 2014), but not in exercise capacity and quality of life according to another (Sharp et al., 2017). The reasons for these discrepancies may be due to the baseline characteristics of the participants, as both noted that in those with lower baseline exercise capacity there was more maintenance of initial improvements. Another study found exercise tolerance, health status and quadriceps muscle force improvements were in fact maintained at one year (Perez-Bogerd et al., 2018).

Patients on night-time non-invasive ventilation (dues to hypercapnia) were also shown to benefit significantly in their effort tolerance and quality of life (Dreher et al., 2015), and when patients improved their physical performance during PR it led to longer survival time, and time to lung transplant (Guler et al., 2022). However, patients on home oxygen showed less benefit, leading authors to conclude that early referral is beneficial (Brunetti et al., 2021). Based on a retrospective review of ILD patients that had completed their PRP, a team in the UK found improvements in HRQOL and exercise capacity, leading them to advise that PR should be recommended for ILD patients (Rickards et al., 2021).

2.5.3: Idiopathic pulmonary fibrosis

Patients with IPF (a specific form of ILD) were found to benefit from PR, showing benefits to cardiovascular function, functional and exercise capacity and quality of life, as well as a decrease in dyspnoea (Choi et al., 2023; Gomes-Neto et al., 2018; Satar et al., 2022; Vainshelboim, 2020), although these improvements may not last (Cheng et al., 2018). Completion rates of PR, magnitude of response and improvements in exercise capacity and HRQOL were found to be comparable to those in patients with COPD (Arizono et al., 2018; Nolan et al., 2021), and improvements in 6-Minute Walking Distance (6MWD) were shown to translate to clinical improvement (Vainshelboim, 2020). Improvement in anxiety (only in the

subgroup with baseline anxiety disorder) and depression (Edwards et al., 2023) and slowing of lung function decline (Yu et al., 2019) have also been demonstrated in IPF patients. Additionally, a halving of the mortality rate, and a decrease in intensive care, ventilator and hospital days if these patients underwent lung transplant (Florian et al., 2019) has been found. Even patients receiving anti-fibrotic drugs showed lasting benefit from PR in terms of their endurance time (Kensuke et al., 2023) with PR protecting from some of the loss of HRQOL and endurance often associated with the use of these drugs (Iwanami et al., 2022).

2.5.4: Pulmonary arterial hypertension

It is suggested by some guidelines (Rochester et al., 2023), and recommended by others (Von Oetinger et al., 2018), that patients with stable PAH receive PR, although the optimal method of delivery has not yet been found (Wojciuk et al., 2022). Despite most studies examining PR in patients with PAH being set-back by small sample sizes, there is promising evidence that the benefits in these patients may include improvements in lung function, dyspnoea scores (El-Assal et al., 2018) and increased pulmonary perfusion (improved blood-flow to the lungs) on magnetic resonance imaging (Ley et al., 2013). Even just exercise training made a significant impact on respiratory muscle strength, HRQOL, 6MWD (Grunig et al., 2021; Wojciuk et al., 2021) and right ventricular function (Chia et al., 2022) in this patient group. Some benefits were shown to last up to six months after the programme ended, although the start of the covid-19 pandemic and the subsequent lockdowns did not allow for follow-up with the control group in this study (Wojciuk et al., 2021).

2.5.5: Non-cystic fibrosis bronchiectasis

In patients with non-cystic fibrosis bronchiectasis undergoing PR, improvements were found in effort tolerance and HRQOL (Lee et al., 2017) to a greater degree than those undergoing pharmacological management only (Balteanu et al., 2017), and similar in extent to the

improvemnts found in COPD patients (Patel et al., 2019). Exercise capacity, dyspnoea, fatigue (Ora et al., 2022; Sara et al., 2020), the level of inflammation (Olveira et al., 2020), and physical activity (Cedeño de Jesús et al., 2022) were all positively affected by PR, with longer times to the first exacerbation of the condition and fewer exacerbations in the year following exercise training (Lee et al., 2014). These benefits were not seen following an acute exacerbation (Chalmers et al., 2019). The literature is, however, conflicting as to whether the positive effects of PR are maintained in the medium and long term, which may be due to the heterogeneity of the PRPs examined in the trials (José et al., 2021; Şahin et al., 2023).

2.5.6: Asthma

Patients with persistent asthma undergoing PR improved their exercise tolerance, HRQOL, peak respiratory pressures, baseline oxygenation, dyspnoea and heart rate, no matter the initial severity of their asthma (Feng et al., 2021; Osadnik et al., 2022; Rivera Motta et al., 2022; Zampogna et al., 2019). Improvements in QOL, exercise capacity, dyspnoea, quadriceps strength, physical activity levels, forced expiratory volume in one second (FEV_1) and asthma control have been shown to be lasting- for one or even two years in some studies (Grosbois et al., 2019; Şahin et al., 2023; van den Borst et al., 2023). These patients had no exacerbations during exercise (Cruz et al., 2017), and were found to have reduced asthma-related needs (such as information about inhalers), and improved control of their asthma (Salandi et al., 2020). Additionally, patients with high body mass index and hard to control asthma improved both their asthma control and perceived breathlessness by undergoing PR (Ricketts et al., 2022).

2.5.7: Lung cancer

Improvements in dyspnoea and fatigue, quality of life and functional capacity were also found in patients with lung cancer undergoing PR, this positively affected their surgical candidacy and post-surgical recovery (including post-operative complications and length of hospital stay)

(Bibo et al., 2021; Chen et al., 2022; Goldsmith et al., 2021; Pasqua et al., 2013; Saito et al., 2021). It may also positively influence morbidity rates (Nakao, 2017) and physical activity levels (Maeda et al., 2016) post-operatively. PR was able to preserve muscle mass and decrease post-surgical embolic events (as seen on CT chest) in patients with non-small cell lung cancer (Choi et al., 2022) and improve ventilatory efficiency in a small sample of patients (Perrotta et al., 2019). It also improved effort tolerance and maintained HRQOL in those undergoing curative radiotherapy for non-resectable lung cancer (Borghetti et al., 2022). It is therefore recommended that PR should be offered as part of standard care to those with lung cancer, in both pre- and post- operative patients, and in those who are not surgical candidates (Rivas-Perez & Nana-Sinkam, 2015).

2.5.8: Cystic fibrosis

In patients with CF, PR is recommended in conjunction with airway clearance techniques, as it is also able to improve exercise capacity, muscle strength, HRQOL, nutritional status (Kalamara et al., 2021), adherence to airway clearance techniques and to decrease exacerbations (Rodríguez et al., 2017). Increases in physical activity have been shown to slow the rate of decline of FEV_1 (Schneiderman et al., 2014) and aerobic fitness is associated with improved HRQOL (Hebestreit et al., 2014) in these patients. Additionally, exercise can improve glucose control in CF patients that have glucose abnormality (Beaudoin et al., 2017) and improve the pathophysiological ion dysregulation (decreased chloride secretion and hyper-absorption of sodium) at a cellular level, potentially leading to further improved HRQOL (Wheatley et al., 2011).

2.5.9: Post pulmonary tuberculosis (PTB)

In the post PTB population, PR was found to be feasible in a resource constrained environment (Jones et al., 2017). This is of great significance in the African and South African context, as

South Africa is one of just eight countries accounting for two thirds of all new PTB cases in 2020 (WHO, 2021). Two separate African-based studies showed that 30% and 45% of patients had lung function impairments and 25% and 30% respectively had decreased effort tolerance following PTB, despite being fully treated and considered to be cured (Chin et al., 2019; Fiogbe et al., 2019).

Early evidence suggested there is potential for PR to lead to improvements in HRQOL, exercise capacity and respiratory outcomes, but these studies were of small sample size and not well powered statistically (Jones et al., 2017; Rivera et al., 2015). However, PR is recommended for patients following PTB, as the evidence continues to develop, in order to improve effort tolerance, HRQOL, dyspnoea, fatigue, FEV_1, oxygen saturation ($Sa0_2$), partial pressure of oxygen ($p0_2$) and respiratory muscle and upper limb strength (Rivera et al., 2020; Singh et al., 2018; Visca et al., 2019). Even just components of PR (namely walking, nutritional advice and management of adverse drug reactions) improved the level of fatigue experienced by PTB patients (Sunisa et al., 2023).

In our local context of the Western Cape, South Africa, a study in examining PR for patients undergoing active treatment for PTB did not show any statistical improvements in lung function HRQOL or exercise tolerance (de Grass et al., 2014). This finding however could be attributed to the timing of the intervention- this patient group had acute lung disease, and were still undergoing active treatment, whereas it is for those with *chronic* lung disease that PR is usually recommended. In addition, the prescribed intervention did not include all recommended components of a PRP. A recent randomised controlled study on the effects of PR in patients with current PTB, was one arm of a larger study around lung function abnormalities and the effects of PR in PTB patients. This study found that there were improvements in lung function, quality of life and exercise capacity in the intervention group, unfortunately these effects had not reached statistical significance compared to the control group, as too many patients were

"lost to follow up" to draw clear conclusions. The author felt however that the results held potential clinical significance if screening was improved to identify patients that would benefit from PR (Manie, 2022). Similarly, to the de Grass et al. (2014) study, timing of the PR intervention was during the acute disease stage, and although these studies hold promise, no conclusive results were offered as to whether PR is effective in the case of post PTB CRD.

2.5.10: Lung transplant

Those awaiting lung transplantation (with a variety of respiratory diseases), that participated in PR, had decreased dyspnoea and muscle strength loss, and improved (or at least did not worsen) their exercise capacity, psychological state, and HRQOL (Hoffman et al., 2017; Li et al., 2013; Pehlivan et al., 2017; Weinhold et al., 2014). Those participating post-operatively, showed improved lung function, exercise capacity, cognitive function, daily walking time, quadriceps force, physical functioning, and blood pressure control (Andrianopoulos et al., 2019; Langer et al., 2012). More intensive PR (defined as more supervised sessions per week as compared to standard PR) showed greater improvement in 6MWD, and less days before they were able to exercise continuously for 30 minutes (Mwizerwa et al., 2020).

2.5.11: Coronavirus disease 2019

Another important condition to consider is covid-19, caused by severe acute respiratory syndrome coronavirus 2 (Sars-CoV-2). Both hospitalised and community-treated covid-19 patients experienced significant fatigue and shortness of breath up to three months post infection (Alhotye et al., 2021), with some patients showing anxiety, depression, fatigue and insomnia that persisted even up to one year post recovery (Zhao et al., 2021). Expert consensus and other early literature, based on models of other respiratory conditions, suggested that there was a role for PR in these patients, to improve factors such as HRQOL, mobility and autonomy (Vitacca et al., 2020; Yang & Yang, 2020), within the context of an individualised assessment

and monitoring (Santana et al., 2021). Subsequent studies found that ongoing dyspnoea and fatigue improved with PR (Khurana et al., 2022) and there were also improvements in psychological markers, pulmonary function and effort tolerance if they underwent early PR (Clark et al., 2022; Kunoor et al., 2022). Unfortunately, although the evidence is promising, it is of low-quality. This means that when making a decision about whether to offer PR to this group, feasibility, capacity and resource constraints would carry more weight in the decision making process (Soril et al., 2022).

2.5.12: Lymphangioleiomyomatosis and ankylosing spondylitis

Even in lesser-known conditions, evidence is promising that PR may be effective. Studies in patients with lymphangioleiomyomatosis (a rare cystic lung disease) showed similar effects from PR to those in patients with COPD (Gloeckl et al., 2020), with improvements in effort tolerance, HRQOL, physical activity levels and dyspnoea (Araujo et al., 2016). Patients attending PR even showed improvement in lung function, which the authors felt was very significant, due to the progressive nature of the condition (Lowder & Whitney, 2016). Patients with ankylosing spondylitis, (another rare disease that affects the respiratory capability of patients) also responded positively to PR, with improvements in exercise capacity, dyspnoea, physical activity, depression levels, HRQOL and better work productivity being shown (Akaltun et al., 2021; Sahin N, 2020).

2.6: The Need for PR in the Local Context

This literature suggests that PR is safe and effective in the treatment of a wide range of CRDs and should therefore be used as part of their management. However, as discussed previously, there is a very low level of provision of PR services world-wide, with PR available to less than 1.2% of COPD patients (Desveaux et al., 2015). Very few eligible patients can access PRPs- even the USA only provides access to PR in less than half their counties (Moscovice et al.,

2019) and to less than 5% of eligible candidates (Rochester et al., 2021), despite being a high income country.

To our knowledge no official statistics on PRP provision and access are available specifically for South Africa and the Western Cape, however a recent multi-method study (Mamani Bilungula et al., 2022) endeavoured to understand the PR landscape in Africa by undertaking both a systematic literature review and a questionnaire based, cross-sectional study of health-care professionals. Despite some of the included studies only looking at isolated aspects of PR, and a high level of heterogeny between various programmes, they still concluded that PR does exist in Africa, and is effective in this setting, although it is still under-utilised. This is similar to the findings of other analyses, that despite risk of bias (for example small sample sizes and lack of randomisation in examined studies), the limited evidence available supports that PR should be implemented in Sub-Saharan Africa (Bickton et al., 2020; Habib et al., 2020). There is however a need for more high quality studies to confirm these results (Habib et al., 2020).

South Africa has a dual health care system, consisting of public health care and private health care. From the perspective of the public health care system, the vision of The Western Cape Department of Health (WCDoH) is "Access to person-centred, quality care" and under its values it advocates for community involvement in healthcare and a comprehensive package of care at the primary health care level (WCDoH, 2013). To enhance access to this important intervention, it therefore follows that an intervention such as PR should be delivered at the as close to the community as possible- the primary care level. In the private health sector physiotherapy practices are run independently from the government and are able to deliver health care to the community in which they are situated, but do not fall under the vision and values of the WCDOH.

2.7: Barriers and Facilitators to the Delivery of PR

An Official American Thoracic Society/European Respiratory Society Policy Statement on "Enhancing Implementation, Use, and Delivery of Pulmonary Rehabilitation" stated:

> *"PR reduces patients' symptoms; improves limb muscle function, exercise capacity, emotional function, quality of life, knowledge, and self-efficacy; has health economic benefits and is an essential component of the integrated care of patients with chronic respiratory diseases. However, despite its clear benefits, PR is grossly underutilized and is frequently inaccessible to patients. Insufficient funding; limited resources for PR programs; inadequate allocation of health system reimbursement for PR; lack of healthcare professional, payer, patient, and caregiver awareness and knowledge regarding the process and benefits of PR; suboptimal use of PR by suitable patients and limited training opportunities for PR professionals all contribute to the gap between the science and benefits of PR and the actual delivery of PR services."*
>
> (Rochester et al., 2015, p. 1373).

This known effectiveness of PR juxtaposed with its poor utilisation globally, has led to various studies attempting to understand what the barriers and facilitators to both the offering, and the uptake of PR might be.

It is important to note, that while many of these studies examined barriers and/or facilitators in better resourced regions like the UK and other western European countries, there are also a number that have been conducted in resource-scarce settings. As discussed below, some of these studies examining resource scarce-settings are conducted in a manner that allows the results to be more generalisable, whereas other may provide some promising ideas, but require further investigation.

Some had only abstracts available, not allowing for in-depth understanding of their findings (Akinremi & Ogwu, 2015; Altaf et al., 2021), while others had information, but were not clear some important details, like what questions were asked, or what the study dropout rates were (Candemir et al., 2017). Others looked at demographic factors such as smoking status and gender, but not at why or how these things were barriers (Díaz et al., 2022; Jhonatan et al., 2023). The results of some studies were not generalisable, owing to the participants all being in one area and healthcare system (Bickton et al., 2022; Sami et al., 2021) or dealing only with patients with health insurance (Gushken et al., 2021).

Valuable information may have been lost due to covid 19 lockdown restrictions interfering with data collection processes, (Jhonatan et al., 2023; Katagira et al., 2021), the questionnaire being presented in English only, while potential respondents also spoke Arabic and French (Farah et al., 2021) and due to low response rates (particularly with online questionnaires) (Díaz et al., 2022; Farah et al., 2021). Potential selection bias was noted in one study, as information was collected by convenience sampling of patients that had already displayed health-seeking behaviour (Katagira et al., 2021), while another asked patients asked about the idea of PRP, but as they did not have actual experience of attempting it, the barriers described were hypothetical (Bickton et al., 2022).

Some studies examined the view of a variety of stake holders (e.g. Health care providers, patients and families), leading to richer information (Sami et al., 2021) or attempted to target all the potential respondents (chest physicians at their conference, and others via email) (Farah et al., 2021). Technology was used to their advantage (virtual interviews or meetings), although challenges, such as with connectivity, were reported (Chan et al., 2021). The one study that did include South Africa was well designed and was able to richly study the lived experience of the participants in attempting to implement PRPs. However, the findings cannot be generalised

to the wider South African context, as this represents the views of only one participant from this country (Bickton & Shannon, 2022), and not all LMICs face the same challenges.

Despite the limitations, the available information about the previously found barriers and facilitators to PR is fairly well described. The following section aims to discuss these barriers and facilitators, as they relate to the healthcare system, the healthcare provider and to the patients themselves.

2.7.1: Barriers

2.7.1.1: Organisational/Healthcare system related factors

Previously found barriers that related to the healthcare system could be divided into three categories, namely "planning and structure", "lack of resources" and "accessibility".

2.7.1.1.1: Planning and structure

Ineffective planning of PR was found to be a barrier (Sami et al., 2021), with challenges such as lack of a structured PR programme (Akinremi & Ogwu, 2015; Chan et al., 2021; Hao et al., 2021), performance quality metrics (Rochester et al., 2021), properly organised logistics (Chan et al., 2021), and inflexibility (Barradell et al., 2022) all being to specifically identified. This poor planning often led to a referral process that was not stream-lined (for example with a referral tool or guidelines) (Foster et al., 2016; Katagira et al., 2021), discontinuity of care (Sami et al., 2021), and severe constraints to both hospital capacity (Alsubaiei et al., 2016) and consultation time (Barradell et al., 2022; Watson et al., 2020).

2.7.1.1.2: Lack of resources

A lack of human resources, in the form of trained healthcare providers to deliver the rehabilitation, was mentioned in multiple studies, in a variety of countries. This ranged from high income countries, such as Saudi Arabia, to LMIC such as Lebanon (Akinremi & Ogwu,

2015; Aldhahir et al., 2022; Alsubaiei et al., 2016; Chan et al., 2021; Cox et al., 2017; Farah et al., 2021; Johnston et al., 2016) and was specifically seen in the situation of too few physiotherapists to deliver the rehabilitation across a selection of LMIC countries including South Africa (Bickton & Shannon, 2022).

Inadequate funding, financial re-imbursement and insurance for PR services were also identified as barriers in multiple studies (Alsubaiei et al., 2016; Cox et al., 2017; Rochester et al., 2021; Sami et al., 2021; Spitzer et al., 2023), which at times led to scarcity of necessary equipment (Akinremi & Ogwu, 2015; Bickton & Shannon, 2022; Cox et al., 2017). One study reported that simply the high cost of care acted as a significant barrier (Farah et al., 2021).

2.7.1.1.3: Accessibility

Limited general access to PR services was noted as a barrier in several studies (Altaf et al., 2020; Chan et al., 2021; Johnston et al., 2013a; Sami et al., 2021). It was attributed to geographical challenges such as the remote settings of rural programmes (Chan et al., 2021; Johnston et al., 2016; Rochester et al., 2021), the availability or amount of PR centres or suitable spaces (Aldhahir et al., 2022; Augustine et al., 2021; Barradell et al., 2022; Johnston et al., 2016), waiting list times (Cox et al., 2017) and the observation (specifically in LMIC) that not all patients were able access the technology (e.g. smartphone applications)required for remote PR (Bickton & Shannon, 2022).

2.7.1.2: <u>Healthcare provider related factors</u>

2.7.1.2.1: Knowledge/Awareness

Often eligible patients are not referred to PR (Francis & Cumella, 2023), with many studies identifying limited awareness by healthcare providers of the existence of PR (Augustine et al., 2021; Chan et al., 2021), its benefits (Watson et al., 2020) and indications (Bickton & Shannon, 2022; Foster et al., 2016) as a significant barriers to PR. Additionally, a number of studies

identified a lack of knowledge about PR from various healthcare providers, including chest physicians and General Practitioners, as a major barrier to the service (Barradell et al., 2022; Chan et al., 2021; Farah et al., 2021; Foster et al., 2016; Johnston et al., 2013a; Milner et al., 2018; Rochester et al., 2021; Sami et al., 2021; Watson et al., 2020). Tellingly, in one study only four of the 123 healthcare providers (who all dealt with COPD regularly) had even heard of PR (Alsubaiei et al., 2016). This was supplemented by poor knowledge regarding the referral process (Augustine et al., 2021; Cox et al., 2017; Johnston et al., 2013a; Katagira et al., 2021; Milner et al., 2018; Watson et al., 2022) and a perception that it was difficult to refer (Cox et al., 2017) or that there were few opportunities to do so (Watson et al., 2022)..

2.7.1.2.2: Teamwork

Challenges in the area of teamwork were identified by various studies, such as lack of co-ordination (Sami et al., 2021), different priorities in treatment approach from different professionals, (Barradell et al., 2022) and a lack of interdisciplinary working (Augustine et al., 2021; Barradell et al., 2022). It was identified that referrals were not being made (Farah et al., 2021), and when they were made the communication from the provider back to the referrer was infrequent (Watson et al., 2022).

2.7.1.2.3: Intra-personal

Intra-personal barriers identified by patients that related to healthcare providers included lack of patient-centeredness and the absence of a holistic approach to the patients (Sami et al., 2021). Furthermore, perceptions that the healthcare providers themselves held, also acted as barriers, including lack of referral due to anticipated difficulties with access (Johnston et al., 2013a), especially for those patients who were employed (Watson et al., 2022), high relative costs and few benefits (Johnston et al., 2013a), concern around patient's physical ability (Stone et al., 2020; Watson et al., 2022) and the assumption that patients would not be adequately motivated

(Watson et al., 2020; Watson et al., 2022). Some health-care workers also expressed lack of confidence in their ability to deliver PR (Akinremi & Ogwu, 2015; Johnston et al., 2016)

2.7.1.3: Patient related factors

2.7.1.3.1: Internal

As with healthcare providers, a lack of knowledge and understanding about PR amongst patients was also identified as a barrier to PR, both by health care providers and by patients and their families (Barradell et al., 2022; Chan et al., 2021; Cox et al., 2017; Fox et al., 2019; Sami et al., 2021; Spitzer et al., 2020). This could lead patients to place more value on the activities, like work, that they felt they would be missing out by attending, (Cox et al., 2017). This was compounded by the unfamiliarity that some participants had with healthcare models in general, and physiotherapy in particular (Fox et al., 2019), as well as limited patient education around PR (Katagira et al., 2021).

At times, patients' health affected their ability to participate in PR, due to the chronic nature and complexity of their disease (Mathar et al., 2017; Sami et al., 2021), the nature of their co-morbidities (Aldhahir et al., 2022; Augustine et al., 2021; Cox et al., 2017; Francis & Cumella, 2023; Mathar et al., 2017; Oates et al., 2019), their functional status and capability, especially around mobility (Cox et al., 2017; Y. Liu et al., 2021; Oates et al., 2017; Yohannes et al., 2022), or being acutely unwell (Bickton et al., 2022; Braeken et al., 2017; Chan et al., 2021; Hoffman et al., 2021). Patient's motivation to participate could also be adversely affected by their health (Farah et al., 2021; McCarron et al., 2019; Spitzer et al., 2020).

Patient related psychological factors that were found to act as barriers to PR included both breathlessness and the fear of exercise leading to increased breathlessness (Candemir et al., 2017; Cox et al., 2017; Hoffman et al., 2021). Other psychological factors included the belief that they were unable to exercise (Guo & Bruce, 2014; McCarron et al., 2019), anxiety

(Yohannes et al., 2022) and depression (Cox et al., 2017). Depression, however, was not a barrier to being referred initially, as patients with depression were more likely to be referred for PR (Stone et al., 2020). Other patient related barriers included a lack of commitment and motivation (Chan et al., 2021; Oates et al., 2019; Spitzer et al., 2020), frustration leading to discontinuation of PR (Sami et al., 2021) and a perceived lack of benefit from the programme (Augustine et al., 2021; Candemir et al., 2017; Cox et al., 2017; Hoffman et al., 2021; McCarron et al., 2019).

Some patients were simply not interested in PR, leading to their refusal to participate at all (Aldhahir et al., 2022). Others chose not to attend because they thought they were already doing enough exercise (Hug et al., 2022; Mathar et al., 2017), or were too well to benefit from PR, while some thought they were too unwell to benefit (Collaço et al., 2022; Cox et al., 2017; Guo & Bruce, 2014; Hayton et al., 2013; Mathar et al., 2017; Xie et al., 2020), or had negative previous experiences with exercise (Sohanpal et al., 2015). Patients may also have felt unworthy of the programme, with an introverted personality (Hug et al., 2022), or shame around their condition leading to isolation, and less likelihood of seeking help (Harrison et al., 2015).

Smoking status was found to be an independent predictor of non-attendance and non-adherence to, and non-completion of, PR. Some purported theories around this include that it indicates the kind of healthcare choices a person makes, that it leads to a higher level of dyspnoea and other physical effects, or due to the stigmatisation that smokers experience (Brown et al., 2016; Díaz et al., 2022; Hayton et al., 2013; McCarron et al., 2019; Oates et al., 2017).

2.7.1.3.2: External

Factors that contributed to the wider societal and family barriers that patients faced to participating in PR included racial and cultural disparities in access and acceptance of the

programme (George, 2017; Johnston et al., 2016; Levack et al., 2016; Rochester et al., 2021) and guilt and shame in some cultures, related to smoking (Fox et al., 2019; McCarron et al., 2019). Language barriers, especially those necessitating patient interactions via family members (Fox et al., 2019; Rochester et al., 2021), as well as low socio-economic status (Augustine et al., 2021; Jhonatan et al., 2023), socio-economic deprivation (Oates et al., 2017; Rochester et al., 2021), lack of technology literacy, information overload (Barradell et al., 2022) and lack of an effective support system (Hayton et al., 2013; Oates et al., 2019; Sohanpal et al., 2015) were also found to be contributing factors.

The financial burden of COPD itself, and to attend PR was found to be great (Guo & Bruce, 2014; Oates et al., 2019; Sami et al., 2021) with direct costs such as transport, and indirect costs such as loss of income being identified (Bickton & Shannon, 2022; Candemir et al., 2017; Chan et al., 2021; Cox et al., 2017). A lack of funding facilities (Augustine et al., 2021), challenges with transportation (Augustine et al., 2021; Bickton et al., 2022; Cox et al., 2017; Hayton et al., 2013; Hug et al., 2022; Johnston et al., 2016; McCarron et al., 2019; Oates et al., 2019; Spitzer et al., 2020), distance, time and competing commitments such as their jobs (Bickton et al., 2022; Collaço et al., 2022; Cox et al., 2017; Hoffman et al., 2021; Levack et al., 2016; Mathar et al., 2017; McCarron et al., 2019; Spitzer et al., 2020), acted as further barriers.

2.7.2: Facilitators

Similarly, to barriers, the facilitators to PR can be divided into three categories, relating to the healthcare system, the healthcare provider and the patients themselves:

2.7.2.1: Organisational/ Healthcare system related factors

A team in a low-resource setting in Pakistan was able to provide effective PR at what they believed to be an affordable cost, concluding that PR was possible in the low resource setting

(Altaf et al., 2020). Participants expressed that if PR, and education about it, was to be made part of standard care for COPD, the system was streamlined (Barradell et al., 2022; Johnston et al., 2013a), and there was scope to adapt PR to the local context and available resources (Bickton & Shannon, 2022), these factors would further enable PRPs, with completion being enhanced when "best practice guidelines" were followed (Stone et al., 2021). Studies also found that some attention to the referral process would better enable PR, for example feedback from PR provider to the referrer on the outcome of the PRP with individual patients or a dedicated person to champion awareness of PR (Spitzer et al., 2023; Watson et al., 2020). A more streamlined referral system, with dedicated prompts, computerised "pop-up" reminders and time on the referral system have also been recommended (Barradell et al., 2022; Cox et al., 2017; Lok et al., 2018; Watson et al., 2022).

Where the public and patients were well informed about PR (Johnston et al., 2013a) and it's benefits (McCarron et al., 2019), and better awareness and recognition (including due to covid-19) existed (Barradell et al., 2022; Bickton & Shannon, 2022), PR as a whole was enabled, although the awareness created by an inpatient exercise class (during admission for acute exacerbation of COPD) did not lead to higher completion rates of PR (Avent et al., 2015). Healthcare providers felt that for them, financial incentives (Watson et al., 2020), encouragement and financial support to gain the required resources, such as equipment, funds and staff (Bickton & Shannon, 2022) acted as enablers. Additionally, the use of home-based programmes (Aldhahir et al., 2022) and tele-medicine (Gushken et al., 2021) and the societal normalisation of PR would enable patients to participate (Barradell et al., 2022). Patients further felt that resources, such as pamphlets, that would prompt or aid discussion about PR would also facilitate the referral and acceptance process (Foster et al., 2016), as would being given access to a "menu" of the options to complete their PRP (Barradell et al., 2022).

Where transport issues were addressed, with free transport or parking, or patients had less distance to travel, they were more likely to attend PR sessions (Altaf et al., 2021; Spitzer et al., 2023).

2.7.2.2: Healthcare provider related factors

Better referrals to PR were facilitated by healthcare providers having experience in PR, especially when the expertise of specialised nurses was considered (Johnston et al., 2013b; Milner et al., 2018). Amongst referrers, provision of training (Bickton & Shannon, 2022; Foster et al., 2016; Milner et al., 2018), an awareness of the benefits of PR, including for those with less severe disease (Gushken et al., 2021; Johnston et al., 2013a; Wexler et al., 2019) and enthusiasm and a belief in its value (Cox et al., 2017; Spitzer et al., 2023; Watson et al., 2022) also facilitated better referral to PR. Some physicians felt that PR could be learned by self-study which led them to engage with it more (Hao et al., 2021)

Where staff, were friendly (Oates et al., 2019), supported each other and worked well together across disciplines (Chan et al., 2021; Watson et al., 2022) and support was shown by management (Spitzer et al., 2023), PRPs were also easier to provide.

2.7.2.3: Patient related factors

Patients were better able to participate in PR if they felt their health and confidence was improving, or they could see tangible benefits and feel like they were "part of something" (Guo & Bruce, 2014; Oates et al., 2019; Spitzer et al., 2020). If patients started with better HRQOL (Boutou et al., 2014) or if they themselves were motivated (Bickton & Shannon, 2022; Guo & Bruce, 2014)- sometimes by more hospital admissions which allowed them to access more medical resources, and information around the need for PR (Xie et al., 2020), they participated more. If patients showed personal determination and expectation of improvement (Bickton et

al., 2022; Hug et al., 2022; Oates et al., 2019) or the hope that they might improve their control over their condition (Collaço et al., 2022; Sohanpal et al., 2015), they also participated more.

Sincere encouragement from, and connection with, the referring health care worker (Sohanpal et al., 2015; Spitzer et al., 2020; Spitzer et al., 2023), a sense that they trusted the health-care worker (Barradell et al., 2022), a strong belief in "what doctors say" that is held by some cultures (Fox et al., 2019) and a belief in the benefits of exercise or PR (McCarron et al., 2019; Oo et al., 2022) facilitated PRP participation. Additional facilitators were the socialisation and support received from other attendees, family, and friends (Barradell et al., 2022; Collaço et al., 2022; Cox et al., 2017; Guo & Bruce, 2014; Hoffman et al., 2021; Oates et al., 2019; Spitzer et al., 2020), as well as the education received in PR sessions (Bickton et al., 2022; Oates et al., 2019; Spitzer et al., 2020).

Interestingly, some factors could be seen as both barriers and facilitators, depending on the particular participant being interviewed (Bickton & Shannon, 2022). Examples include the influence of the referring doctor on the patient that could be regarded as either positive or negative, as could the influence of a group setting (Cox et al., 2017; Spitzer et al., 2020). Both a lack of information and opposingly, an information overload, were often seen as barriers (Barradell et al., 2022).

2.8: Conclusion

CRDs, negatively affect many aspects of people's lives, and are responsible for a high burden to healthcare globally. These CRDs are best managed in a multi-factorial manner, including with PR, which has been shown to be effective in improving the lives of these patients. Given the extent of CRDs both globally and in the context of South Africa and the Western Cape, together with the proven effectiveness of PR in improving HRQOL and exercise related

parameters, PR should ideally be made available and accessible to all who would benefit from this intervention.

As discussed in sections 1.5; 2.2; 2.5 and 2.6, there is, however, a disparity in our knowledge surrounding the effectiveness of, and the need for PR, and the extent to which it is being delivered in the real-world setting. Its efficacy is well known, but it is being offered to relatively few patients. Various studies have endeavoured to add to the understanding of the barriers to these programmes, and some have even considered the facilitators, but to our knowledge none have focused on our local context in the Western Cape, South Africa. South Africa is a country of great ethnic, social, cultural and financial diversity, and the South African health care system is different to many of the other systems that have been studied more extensively. This unique mixture of low and high resource settings and dual provision of services by the private and public sectors means that barriers and facilitators that were found elsewhere may not be contextually relevant to the South African population. This study will attempt to shed light on both the barriers to- and the facilitators of the provision of PRPs experienced by local physiotherapists, in the hope that these can be addressed in order to improve our practice and provision of services to our patients.

Chapter 3: Methodology

This chapter describes the research process followed in this study, which aimed to explore the factors that affect the establishment and provision of Pulmonary Rehabilitation Programmes by physiotherapists in the Cape Metropole. Following these, the ethical and legal issues that were considered, are discussed.

3.1: Research Question

What factors affecting the establishment and provision of an outpatient PRP are experienced by physiotherapists in the Cape Metropole?

3.2: Research Objectives

1. To explore and describe current outpatient PRPs offered by physiotherapists in the Cape Metropole using a questionnaire and semi-structured interviews.
2. To explore and describe the factors which have facilitated the establishment of the current PRPs.
3. To explore and describe the factors which have presented as barriers to the establishment of the current PRPs.

3.3: Study Approach

This study sought to gain a deeper understanding of physiotherapists' perspectives of the factors involved in setting up and providing PR and therefore a qualitative approach was chosen, as the numerical data and statistics resulting from a quantitative approach would not offer this kind of understanding. When searching for a paradigm to guide the data collection process and through which to interpret the data, the researcher chose an interpretivist, constructivist paradigm, because an interpretivist paradigm looks for meaning in data, rather

than rules or laws, and aims for understanding, rather than prediction; (Dudovskiy, 2011b) and a constructivist paradigm is based on the idea that knowledge comes from experiences that humans have (Dudovskiy, 2011a). This combination allowed the researchers to understand and interpret the factors impacting on the service provided, from the perspective of the experience of the people involved, rather than critically evaluating the service itself.

An EQD design is a hybrid of exploratory research, which allows for description and understanding of an area of life (Stebbins, 2001), and qualitative descriptive research which provides a descriptive summary of the information pertaining to the phenomena of interest (Sandelowski, 2000). It has been established as an appropriate design to explore areas in healthcare where little information is known (Hunter et al., 2018). EQD was therefore chosen for this study as minimal information regarding the factors surrounding the establishment and provision of PRPs is currently available in the South African context.

3.4: Research Setting

This research study set out to examine adult focused, outpatient PRPs, which could be provided in both the private and public healthcare settings in South Africa. Physiotherapists, as opposed to those practicing other professions, were selected to be interviewed as according to the Health Professionals Council of South Africa (HPCSA) scope of practice, in the South African context these are the health care professionals tasked with rehabilitation of patients (Health, 1976). An attempt was made to approach all physiotherapists in the geographical area of the Cape Metropole, Western Cape, South Africa. This included public health sector physiotherapists at tertiary, regional, district level institutions, mobile clinics and specialist hospitals, as well as physiotherapists in private practices and non-profit organisations.

3.5: Study Population and Sampling

Initially, the researcher used a convenience sampling method to recruit participants from the total population of physiotherapists working in both the private and public sectors of the Cape Metropole, Western Cape, by endeavouring to invite all possible physiotherapists in this area. This was done with the hope of recruiting participants from all the applicable types of facilities- district, regional and applicable specialist hospitals, mobile clinics, private practices and non-profit organisations. Physiotherapists registered with the South African Society of Physiotherapy (SASP) or recorded in in the SASP public sector list were invited to participate in the study. In order to increase participation, an invitation was extended on the Allied Health Workers of South Africa and SASP Facebook pages.

As not enough participants were recruited for interview via these methods, a snowball sampling approach was then used to further widen the net and recruit more participants. This was done by enquiring from the participants and other physiotherapists known to the researcher and supervisors, whether they were aware of any potential participants that could be interviewed. The following selection criteria were applied to guide sampling:

3.5.1: Inclusion criteria

- Providing cardio-pulmonary out-patient physiotherapy services to adults
- Situated in the Cape Metropole

3.5.2: Exclusion criteria

- Have never attempted to provide a pulmonary rehabilitation programme (our interest was in exploring the experience of this attempt.)

3.6: Data Collection

3.6.1: Gaining access and recruitment

Permission to approach physiotherapists working in all applicable public health institutions in the Cape Metropole was sought from the National Health Research database. Once this was permission was granted (Appendix A) the SASP Western Cape Branch distributed the informed consent information letter (Appendix B) to both private and public sector physiotherapists, inviting potential participants to participate in the study. This initial strategy represented an extensive reach as the invitation to participate was sent to 1159 members in the private sector, and the public service representative of SASP forwarded it to approximately 69 physiotherapists working in the public sector. Additionally, advertising of the study on the social media platforms of SASP and Allied Health Workers of South Africa Facebook pages was done. In the snowball approach phase of recruitment, potential participants were identified by approaching contacts of the researcher and supervisors either as potential candidates to interview, or to provide names of potential participants, or both. Additionally, those being interviewed were asked to provide names of potential participants. Potential participants identified in this way were then formally invited to participate in the study by an email sent directly by the researcher. This included the detailed information letter and informed consent form in the same manner as the earlier invitations.

When potential participants clicked on the emailed link to SurveyMonkey, they were transferred to the screening questionnaire (Appendix C). Prior to the first screening question, the participants were asked if they had read the Informed consent information letter and if they agreed to participate in the study by answering the questionnaire. The screening questionnaire was used to confirm that participants met the inclusion criteria for participation and asked them to indicate their willingness to participate in the interview portion of the study.

A total of eleven physiotherapists responded to the study by following the SurveyMonkey link and completing the screening questionnaire. This occurred in two phases. Initially, in the convenience sampling phase of recruitment a total of eight participants answered the questionnaire on SurveyMonkey, of which three did not consent to be interviewed and a further two did not meet the inclusion criteria. This led to an initial total of three participants being invited to be interviewed and accepting. Subsequently, during the snowball phase of recruitment, a further three participants answered the questionnaire on SurveyMonkey, all of which consented to be interviewed, met the inclusion criteria for the study and were interviewed. Recruitment of these six interview participants occurred between April and August 2021.

When selecting which of the three initially available participants with which to conduct the pilot study, potential bias from the interviewer (for example choosing the one participant of the initial three that she knew previously to make the interview easier), was avoided by randomly ordering them using the "Random Order" application (available from Google Play Store). Participants were interviewed in the order that it generated, with the first interview acting as the pilot interview. Following this, participants were interviewed as they were recruited, until no more participants meeting the inclusion criteria could be recruited, and data saturation was reached.

3.6.2: Data collection tools

Data collection was done by three tools: The screening questionnaire, semi-structured interviews (which provided the bulk of the data) and a reflective journal kept by the interviewer.

The screening questionnaire was dual purpose, in helping to identify participants and acting as a secondary data collection tool. It did this by providing some background information, relating to objective 1, such as the context in which the participant was working, their role in this

context and whether they had attempted to provide a PRP at any time. This information aided in understanding the context in which each participant worked when they attempted to set up a PRP and assisted in ensuring sufficient scope by aiding in prolonged engagement.

The main data collection tool was an individual semi-structured interview (Appendix D) conducted by the researcher. The interview guide was drawn up following the guidelines set out by DeJonckheere and Vaughn (DeJonckheere & Vaughn, 2019), based on the earlier seminal work "The Ethnographic Interview" (Spradley, 1979). In this method a "Grand Tour" or general question is asked to initiate the interview. In this case the question was "Tell me about your understanding of PRPs?".

This was followed by a core question that directly related to the information the researcher wanted to know and allowed the participant to talk openly. In this interview the core question was "Tell me about the context you worked in when you attempted to institute an outpatient PRP?". Planned follow up questions were then asked, depending on participant responses. This was to gain greater detail about how the PRPs looked and what barriers and facilitators were encountered by the participants in attempting to set up and provide them. Lastly, probing questions arising from the participant responses were asked during the interview, for example: "So you mentioned a little bit about what your programme entails when you spoke about anxiety and strengthening and that kind of thing, can you maybe elaborate on that a little bit?" and "How does a typical programme look?". These were used to gain further information and clarification as needed. The manner in which the interviews were conducted was important, not only to ensure that ideas were not planted by the interviewer, but also to draw information out of the participants. For this reason, the supervisors checked both the pilot and subsequent interview recordings and transcripts for technique and effectiveness. The shorter interview reflected the personality and speaking style of participant 5 (straightforward and concise), while the longer interview with participant 4 reflected his speaking style but did not necessarily

yield better quality data. Although there was great variation in length of interviews, the researcher and supervisors felt that depth of information was more important than length and were satisfied that data saturation was reached in each interview.

The other secondary data collection tool was a reflective journal detailing the circumstances of each interview, and the impressions formed by the researcher during the process. This contributed to the overall interpretation of the data as it allowed the responses to be contextualised.

3.6.3: Data collection method

The participants were asked to sign the written informed consent for participation in the semi-structured, qualitative interview (Appendix E) and return it electronically prior to the commencement of each interview, but were given the option to discuss any questions or issues related to the study at the beginning of the interview and sign the consent form once satisfied. The aims of the study were explained to participants and any questions the participants had were answered before commencing the interview questions.

3.6.3.1: Pilot interview

One of the participants, meeting the inclusion criteria, was randomly selected for a pilot interview, where the extent and suitability of the semi-structured interview questions and the effectiveness of the interview technique were assessed by performing the entire interview. The interview was conducted electronically via Zoom video conferencing platform (Zoom Video Communications, San Jose, California) as the participant was unwell and needed to isolate as per covid-19 regulations.

The participant's feedback on the experience of the interview and the ease of understanding the questions was that there were no issues to be addressed. The interviewer kept a reflective

journal and found regarding ease of conducting the interview and time taken in the interview that no challenges arose, and additionally that the electronic format was effective. The audio recording and transcript were checked by the research supervisors to ensure accuracy. Due to the interviewer, the supervisors and the participant being satisfied with the conditions of the interview, a second pilot interview was not deemed necessary and the information from the pilot interview was included in the data set for further analysis.

Two additional questions were however added to the semi-structured interview question guide: "Why do you think there are so few PRPs currently in existence?" to allow the participants to expand their answers by approaching the idea from a different perspective, based on their experience, and "Do you know of any other physio's we could talk to about this?" to aid in the snowball sampling that had begun at that point.

3.6.3.2: Interviews

The interviews were conducted between June and August 2021 at a time deemed to be convenient for the interviewer and the participant. They lasted from 16-45 minutes and, with the permission of the participants were audio-recorded on both Zoom and a recording device. Five of the six participants also agreed to the interview being video recorded on Zoom. Initially the interviews had been planned as face to face, with Zoom only as back-up, but a heightening in lockdown restrictions, after the pilot interview and prior to the other interviews, often prohibited face to face meetings of this nature. This led to all the interviews being conducted electronically. Additionally, the electronic interviews allowed for easier scheduling by both the interviewer and the participants.

A reflective journal was employed by the researcher, who made notes on non-verbal cues and other observations relating to the interview. The researcher also reflected on the practical

aspects of the research process and her thoughts relating to the participants' responses in the journal.

The interview data was transcribed verbatim by the researcher and summaries reflecting the researcher's understanding and interpretation of the content of each interview were sent to the participants via email, to check if the information captured was accurate and representative of the views of each of the participants. Four participants responded that the summaries were accurate, and they had nothing to add, one participant replied via email with some points of clarification, and another indicated that she had additional information to add, leading to a follow up interview being conducted via Zoom in November 2021. The additional clarifications and information were then considered in the overall analysis.

3.6.4: Data analysis

The inductive approach of theoretical thematic analysis was used to analyse the data sets according to the following method, described by Braun and Clark (Braun & Clarke, 2006):

Transcription of the interviews was done by the researcher as a part of data familiarisation and immersion, with the aims and objectives of the study always kept in mind. This was supported by repeated re-listening to the audio and re-reading of the transcripts, whilst avoiding pre-conceived ideas of what codes, categories and themes might be identified, but noting preliminary ideas of meanings and patterns as they arose. During this time, initial codes were generated from the data which were discussed and clarified with the supervisors as part of supervisor review and debriefing. In this manner codes were workshopped, refined and sorted into categories. These categories were then sorted into potential themes, and emerging relationships between themes were noted, in constant discussion with the supervisors. These code lists, categories and early themes can be found in the codebook (Appendix G)

These themes were then re-examined, and the coded data and categories reviewed within the themes to ensure the best fit of the information. The ongoing process of understanding how the themes related to each other and the data set as a whole led to further changes, until the themes were clear enough to be named, defined and analysed. These were presented along with direct quotes from participants, edited for ease of reading by removing filler and repeated words, where these did not affect the participants meaning. Finally, a report of these findings, analysing the themes in relation to the research question was produced, and discussed, with recommendations for further practice being made.

3.6.5: Trustworthiness of the data

Lincoln and Guba (Lincoln, 1985) outline four criteria that guide the researcher to ensure the trustworthiness of a qualitative research study: credibility, transferability, dependability and confirmability. In this study, these criteria were upheld using the following strategies:

To ensure credibility, the researcher strove to actively engage with the participants throughout the interviews and observe their non-verbal cues, tones and actions. Member checking was conducted by returning the analysis of the interview data via email to the participants, giving them opportunity to comment, clarify and confirm the researcher's interpretation of the information they shared. Peer debriefing of the data and its analysis was done by discussion with supervisors, acting in their capacity as qualified peer researchers.

Transferability was addressed by providing a rich description of the participants' backgrounds (provided in the screening questionnaire) and asking them to describe their work settings during the interviews. Additionally, the researcher sought to get to know each participant through chatting informally about shared experiences and mutual acquaintances prior to the formal interview, to encourage open responses during the interview. These actions allowed the

researcher to generate a thick description of the specific context of each participant, guiding the application of the study findings to other contexts.

Dependability and confirmability were ensured by maintaining a meticulous audit trail, accessible for review on a secure platform, by the research project supervisors. Furthermore, the researcher disclosed to the supervisors that one participant was known to her in a professional capacity, whilst another was known in a private capacity. A deep, discussion ensued during which the researcher and supervisors outlined how this may impact on data collection. This process of bracketing led to assurance that the researcher could focus objectively on the goals of the study. The interviews with these participants thus continued. Confirmability was further ensured by continuing the processes of bracketing. This was done by frequent supervisor debriefing, a reflective piece written prior to the commencement of the proposal, and a reflective journal which was maintained throughout the research process, to make explicit how the researcher's values, beliefs and experiences could have impacted the research, and encourage measures to be taken to address this.

3.6.6: Data management

Participants were each allocated a study number to protect confidentiality and ensure their anonymity, and all data was stored accordingly. Recordings were password protected and stored on the researcher's password protected personal computer. Backup copies were uploaded to Google's secure drive, to which only the researcher and supervisors had access. Hard copies of interview notes were stored in a lockable cupboard in the researcher's locked office space.

All data will be destroyed five years after the completion of the study, in line with UCT's data management policy (available here).

3.7: Ethical Considerations

This research protocol adhered to the World Medical Association Declaration of Helsinki- Ethical principles for medical research involving human subjects (World Medical, 2013) and was approved by the University of Cape Town's Human Research and Ethics committee (Appendix F). The Helsinki principles were addressed as follows:

3.7.1: Autonomy

Participation in this study was voluntary and participants did not receive incentives for participation. Participants were advised that they could withdraw from the study at any stage without any negative consequences.

3.7.2: Informed consent

An informed consent information sheet was included with the initial invitation to participate, that was sent to all possible participants. Respondents confirmed their consent in the questionnaire. At the time of the interview, informed consent was again reiterated. The researcher ensured that participants were aware of all aspects of the study and that they had the opportunity to ask questions for further information or clarification. Copies of written informed consent were obtained from each participant and kept by the researcher.

3.7.3: Beneficence

At the conclusion of the study, the participants will be invited to a private presentation of the findings, with opportunity for discussion and networking. They will have access to the researcher, to allow for questions and exchange of ideas around pulmonary rehabilitation in the

future. The researcher's dedicated research email address will remain available for this purpose.

Indirect benefits include an increase in the knowledge base of pulmonary rehabilitation, including in our local context. This will act as a foundation for improving the availability of pulmonary rehabilitation programmes in the future, thereby also benefiting patients that are eligible for such programmes.

3.7.4: Non-Maleficence

Due to covid-19 lock-down levels at the time, face to face interviews were deemed a risk for covid-19 spread, and not allowed, therefore interviews were conducted online to negate this risk. Employers did not, and will not, have direct access to the information given by their employees during the interview process, as fear of retribution may have prevented participants from sharing honestly. No other risk to the participants was identified. A non-judgemental atmosphere of sharing was encouraged, with open, frank discussion emphasising the avoidance of social desirability bias, and notes made in the reflective journal where this may have occurred.

3.7.5: Justice

The participants were not rewarded or penalised according to their answers. Participants will have access to the information generated, to be used at their discretion to inform their practice. The scheduling of interviews was negotiated to minimize impact on workload and productivity, which was assisted by the convenience of electronic meetings.

3.7.6: Confidentiality

Names of participants and details of their workplaces have not been used in the reporting and writing up of the study findings, nor will they be used in its presentation or publication.

Participants will rather be identified by their allocated pseudonym. All electronic information is stored on a laptop that is password protected and not in shared use, whilst paper records are being kept in a locked drawer, to which no-one other than the researcher has access.

3.8: Conflicts of interest

No conflicts of interest were identified.

Chapter 4: Findings

In this chapter, the researcher presents the findings of the data collected from the individual interviews and the follow-up interactions. The researcher has drawn on the results of the screening questionnaire to present the process and outcomes of recruitment, and to present an introduction to each participant who was enrolled into the study.

4.1: Screening questionnaire results

Following both recruitment strategies, eleven physiotherapists (less than 1% of those invited to participate) filled out the online screening questionnaire, with one of these not consenting to any participation. Of the remaining ten participants, nine reported that they were in private practice, and one reported that they were a public service employee in what they termed a "Specialist Hospital". Of the nine private practice physiotherapists, six of the therapists (66%) described themselves as being in a position of authority, such as practice owner, manager or director, and three (33%) described themselves as physiotherapists or independent practitioners, while the therapist in the public service described themselves as a chief physiotherapist. Of these ten participants, two did not consent to be interviewed, and another two did not meet the inclusion and exclusion criteria, leaving six to be interviewed, as summarised in Figure 1, below.

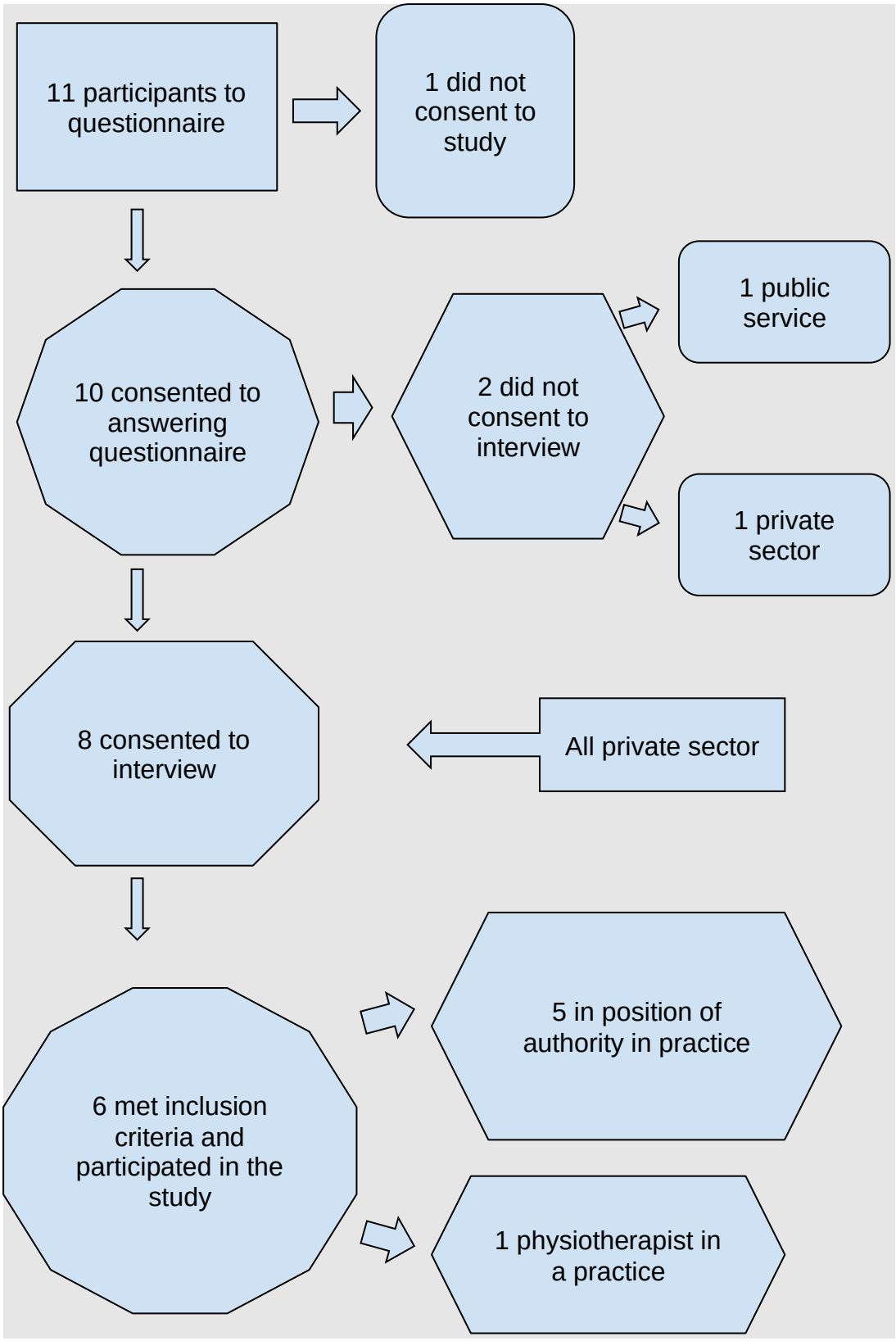

Figure 1: Results of the screening questionnaire

4.2: Description of the participants

In Table 2, the researcher introduces each participant, with some background contextual information, the extent to which they provided PRP in their settings and their self-descriptors from the screening questionnaire and follow up email.

In addition, the researcher noted her impressions of each participant as they shared information throughout the interview process, and her interpretation of the differences in their outlooks.

These names are pseudonyms to protect the confidentiality of the participants.

Table 2: Participants self-descriptions and the researcher's impressions

Participant	Years of practice	Additional Qualification	Program length	Drainage area	Funding	Self-description	Researcher's Impression	Descriptor
Mandy (Female) 28	6	None	January 2019-current	Southern suburbs and City	Mostly medical aid, and sporadic private	PR and ICU physiotherapist in private practice, offering a PRP that "focused on education, breathing, strengthening and endurance training".	Different approach and manner to other participants- not confining herself to the norms but acting freely as she felt appropriate.	Individualised
Kim (Female) 33	10	M.Sc Physio (not related to cardio-pulmonary)	May 2020-current	Claremont and surrounds,	Medical aid and private	Owner of a private practice with a special interest in PR. Offering a PRP, but referrals and uptake	Trying for a second time, fixing previous mistakes and overcoming	Optimistic

				Southern suburbs		had not been good. Had made an unsuccessful attempt to provide a PRP previously.	barriers as she goes.	
Sarah (Female) 32	10	M.Sc Physio (related to cardio-pulmonary)	August 2015-current	Northern and Southern suburbs, occasional Gauteng, KZN and Westcoast	Mostly medical aid and private, sporadic state and pro-bono	A director of a private practice, head of their cardiopulmonary rehabilitation department and a physiotherapist. Running full-time outpatient PRP "incorporating evidence-based assessment and treatment, targeted to	Experienced and settled, coming from a place of a successful practice that is well known.	Competence

						the patient's unique presentation, assisting individuals diagnosed with any chronic respiratory conditions, unexplained breathlessness and undiagnosed breathing pattern disorders, as well as athletes looking to improve performance".		
Ben (Male) 33	11	CPT1 2016/7	2013-2021	Bellville and Paarl	Private	Owner of a private practice, providing cardio-pulmonary rehabilitation after cardiac events, cardiac	Innovative and forward thinking, almost to the point of discussing	Big picture

						surgery and pulmonary infection as well as in cases of ICU acquired weakness. He did not differentiate cardio-pulmonary rehabilitation from pulmonary rehabilitation.	around the question.	
Nina (Female) 37	15	M.Physio (related to cardio-pulmonary) 2015	Run during 2018	Goodwood and surrounds	Medical aid	Owner of a private practice. Her practice provided PRPs that incorporated “various types of exercises, while referring to other	Resigned. A bit of an “it is what it is” mind-set, pushing through without a fuss despite the challenges.	Stoic

						members of the MDT as needed".		
Cindy (Female) 45	21	None	Febuary to Nov 2019	Helderberg, Strand, Somerset West	Medical aid	The HOD of a private practice. Not currently offering outpatient cardiopulmonary services or a PRP but had unsuccessfully attempted to do so previously.	Passion for facilitating something that will bring lasting change, but she thinks she is not the person to run it.	Enthusiastic

4.3: Themes and categories

The semi-structured nature of the interviews led to participants sharing a diverse array of information, thoughts, and perceptions about their implementation of PR. The three themes that were identified in this study allowed for the objectives of the study to be met, but also produced further insights relating to future considerations for the provision of PRP in the South African context. These themes are presented with their categories in Table 3 and summarised visually in the thematic map below (Figure 2).

Table 3: Overview of themes and categories

Theme	Categories
One: One size does not fit all	Multi-faceted approach to the programme Varied structure of the programme and chosen interventions
Two: Sustained and driven by internal factors and external sources of support	Internal Factors External sources of support
Three: Common barriers with differing impacts	Financial Physical Human

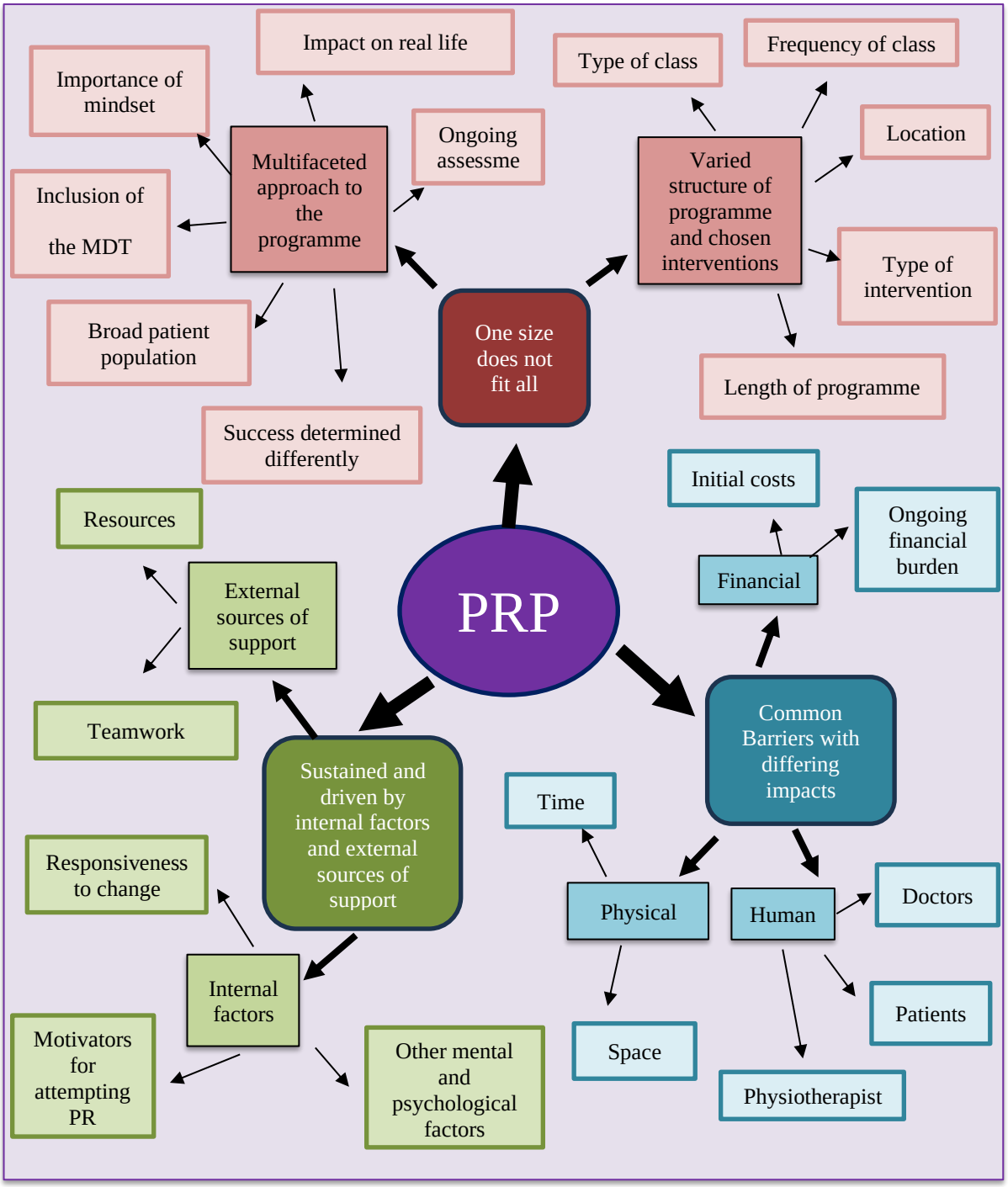

Figure 2: Thematic map of the themes, categories and sub-categories found in the data

4.3.1: Theme One: "One size does not fit all"

This theme related closely to study objective one, which aimed to describe the nature of the PRPs implemented by the participants. When describing their PRPs, participants described their varied approaches to providing the programme. Although the participants' programmes

varied, there were also overlaps in the approaches they used, with some aspects that were common among many of them.

4.3.1.1: Multifaceted approach to the programme

The approach to the programme that participants described was multifaceted as it focused not only on the patients' pulmonary condition but on how it could affect many different aspects of their lives.

4.3.1.1.1: Impact on real-life

The participants were very clear that their PRPs encompassed more than just physical exercise, with all of them speaking to the importance of addressing other aspects that were impacting the patients' lives:

> *"get these patients to better quality of life and being able to manage their lung diseases"* (Kim, individual interview)

> *"the physio side, and then we do a bit of looking at things like managing their anxiety, certain techniques, what to do when you're getting anxious, and then things which are specific to them. I guess looking at what they need to do on a daily basis and how to get there"* (Nina, individual interview)

They felt it was important to look at the patient's function in the context of their life, and consider what demands each individual was facing in their home, work and social environments:

> *"the rehabilitation is contextualised to the actual environment"* (Ben, individual interview)

"my one patient would come with like 'aahh I went to the shops, I didn't need a trolley like I had a basket and carried my groceries into the house and I unpacked them all by myself' and for them that was more of an achievement" (Mandy, individual interview)

"some people want to be able to walk five kilometres, or walk up the church steps" (Nina, individual interview)

"focused primarily around the activities of daily living and basic activities of independence that were required for them to be able to be discharged home; just be functional within the home space. Many people desire to obviously be functional beyond just the home space" (Ben, individual interview)

"I guess looking at what they need to do on a daily basis and how to get there" (Nina, individual interview)

4.3.1.1.2: Importance of mindset

The participants described that a key aspect of the intervention was addressing changes in the patient's mind-set, such as how they thought about their health, their condition and their breathing, as well as changes in their mind-set regarding exercise:

"addressing the physical side of things, but also the emotional side of things and then trying to facilitate a health behaviour change in these patients" (Sarah, individual interview)

"I guess the point is then independence and just giving them that confidence that they can do it" (Nina, individual interview)

"especially with the COPD it's been an issue for a long time and now someone is asking you to do something different, and I think some of them have just accepted that 'I cannot do this and people will do things for me'" (Nina, individual interview)

"realising that they can, that they are capable of so much more, it's just very interesting that breathlessness can make people so scared" (Cindy, individual interview)

"even though I was looking at specific impairments, I really was looking at how they thought about exercise and changed that aspect" (Mandy, individual interview)

Participants emphasised the importance of securing a commitment from the patients to "buy-in" to the intervention. To promote this buy-in, they clearly explained their expectations to the patients, they shared that they were invested in helping the patients, and they provided tools to help them follow through the intervention expectations:

"you're gonna say 'for eight weeks I'm gonna commit this time to my health and to my improvement of my condition', and then generally patients will enrol… by starting off that way by saying 'you gonna commit for eight weeks' was for me a lot more effective than saying 'ok you're gonna start coming for physio and we'll see where it goes'" (Mandy, individual interview)

"they're not buying in because they often don't have the money, so it's just like this viscous cycle of one thing leading to another… but I do feel like that vicious cycle can be turned around with the right kind of momentum, like Sarah has shown: if you have the momentum and that passion and people can get excited about something- and really show someone how much it can help them, I think you can turn that vicious cycle around" (Cindy, individual interview)

"in the first week I would give them a little diary which was their diary to keep them accountable" (Mandy, individual interview)

4.3.1.1.3: Ongoing assessment

Individualised assessments were described across the interviews as being foundational for setting up a programme specific to the patient's needs, with the progression of the rehabilitation also needing to be tailored to the individual:

> *"we will do a full subjective assessment with these patients and then an objective assessment as well… we'll typically do sort of questionnaires that are applicable to the population that we're assessing, so whether it's breathlessness or pulmonary disease or post covid, and then we'll do peripheral dynamometry testing, diaphragm strength testing, endurance testing, peak flows, 6-minute walk tests, whatever's suitable to that patient that presents on that day"* (Sarah, individual interview)

> *"depending on the patient, my programme was very much individualised to each patient so depending on the their assessment, what were their major limiting factors, so their quality of life would always be assessed you know. Is it endurance, is it strength, is it inspiratory muscle weakness? So based on the assessment that would generally be how I designed a programme for that specific individual patient"* (Mandy, individual interview)

> *"we re-assess after 12 weeks and then at 12 weeks we will see where we've made relevant progress. If we are happy that the patient's made their age predicted norms and those age predicted norms have transpired into them actually improving in the activities of daily living and improved health related quality of life, we'll discuss a maintenance programme with them, and that's either in the form of them attending group classes on a every week, every second week, once a month, or we check in with them online telephonically. If we feel at 3 months that we're not really where we wanna be with them, we haven't made the age predicted norms and they're not really feeling*

that their they've sort of regained that function that they were looking to gain in the first place when we did goal setting, then we will encourage them to enrol for a further 3 months and then we'll reassess again" (Sarah, individual interview)

4.3.1.1.4: Inclusion of the MDT

The multifaceted approach was also supported by the inclusion of physiotherapists in other areas of interest, as well as other health-care professionals, when indicated for that specific patient:

"we… share a space with occupational therapists and then a physiotherapy group, our sister practice who specialises in chronic pain and women's health so there is sorta inter-disciplinary referrals" (Sarah, individual interview)

"we looked at nutrition, so I was working closely with our dietician, we looked at psychological factors so sometimes my patients were referred to the psychologist or the psychiatrist on board" (Mandy, individual interview)

4.3.1.1.5: Broad patient population

As PR is aimed at patients with chronic respiratory conditions, most participants were offering it to patients with these chronic conditions, namely COPD, bronchiectasis, cystic fibrosis, asthma, fibrosis, recurrent bronchitis and to those awaiting lung transplant:

"someone with a chronic pulmonary disorder or disease or someone struggling with their lungs, coming in to get rehabilitation of their condition" (Kim, individual interview)

"mainly been working with patients umm with respiratory failure, so I had quite a broad spectrum. So I had patients that were at end stage respiratory failure which were

awaiting for lung transplant and maybe had patients that just had generalised you know COPD, CF" (Mandy, individual interview)

Interestingly, more than half of the participants were also offering PR to those with conditions that could be classed as acute or chronic, such as respiratory failure, breathing pattern disorders and post covid-19 or with long-covid.

"I think there's going to be lots of people who are left with problems following covid and breathlessness and fatigue and all of that, and the principles that you use for pulmonary rehab would fit in really nicely with that" (Cindy, individual interview)

"we've moved through to sort of the post covid population and then patients with breathing pattern disorders" (Sarah, individual interview)

However, one participant in the study was also offering what they labelled as "cardio-pulmonary rehabilitation" speaking of it inter-changeably with the term "pulmonary rehabilitation" to patients with acute respiratory issues (such as pneumonia) and following pulmonary procedures, as well as those with non-respiratory conditions, for example following cardiac- and other non-pulmonary surgeries and to patients with immune-suppression. These conditions would however usually fall outside of the remit of PR, and more under the banner of acute care:

"it was primarily post cardiac surgery cases patients who had undergone cardiac events as well as patients who had undergone various pulmonary or respiratory procedures, these included vats these included drainage that was inserted ah for patients as well for people who had you know complications as a result of AIDS as well, so immune-suppressant conditions as well. So that was, those were primarily the

conditions that I was exposed to and haemo-pneumo thoraxes and the like, very few trauma cases" (Ben, individual interview)

4.3.1.1.6: Success determined differently

How the success of the programme was defined varied between the participants. According to one participant her programme could be identified as successful because it was full, and patients were completing their individual programmes, and being discharged having completed the programme:

Researcher: *"and what do you mean by success? How would you clarify that?"*

Participant: *"It's so we are fully booked, so for the first time this year we actually have a waiting list of patients that are interested in coming, we have turnover of patients which means patients aren't getting stuck in the programme they actually entering, doing the programme and leaving"* (Sarah, individual interview)

Most participants, however, identified a successful programme on the individual patient level, with varied methods of implementation naturally leading to varied measures of success. These measures fell into the following groupings:

Improved quality of life:

"so I would basically measure my success, well of the programme itself, would be on the quality of life of the patients that how their quality of life improved, and their verbal, subjective response to after the 8 weeks" (Mandy, individual interview)

"Actually living a life that has more quality to it than when they started" (Sarah, individual interview)

Improvements in objective test results:

> *"the success of the actual intervention I would measure in terms of my objective assessments that were done in the first week, compared to the eighth week"* (Mandy, individual interview)

> *"so we would utilise a step test or a six minute walk test, as one objective measure, another one we would utilise is we would actually have a look at their functional participation so we would use a functional score-card"* (Ben, individual interview)

Decrease in hospital admissions:

> *"the patients that are in programme aren't frequently admitted at all, so their, they're not really struggling with acute exacerbations like they used to in the past"* (Sarah, individual interview)

Return to activities:

> *"I've had a few, quite a few clients that have come and gone through a 4-to-6-week programme and have really, really done well, and taken the breathing retraining and the and the diaphragm work onwards and upwards you know- back on their bikes doing marathons and all that sort of thing"* (Kim, individual interview)

> *"you just want to get them into a space where they can function with their day to day activities, just maybe get dressed in the morning- you know be able to participate in some social activity like getting into their wheelchair so they can go to church, or get them to be able to go to the toilet"* (Ben, individual interview)

"they're doing everything that's required of them then ja I would say then they are successful, you know, they get to do the things that they wanted to do on their own" (Nina, individual interview)

Reaching the individualised goals that had been set:

"success is depending on whatever the patient said their goal was" (Nina, individual interview)

The patient's subjective thoughts and feelings:

"I think the success of the programme was purely based on how the patients responded to how they felt" (Mandy, individual interview)

4.3.1.2: Varied structure of the programme and chosen interventions

In addition to being multi-faceted, the specific interventions that the participants used, and how they chose to structure them also varied widely due to their commitment to tailoring the programme to meet the individual needs of each patient. Consequently, no two programmes were alike, with much variation between the different therapists, and even by the same therapist treating different patients.

Programmes ranged from two weeks in length for in-patients up to four to twelve weeks for out-patients:

"the inpatients were more like CF patients that would stay for 2 weeks" (Mandy, individual interview)

"know I've had a few, quite a few clients that have come and gone through a 4 to 6 week programme" (Kim, individual interview)

"so shortest is probably about 12 weeks" (Sarah, individual interview)

Sessions could be attended twice weekly, weekly or every second week:

> *"initially some of them attended twice per week, but as our clinic has filled up we can unfortunately only accommodate them once a week, and our breathing pattern disorder patients we'll typically see every two weeks"* (Sarah, individual interview)

> *"an average of about 2 sessions over a period of 6 weeks so that's a total of 12 sessions, all in all"* (Ben, individual interview)

The programme could be done as individual sessions or group classes and could also include a maintenance programme:

> *"we only do one on one"* (Nina, individual interview)

> *"either a small group or one on one and then progressing to a bigger group once they were through that 6 weeks period"* (Cindy, individual interview)

> *"we'll discuss a maintenance programme with them, and that's either in the form of them attending group classes on a every week, every second week, once a month, or we check in with them online telephonically"* (Sarah, individual interview)

These sessions were delivered at the physiotherapy practice, at the patient's home or via the internet:

> *"I'm in outpatients only and you know I started it with, the goal was, you know I want to, one of the bigger things that I do is pulmonary rehab"* (Kim, individual interview)

> *"that's why the home rehabilitation option offering is so appealing because now you take away all of that additional work that is needed, the physio can come to the home"* (Ben, individual interview)

> *"even now I'm doing a lot of remote pulmonary rehab"* (Mandy, individual interview)

"we've also opened up an online side of things as well that we can help patients that are international, or patients that are not able to come into our clinics" (Sarah, individual interview)

Participants identified three types of physiotherapy interventions in PR, which they were using.

Firstly, interventions focussing on correcting respiratory impairment (such as airway clearance, general mobility, breathing and recovery techniques, thoracic mobility, chest expansion and posture correction):

"mucus clearing techniques for patients who would require it... improve air entry, chest expansion and then mobilisation" (Ben, individual interview)

"patients like the CF patients that would do the 2 week IV… they would do like airway clearance and do a lot of education and they'll do very basic mobility around the ward- basic exercises" (Mandy, individual interview)

"we focused primarily on cardiac endurance, pulmonary or breathing techniques rather and stress relief techniques that people were short of breath or if they were anxious they would be able to manage and cope with it. Followed then by upper limb and diaphragmatic or rather upper limb and shoulder girdle strengthening as well as posture correction and ja like I mentioned before, breathing techniques" (Ben, individual interview)

Secondly, interventions addressing non-physical components of the patient's condition (such as education and advice, goal setting and dealing with anxiety):

"the marked improvement in quality of life is quite huge, just because you sat and you listened to that person and you understood- you gave them that time to talk, and then

educating them about their anxieties around doing activities already improves their health quite a lot." (Mandy, individual interview)

"including exercise, breathing re-training, patient education" (Kim, individual interview)

"regained that function that they were looking to gain in the first place when we did goal setting" (Sarah, individual interview)

Thirdly, interventions focussed on addressing the physical exercise components (Cardiovascular, strengthening and activity prescription):

"So, the exercise programme is aimed at strengthening the arms and the legs and the musculo-skeletal system to then reduce the pressure on the on the lungs and thereby- and also just allowing them to realise that the breathlessness- kinda decreasing their sensitivity to breathlessness to stop them from doing their activities of daily living, so also and also educating them on their condition and how they can get stronger and fitter" (Cindy, individual interview)

"you can also do inspiratory muscle strengthening" (Nina, individual interview)

"so, I rather gave them activities- like we would identify activities that they enjoyed doing and used that as an exercise therapy rather than prescribed exercises" (Mandy, individual interview)

These interventions were used as applicable to each patient, based on their individual needs and progression, again highlighting the unique format of the programme for each patient:

"So, depending on the patient, my programme was very much individualised to each patient so depending on the their assessment, what were their major limiting factors" (Mandy, individual interview)

4.3.1.3: Conclusion to Theme One

Throughout the description of the participants' programmes the importance of valuing the patient as a unique individual presenting with diverse needs, was emphasised. Participants did not feel that a "one size fits all" approach was appropriate and endeavoured to address the concerns of each individual patient holistically, adapting the PRP as the patient's needs changed, and including other health care professionals where appropriate. Their programmes also varied according to their own knowledge, experience, preferences and outlook.

4.3.2: Theme Two: "Sustained and driven by internal factors and external sources of support"

The second theme related to objective two, which explored participant's perspectives of factors that facilitated the setting up and provision of their PRPs. These facilitators could be divided into two categories: "Internal factors" and "External sources of support".

4.3.2.1: Internal factors

The internal factors facilitating the provision of the PRP were located in the internal characteristics of the participants, and could be described as: "Motivators for attempting PR", "Responsiveness to change" and "Other mental and psychological facilitators".

4.3.2.1.1: Motivators for attempting PR

Almost all therapists interviewed identified that the reason they became interested in PR was a realisation that the overall management received by their chronic respiratory patients in hospital was not enough, and that the patients did not improve over the course of multiple admissions. They felt that although PR services were available internationally, South Africa lacked adequate services and needed to align better with the international standards, with physiotherapists being the appropriate medical professionals to deliver PR in the South African context:

> *"the reason for the implementation of this programme is we kept seeing our patients returning to the hospital sort of looking worse every single time, and you know, kinda thought there must be more we can do for these guys, so I had a look internationally, saw pulmonary rehabilitation, had a look in South Africa, saw that there was nothing, thought it was terrible, so I thought well we've gotta do something"* (Sarah, individual interview)

"and you know just I think my feelings of helplessness when it comes to COPD in the acute setting, I can help them to a point, to get home, but I know that that's not enough, so it was to try and continue that care" (Cindy, individual interview)

"the thing is the patients keep coming back with the same issue, and when I read about pulmonary rehab they're saying there's no reason to do any more research, we know that it works" (Nina, individual interview)

For one participant the addition of a lung transplant programme at her hospital motivated the PRP, and another felt that although she had identified that the service was needed, she was not the correct person to run it and so sought to motivate, facilitate and support other practitioners in the provision of PRP:

"then we started talking about lung transplants and then obviously I was like 'ok we need to… now it's not just chest physio, now there's actually hope!' And that's when I started researching what we can do to optimise him for transplant, and pretty much used him as a bit of a guinea pig" (Mandy, individual interview)

"I don't want to run the programme, I want to empower some-one else to do it" (Cindy, individual interview)

4.3.2.1.2: Responsiveness to change

Responsiveness to change by the clinician providing PR emerged as an important facilitator, as those striving to provide PR services had to adapt in response to challenges. Those who were able to display increased flexibility eventually showed greater success in their implementation of the PRP:

"These were indeed initial barriers, but can comfortably say that with hard work, none of them are barriers anymore. Patients are willing to self-fund as they see the value,

referrals are constant due to constant awareness and communication with pulmonologists regarding patient progress and equipment is really a once off initial cost" (Sarah, clarification email)

"thinking about the way that I tried to do it in the previous practice and then moving forward to then opening my own practice" (Kim, individual interview)

Programmes evolved as they gained more knowledge and experience in the discipline, but only one participant volunteered that their programme was based on evidence-based guidelines:

"We base our programme on the evidence-based guidelines from Leuven University and we go according to their structure, and then we've added on quite a bit as we've moved through to sort of the post covid population" (Sarah, individual interview)

Responsiveness to change further facilitated the participants' programmes as they found ways to use technology to their advantage and explored other ways of providing PR, for example at step down facilities where there were more resources, or at home rehabilitation programmes to combat poor attendance:

"...and even now I'm doing a lot of remote pulmonary rehab, and so I'll do like three or four sessions on zoom and just from that, without even having to touch the patient, without even prescribing exercise the marked improvement in quality of life is quite huge" (Mandy, individual interview)

"he can do it in the home space, so the rehabilitation is contextualised to the actual environment, and the patient has no excuse not to attend the session, cos they're at home, in their pj's, so it works!" (Ben, individual interview)

"we looked everywhere for the right place to do it and we eventually found, there's a rehab centre in the strand called Spescare, where a lot of the neuro patients, or the

orthopaedic patients actually, go as step down. So the benefit to that facility is just that they have all the equipment for resuscitation, they have oxygen, they have doctors available and the gym space and the equipment" (Cindy, individual interview)

One employed flexible payment strategies and charitable programmes that allowed for more patients to be able to afford the service:

"if the patient is really, really sick and… like a lot of people are unemployed now, I encourage them to come regardless, and I don't charge some of them to be 100% honest- and it's not, it's not a lot of them. We have had some funding programmes as well where patients that have been with us, when they've passed away, their loved ones have wanted to support some patients through as well, so sometimes, they will… ja we've got a pay it forward programme where they donate used concentrators, portable oxygen machines, humidifiers, and we'll kind of loan those to patients to use for those guys that they can't afford things. So a lot of people out there are willing to help but, we do quite a bit of charitable work as well" (Sarah, individual interview)

"otherwise we customise it to suit what they can afford because one rehab session once a month or once every two months- you know just that input is better than nothing at all" (Sarah, individual interview)

The ability to adapt to contextual changes, allowed physiotherapy practices, and by extension their PRPs, to survive, for example, one participant noted that the change from hospital-based work to home rehabilitation was necessitated by changes in the available referring practitioners:

"the two physicians I worked with left the hospital and as a result that also took away a lot of our pulmonary care work as well, so unfortunately I was not able to ah secure

the referral of the other physicians over there, as they were already utilising other physiotherapy teams, and so our practice had to take a different direction… to pivot into the home rehabilitation space" (Ben, individual interview)

They also had to adapt to changes that occurred over time, as the programme itself grew and covid-19 changed both the health-care landscape and the presentation of CRD with the appearance of long-covid:

"And obviously it's been a weird year because of covid, and so like I said it's kind of a different population group coming through now but you know I've had a few, quite a few clients that have come and gone through a 4 to 6 week programme and have really, really done well and kind of taken the breathing retraining and the diaphragm work onwards and upwards you know- back on their bikes doing marathons and all that sort of thing. Ja but like I say, it's a different cohort, it's not like your classic pulmonary rehab type of population I think, whereas classically you see it in the elderly more chronic conditions whereas I'm sort of seeing this different kind of patient group" (Kim, individual interview)

"We're very fortunate to be able to now utilise our cardiopulmonary rehabilitation experience in the fight against covid 19 across the country" (Ben, individual interview)

"I think now with covid, I actually think long term it's going to be even more necessary" (Cindy, individual interview)

Individual programmes required adaptation as the patients improved in both the physical and non-physical components of their presentation:

"then eventually that activity would become an independent activity" (Mandy, individual interview)

"but just watching them, how far they could walk into the class, and how much they could do six weeks later- so the one woman in the class said like you know she could do I think 3 sit to stands when she first started the class, and [now] she was cycling for 15 minutes, and she could do all the exercises and you know chatted throughout the class" (Cindy, individual interview)

Participants identified that their practices and programmes had to adapt according to location, as costs and mind-sets tend to differ according to area:

"Big difference between northern and southern suburbs is southern suburbs guys don't really even ask about medical aids but in the northern suburbs due to socio-demographic… ja just the demographics they do ask a little bit more" (Sarah, individual interview)

4.3.2.1.3: Other mental and psychological factors

Other mental and psychological factors that facilitated PR included motivation, the existing knowledge base around PR and the nature of the physiotherapist providing the PRP.

Motivation was regarded as a key facilitator, both for patients to complete the programme, and for participants to provide the programme.

Participants felt that the support network provided by participating in the programme as well as the idea of "being part of something" were motivations for patients to complete the programme:

"I know that group setting is ideal for people you know to just see what someone else is going through and to encourage that person" (Cindy, individual interview)

"encouraging each other and spurring them on, I think it does make a difference" (Nina, individual interview)

"patients feel like this is actually a programme, you know this is something you can be part of" (Cindy, individual interview)

Patients were observed to be spurred on by improvements that they gained, and some voiced a fear of regressing if they did not finish their programme:

"reflecting back to that was always a good reward for the patient, where they're like 'oh my gosh this is where I was and look where I am now'" (Mandy, individual interview)

"and they're like 'but we still want to keep coming' because they're so scared of falling out of the habit they've created" (Mandy, individual interview)

Participants expressed that a sense of hope that they could provide better care to their patients was a facilitator for them:

"now it's not just chest physio, now there's actually hope" (Mandy, individual interview)

"she said to me 'you know if there's one thing that can help your patients, this programme is amazing'" (Cindy, individual interview)

Additionally, participants found that when they experienced some success it was rewarding and motivated them further, as did working with patients who themselves were motivated to participate:

"it takes a long time but it is very much worth that time every little bit of it" (Sarah, individual interview)

"I have seen um the programmes that are run overseas and just seen how… like breaking through that barrier of the breathlessness and how rewarding it is for patients and how excited they are" (Cindy, individual interview)

"if I knew then how great it would be or how many people we would be helping at this point it would have been nice to know then, because there were times where it was very, very quiet, but I can't really, ja, just that it would become everything that I dreamed that it would" (Sarah, individual interview)

[After explaining how patient demotivation led to programme failure] *"but they're not all like that, there are obviously some that are very motivated who clung to every word that I had to say"* (Cindy, individual interview)

There is a large research base advocating for the effectiveness of PR, in managing some conditions (especially COPD), even in comparison to medication. Participants felt that this knowledge acted as a facilitator for their PRPs:

"patients keep coming back sort of with the same issue and when I read about pulmonary rehab so, I mean I read this, they're saying like you know there's no reason to do any more research, we know that it works so then it doesn't make sense, and even something like is more effective than triple therapy so it's more effective than the medication, why aren't we doing it? It's actually going to cost less" (Nina, individual interview)

"that's when I started researching like what we can do to optimise him for transplant" (Mandy, individual interview)

"if you look at all the UK based research and the Australian based research like there's so much buy-in and someone walks into a GP's office with a breathing problem the first people they go to is the physio" (Kim, individual interview)

"is also just the research obviously showing, you know that it's actually even better than medication and all of that" (Cindy, individual interview)

PRPs were further facilitated by knowledge and resources being easily accessible and the fact that the subject of PR itself is seen as interesting:

"the Australian site has a really nice, I think it's called 'Australia pulmonary rehab' or something, and they have like a step by step how to set up a pulmonary rehab programme so I got a lot of it from there" (Kim, individual interview)

"I know there are lots of resources on the internet, which do help, and I've looked at there's an Australian website that's got an amazing package" (Cindy, follow up interview)

Participants felt that the nature of the physiotherapist providing the PR was important. A therapist with a passion for respiratory physio and confidence in their self was better able to facilitate a PRP.

"just a little bit more passion, like I think you need someone to be so confident that it's going to be ok, you know that even though you're breathless you're going to exercise, you're gonna be fine. You just need that kind of energy and that that kind of person who's going to put it out there" (Cindy, individual interview)

"I think because the lungs have always been a huge passion it wasn't a problem to keep pushing" (Sarah, individual interview)

"I think if you have a passion for this kind of thing, which I do… that is a big driver you know, that's something I would say you need" (Ben, individual interview)

Furthermore, they felt the physiotherapist should be able to take on the role of advocating for PR by educating around it, promoting, or championing it:

"just air our voices and what we're so capable of doing" (Sarah, individual interview)

"I think it just it will require consistent effort on our part, consistent advocating for the patients, identifying the patients- where are they, where would the referral base be and then trying to… I don't like to use the word 'educate' doctors, but to try and get them sort of understand the role that physiotherapy can play in these long-term patients" (Kim, individual interview)

Lastly, they felt that the physiotherapist should be able to effectively manage the patient's expectations of their programmes:

"really identifying if their expectations are even realistic, because if they don't have realistic expectations then the programme, it's not going be successful for that patient" (Mandy, individual interview)

"you're not going to get them climbing stairs you're not going to get them to run marathons you just want to get them into a space where they can function with their day-to-day activities" (Ben, individual interview)

4.3.2.2: <u>External sources of support</u>

The external sources of support referred to factors within the contexts of the participants, which facilitated the provision of PRPs. These could be described as falling into two groups, namely Resources and Teamwork.

4.3.2.2.1: Resources

Although financial considerations were overwhelmingly referred to as barriers to PRPs, and will be discussed extensively in theme three, there were some financial elements that participants felt could be facilitators in their specific contexts.

One participant noted that medical aids were likely to partially fund the patient's participation in the programme, which they felt encouraged patients to start the PRP. This led to the possibility of the patient then seeing the value of ongoing involvement:

> *"they (the medical aids) do only give about 10 sessions which I think was often the buy-in for patients to attend rehab, because for them they're like 'well I'm paying medical aid I might as well you know go'… then what generally happens is the patients by you know the 8th session… then they generally see their massive improvement in their quality of life from where they've come and then they don't mind paying"* (Mandy, individual interview)

They added that some patients were willing to self-fund, especially as PR is a relatively inexpensive intervention for the patien:.

> *"even with private paying patients I just I always charged medical aid rates it wasn't that expensive compared to, you know other healthcare professionals, generally not a problem"* (Mandy, individual interview)

> *"a lot of them are willing to pay"* (Sarah, individual interview)

Participants found that although their inpatient and outpatient programmes were separate, they could cover the expenses associated with providing PR from their in-patient hospital work. They could also look to group classes to improve the financial viability of running the programme. One participant noted that progressively more competitive equipment pricing is

decreasing the set-up cost. It was felt that a structured programme funding (such as a global fees package) would be a facilitator to address many of the financial barriers encountered:

> *"even though I was quiet, I could go back to the hospital as well, so I didn't depend on outpatients filling up that space"* (Sarah, individual interview)

> *"in a group setting it can be financially viable, but then you have to have enough people to buy in"* (Cindy, individual interview)

> *"as more competition comes into the into the equipment space and into the product space, products are becoming cheaper and we can now have access to more products as there's more competition. So we can actually outfit our gyms a bit cheaper"* (Ben, individual interview)

> *"there are many programmes medical aids have put forward, for multiple conditions- like some medical aids have back and neck care programmes, some medical aids have pregnancy programmes, they've now recently just launched a chronic pain programme, which is awesome, and we see medical aids going to a more global fees structure, which in some cases is good and in others is bad, but if we could have a cardiopulmonary programme or funding methodology for COPD patients or for cardiopulmonary rehabilitation in general that would be amazing* (Ben, individual interview)

> *"try and come up with almost like a package, where someone would know how much it's going to cost and be fully aware of that, or fully aware of how much they can claim back medical aid before they started the programme."* (Cindy, individual interview)

Other resources included the availability of an appropriate space (if available) and according to some participants, minimal physical resources are actually needed:

"we looked everywhere for the right place to do it and we eventually found, there's a rehab centre in the Strand called Spescare, where a lot of the neuro patients or the orthopaedic patients actually, go as step down. So the benefit to that facility is just that they have all the equipment for resuscitation, they have oxygen, they have doctors available and the gym space and the equipment" (Cindy, individual interview)

Attachment to a hospital with the appropriate inpatient setting was seen as a facilitator by most therapists, as it provided access to potential patients:

"hospital as a platform [Facilitated the programme] that this could be an extension of a hospital service- I didn't have to open up an outpatient pulmonary rehab programme all on its own, so due to our involvement with the hospital we had sort of, I call it a feeder, but from the pulmonologist he would feed directly into our clinic so because we were seeing his hospital patients we already had that referral basis which is really important" (Sarah, individual interview)

"it also made it easier being in a hospital setting because you get to see those patients during their hospital admission with an acute exacerbation, you'll be able to get quite a lot of information from that and then you'd say 'ok well in 2 or 3 weeks' time, once you're feeling better, let's enrol you into the programme' and then you kinda had that almost 2 weeks to get to know them, do your subjective get to know like what their needs are, and that really helped for enrolling into a programme" (Mandy, individual interview)

4.3.2.2.2: Teamwork

The support of their team, especially the more senior members, facilitated participants developing and providing their PRPs:

"I had the full support of the then directors, and being a director now I suppose it hasn't really changed anything, I mean the team has been incredibly supportive from the get go, but I can imagine if you are employed by someone who's not supportive of what you're doing, the implementation is going to be impossible" (Sarah, individual interview)

Participants also shared that often there had been another physiotherapist, more experienced in PR, that had acted as a mentor, guiding, assisting and encouraging them, which had been invaluable:

"she was just really good at like allowing us to go watch her programme and sending us information from Stellenbosch [University] and how they've run their programme, and she gave us lots of support with research articles and she sat with us to- she even came to see the venue to check that you know, she thought it was a viable option" (Cindy, individual interview)

"I got a lot of advice and direction of where to look for information from Sarah" (Kim, individual interview)

When professional relationships between physiotherapists and other healthcare practitioners were developed, and PR was seen as a valuable part of the wider management of a condition by these professionals and promoted by the MDT, it facilitated the provision of the programmes. Close physical proximity to the MDT was also seen as valuable, especially in the event of an emergency:

"if the referral came from a dietician, you know they would speak very highly of pulmonary rehab and say 'you know you must try this', or the pulmonologist that's referring like 'listen here I'm going to give you this, but this is not going to be, you

know, be the cure to everything and maybe pulmonary rehab would be a very good addition to everything'. So I think that made it easier because patients came all with people already promoting pulmonary rehab and it wasn't like you had to start from the start and then I guess it also made it easier" (Mandy, individual interview)

"other health other colleagues and stakeholders are beginning to see that physiotherapy has a vital role to play in the management of these patients and the prevention of their deterioration and, their improvement going forward, so that has definitely assisted" (Ben, individual interview)

"so we are lucky enough in our Kuilsriver branch to share a space with occupational therapists and then physiotherapy, a physiotherapy group, our sister practice who specialises in chronic pain and women's health so there is sorta inter-disciplinary referrals, mostly to the women's health side, and sometimes now with the post covid to the chronic pain side, which has been a really, really great network. Occupational therapists, unfortunately our group they sort of hands specialised and vocational rehabilitation, so if these patients do happen to need to re-integrate to work, mostly our post-covids, then we'll get the occupational therapists in to assist with that work set up. So ja, it's been great" (Sarah, individual interview)

Patients themselves advocating for PR facilitated PRPs and when families were involved and supportive, it facilitated the patient's involvement in the programme:

"and then she [The patient] said to me 'you know if there's one thing that can help your patients, this programme is amazing'" (Cindy, individual interview)

"if they are battling with adhering to the programme, then we just make sure that we sit down with the family as well, to discuss the impact of their behaviour to ensure that

they understand the value that there is in following the programme going forward" (Ben, individual interview)

"getting the patient's buy in, getting the family's buy in because it's often means that they have to bring them" (Nina, individual interview)

One participant noted that the potential of public/private collaboration is an opportunity to expand the reach of PR and that the lately improved perception of physiotherapy in respiratory care, possibly as a result of physiotherapy involvement in the pandemic, is already acting as a facilitator to PRPs:

"slowly but surely physiotherapists are being recognised as playing a vital role in cardiopulmonary health particularly, which has been brought on by the covid-19 pandemic that, you know other health colleagues and stakeholders are beginning to see that physiotherapy has a vital role to play in the management of these patients" (Ben, individual interview)

4.3.2.3: Conclusion to Theme Two

While both the nature and motivation of the individual therapist intending to provide these services plays an important role in the provision of PRPs, the ability to adapt and improve their PRPs to overcome potential barriers and provide the level of services that they view as acceptable, is vital. The other factors such as the identification and procurement of appropriate resources and an environment where effective teamwork occurs, were incorporated by those successfully providing these programmes.

4.3.3: Theme Three: "Common Barriers with Differing Impacts"

This theme relates to objective three- the barriers the participants encountered in the initiation and ongoing provision of PRPs. Although many participants tended to weight their perception

of the barriers toward the financial challenges, other barriers beyond financial were also described. Although the barriers themselves were often alike, their impact differed according to the participants, the situation and resources of the practice they worked in, their role in the practice and their outlook on how to overcome these barriers.

4.3.3.1: Financial

4.3.3.1.1: Initial costs

As discussed earlier, some participants described the need for minimal physical resources as a facilitator for setting up a PRP. However, most participants interviewed felt that the set-up costs were actually very high, requiring a great financial outlay (also described as investment) relating to equipment, space and the appropriate post-graduate courses:

> *"the barrier to entry is high in terms of financials"; "the potential for crippling financial loss is great and so it, it stops many people from actually investing too much into it"* (Ben, individual interview)

> *"the equipment that's needed is expensive, so that's another thing so, the oxygen concentrators the power breathes, all of those things that kind of enable the programme to really be accessible for the most amount of people"* (Kim, individual interview)

> *"renting out a space and then kitting out a space, keeping in mind that checklist that's really important if you are starting a pulmonary rehab programme, so you need to have a defibrillator there, you need to have oxygen, so if you're offering this service you need to be able to back that service and if you get a patient in who's dependant on oxygen you need to be able to support them and it's expensive, so just the renting of a space, kitting out of that space"* (Sarah, individual interview)

"there is the education that is required to be able to do this effectively, I would recommend an APPL level 2 diploma at the very least, for you to be able to understand cardiopulmonary rehabilitation which I think will probably set you back another R20 000" (Ben, individual interview)

4.3.3.1.2: Ongoing financial burden

They felt that financial risk remained an ongoing concern, especially as income was initially slow:

"that people put in a lot of effort into it and financially it's not viable- well it's not as rewar- it's not, I know it's terrible to say, but ja the amount of effort to the money that comes in" (Cindy, individual interview)

"it's quiet at the, at the start of a programme" (Sarah, individual interview)

"you would require high levels of referral for patients to move through your practice to be able to cover your costs, let alone to actually be able to pay yourself" (Ben, individual interview)

This was further compounded by the fact that medical aid authorisation is needed, and medical aids did not always fully cover the sessions, tending to be unpredictable in their level of cover. If medical aids did pay, they were likely to do this out of the patient's day-to-day benefits which were easily depleted due to the chronic nature of their illness:

"if I ever spoke to them about the rehab and the question of cost came in, they were all just at their limits, where all their savings had been used up, so they had no extra money to pay for it, so I'd say that was quite a major barrier for a lot of patients" (Cindy, individual interview)

"I think it's difficult for patients because medical aids don't pay for it so that you know trying to get patient buy-in that's quite difficult, depending on your population group as well, but to say you know let's do an 8-to-12-week programme where you come in maybe twice a week for the first 6 weeks or 4 weeks, that's quite a big expense" (Kim, individual interview)

"we apply for PMB for our patients, and we do explain to them you know sometimes the medical aids will pay, sometimes they don't" (Sarah, individual interview)

"it's not something that was very popular, and the big reason is that the medical aids don't pay. So ja, patients they would generally, they would go to sometimes, they would go for it to a step-down facility but they because then it will be paid for, whereas if they wanted to do pulmonary rehab then it comes from their savings" (Nina, individual interview)

4.3.3.2: <u>Physical</u>

Challenges around both space and time were found to act as barriers to the provision of PRPs.

4.3.3.2.1: Space

The space in which to deliver the PRPs was seen as a barrier for multiple reasons- including the cost of procuring an appropriate space and finding one of an appropriate size:

"as a practice owner I would have to invest into a space, where I could have an open area space, it can't be small, it can't be enclosed, it needs to be a large area that has windows, that can allow for free air to move freely in and out. So you're looking at least at a gym of about 50 square metres. In South Africa that's going to cost you, anywhere depending on the area that you're in, you know from R5000 on the lower end

in your townships, all the way up to you know R30000 in Camps Bay- so there alone is quite a bit of capital outlay" (Ben, individual interview)

Adequate storage as well as privacy and accessibility both to the venue (e.g., patients are often too dyspnoeic to climb stairs) and to the programme (e.g., acquiring appropriate transport) were also challenges that needed to be overcome. At times an adequate space was available, but not accessible to therapists outside of certain practices.

"to make it easier would be space that is, what's the word, accessible for everyone, so the space we were in had stairs, so it was very difficult, and it was a shared gym so that also I think makes it a little more difficult, there was no real space for us to store equipment like oxygen and oxygen concentrators without it being a risk because it was part of this other gym" (Kim, individual interview)

"most cases these patients require transportation" (Ben, individual interview)

"it often means that they have to bring them, so the transport is an issue" (Nina, individual interview)

"we were in the northern suburbs only- pulmonologists based in the southern suburbs were hesitant to refer their patients because of travel" (Sarah, individual interview)

"there was a physio specifically was very interested in doing that, the problem is she doesn't have access to this venue" (Cindy, individual interview)

4.3.3.2.2: Time

The time constraints involved in setting up a new service and then juggling the PRP with existing in-patient work acted as further barriers, as did not having direct access to emergency services (as one would in a hospital setting). Participants also felt that the South African context

was one in which the ideal guidelines from other parts of the world were not always practical or sustainable:

> *"I think splitting yourself in two and kinda getting to your hospital work, and pushing this is something that people do struggle with, and I can see why"* (Sarah, individual interview)

> *"the barriers to that was just not having the resus equipment, not having the oxygen or the doctors on standby"* (Cindy, individual interview)

> *"I think in our demographic as well I think we do have to be flexible, and I think we have this idea, this perfect idea how it would be great for it to work, but in South Africa it's just not always practical and you've gotta customise your programme despite what the guidelines say to suit the person in front of you"* (Sarah, individual interview)

> *"you Google like all these beautiful, amazing centres all across the world and you realise that that's not really something that is sustainable here"* (Mandy, individual interview)

> *"the training that I did was with Rik Gosslink from Europe, and I just found it was really hard to apply those ideas here because our resources are so different"* (Cindy, follow up interview)

4.3.3.3: <u>Human</u>

Barriers relating to humans were as diverse as humans themselves, but could be identified as relating to doctors, patients and the physiotherapist.

4.3.3.3.1: Doctors

Participants felt that doctors lacked awareness of what PR could offer, and thus did not value the PR service. This meant that they did not refer as often, or as soon as they could have done:

> *"it does feel frustrating at times, because emails go left unanswered you know you'll send through protocols and identifying patients- like try and make a checklist, make it really easy for the GP's like 'ok this patient has this, this is what Kim sent through', you know and then that just goes, un-replied to, so it's a bit frustrating. I think that would be the biggest barrier for me, the most difficult thing."* (Kim, individual interview)

> *"we've tried to raise awareness among the GPs, but the uptake hasn't been great"* (Sarah, individual interview)

> *"if the other doctors aren't pro pulmonary rehab, it's very difficult to persuade a patient when it's not coming from the other health care professionals"* (Nina, individual interview)

> *"the GP and the physician is the kind of primary health care practitioner and I think in South Africa they just don't know, or they're not aware, or not enough of them are aware, of kind of the rehab programmes that we offer"* (Kim, individual interview)

> *"appropriate referrals, and referrals at the right time before the patient is so debilitated it's very difficult for them to kinda make amends. So those early referrals- those guys that present to the GP with you know slight, slight shortness of breath and things, is so important, so that awareness in everything, so there's big holes"* (Sarah, individual interview)

Additionally, one participant reported that initially fewer clients were being referred due to the unequal distribution of specialist health-care services:

> *"because the saturation of pulmonologists is definitely more in the southern suburbs than in the northern suburbs… eventually it changed, but initially that was a barrier"* (Sarah, individual interview)

4.3.3.3.2: Patients

Participants recognised that patients themselves may have negative perceptions of exercise, perceiving it as pointless or unsafe for them, and too time consuming; also noting that similarly to healthy people, potential PR patients are often reluctant to exercise consistently. This is further aggravated by the realisation that PR is not "the easy option" but requires hard work and dedication from the patient, by the feeling of hopelessness that many patients display, having accepted what they think is their health status quo:

> *"they're not born to enjoy exercise, they fear it and they run away from it"* (Mandy, individual interview)

> *"there's a fair amount who just feel like this is their lot, they're breathless and it's pointless, and it's gonna end up in death anyway, so what's the point of getting fit?"* (Cindy, individual interview)

> *"most of them say: 'no, exercise is not safe, like I'm gonna die'"* (Mandy, individual interview)

> *"the patients would be referred to pulmonary rehab because their doctor told them to come, but they weren't really explained what it was required from them, you know it wasn't like this magic drug that you just take and then you're going to be able to breathe. There's that expectation sometimes"* (Mandy, individual interview)

"getting the patients buy in is challenging because they're, especially with the COPD, it's been an issue for a long time and now someone is asking you to do something different, and I think some of them have just accepted that 'I cannot do this and people will do things for me'" (Nina, individual interview)

"if you just tell some-one and give them a leaflet, you know you can exercise you know, and you can get better- I mean there's healthy normal people that aren't gyming and doing what they should to stay fit" (Cindy, individual interview)

A lack of trust in the health-care industry (partially due to perceived over-servicing) and not taking responsibility for accessing healthcare were also seen as negatively impacting on PRPs:

"Patients would often-times become suspicious as to the amount of people that are needing to see them. Unfortunately there's been a lot of a of trust lost in the in the health care community over the last couple of years, for various reasons in the private sector, ah think chief among which before covid 19 was perverse incentives, of overutilization of the medical aid funds, and then I think post covid-19 I think with all the misinformation there is regarding the vaccines and perverse incentives from the hospitals getting funding from the state umm there's been a lot of trust lost with the medical community" (Ben, individual interview)

"then I say 'if you have issues with ongoing breathlessness or fatigue or weakness, you know, contact me' and I just never hear from anyone" (Cindy, individual interview)

Physically, patient participation was found to be challenged by limited effort tolerance, a cycle of deterioration having led to them being weaker by the time they presented to PR, fluctuating performance and in some cases the natural disease progression inhibiting effectiveness:

"we find that these patients, their effort tolerance is low, so it's exercise rest, exercise rest, exercise, rest" (Nina, individual interview)

"we thought those patients that are classified on an MRC scale of dyspnoea of less than 2 you know, get them before it really becomes 4 out of 4 on an MRC scale, you know, get them before they lose that quality of life." (Sarah, individual interview)

"because during the 8 weeks you're always going to have these up and down flows, so they might have a down day and then think' I'm going nowhere'" (Mandy, individual interview)

"so they sit and it doesn't happen and then they get weaker and that whole cycle and then by the time that they're eventually referred to us the work sometimes is so hard as well" (Sarah, individual interview)

"In some cases, you know patients are just either too weak, or they're just so far down the process that, you know, all you really can do is assist them to be more comfortable" (Ben, individual interview)

Other patient related barriers to PR that were identified included poor individual attendance to the programme, a lack of awareness by patients about what PR offers, the need for assistance from family friends or carers to attend (not only regarding transport, but physical assistance as well), and a possible lack of carry-over from the acute to the rehabilitation setting:

"I think the biggest thing that I found was that that attendance initially was quite difficult- getting patients to attend regular sessions" (Mandy, individual interview)

"there's so many people sitting out there who don't know that they can actually breathe a little bit better" (Sarah, individual interview)

"they require somebody to help them and assist them, and so it's very seldom that we'd actually get them to commit to that in total" (Ben, individual interview)

"it's quite a quite a big gap going from acutely sick in hospital to then being ok to start a rehab programme" (Kim, individual interview)

4.3.3.3.3: Physiotherapists

Some participants had observed what they perceived to be a comparative lack of interest in respiratory medicine from physiotherapists, furthermore, observing that those with an interest in this tended to prefer in-patient work to out-patient work. They felt that this led to very few physiotherapists wanting to be involved in outpatient PRPs and displaying the passion necessary to be a driving force or a champion of respiratory care, which prevented programmes from being successful:

"among physiotherapists as well, I mean respiratory is not a well populated field, and I don't know if the physiotherapists who have a special interest in respiratory maybe have a bigger love for the hospital side of things? I don't know if there's… you know you get your hospital physios and your out-patient physios, I don't know if there's enough of us that are interested in pulmonary rehab" (Sarah, individual interview)

"I think just from not having that one person there that really was driving it and quite passionate and excited it never really took off" (Cindy, individual interview)

One therapist voiced a negative perception that she herself had of formal exercise prescription, while another noted her fears around patient safety, especially in online formats, and uncertainty and indecision about the scope of her particular practice and whether the responsibility for follow-up should lie with the therapist or the patient. Another pointed out that he felt that not being able to control all outcomes was a frustration:

"I found exercise prescription be pretty useless in most of these cases" (Mandy, individual interview)

"breathlessness can make people so scared and the problem for me in the outpatient setting, if I'm 100% honest, is that I find it scary too! I find exercising breathless people scary" (Cindy, individual interview)

"I saw overseas that there were online options ah but I just felt like because our system, our programme had never got up and running one on one, that getting people to do it that way just wasn't going to be safe" (Cindy, individual interview)

"we were just trying to decide whether to make it you know just covid rehab or covid clinic or whether to have it as like a combined pulmonary rehab and covid" (Cindy, individual interview)

"I think that's where, where I struggle, is where the responsibility lies in a patient contacting you versus, you following them up and checking in on them" (Cindy, individual interview)

"you also tend to blame yourself for things that are completely out of your control" (Ben, individual interview)

Participants also identified a perceived lack of undergraduate training in PR as a significant barrier to provision of programmes, which was underpinned by the diverse meanings that various participants ascribed to the term "pulmonary rehabilitation" (as discussed in Theme One). They felt that a comprehensive post-graduate training programme would further facilitate the provision of PR in their settings:

"we didn't learn pulmonary rehab at varsity so probably that's the start" (Kim, individual interview)

"I think it's that, when I was at university, I don't remember anyone teaching much about pulmonary rehab" (Nina, individual interview)

"I don't think it's something that we are exposed to in in in undergraduate studies, so no, it's not something that you get to see very often" (Ben, individual interview)

"I just don't think that it's a priority for anyone" (Ben, individual interview)

"I feel like there maybe would be an increased chance of it working if there was a kind of a course that could be offered" (Cindy, follow up interview)

Lastly, poor support from seniors was identified as a barrier within a practice:

"If you are employed by someone who's not supportive of what you're doing the implementation is going to be impossible" (Sarah, individual interview)

"the practice I was working in there was semi-buy-in of the idea, so we didn't necessarily get all the equipment that we needed and the practice space wasn't hundred percent" (Kim, individual interview)

4.3.3.4: Conclusion to Theme Three

The different barriers that were described affected the participants and their programmes, as well as their perception of the success of their programmes, in various ways. Some felt that they had not yet sufficiently overcome the barriers they had encountered, and their programme was therefore not successful. Others who perceived their programme as successful, had found ways to overcome these barriers. This led to an interesting "two sides of the coin" scenario, where some had overcome what others saw as barriers, and now thought of them as facilitators.

Chapter 5: Discussion

This study set out to answer the question "What factors affecting the establishment and provision of an outpatient PRP are experienced by physiotherapists in the Cape Metropole?" In seeking to answer this question the researcher aimed to understand these factors in line with three main objectives, namely, to explore and describe the current outpatient PRPs available, the factors that facilitated these PRPs and the factors that acted as barriers to these PRPs.

During the thematic analysis of the data generated, three themes were developed, answering the research question, and fulfilling the three objectives. The theme "One size does not fit all", described the nature of the current PRPs available, while "Sustained and driven by internal factors and external sources of support" described the facilitators to these PRPs, and "Common barriers with differing impacts" described the barriers to these PRPs.

These findings demonstrated that even though there is a well described "best practice" model defining the essentials of PR (Martijn, 2014), there are many variations in how participants are implementing their PRPs in the real-world setting. This could be due to the different ways in which physiotherapists are using facilitators to their advantage and attempting to overcome the barriers facing them. This chapter will briefly discuss the similarities and differences between the findings of this study and the findings of previous studies, before discussing the findings through the lens of Social Cognitive Theory (SCT).

5.1: Previously found barriers and facilitators compared to this study

Previous studies described facilitators to PRPs in such a way that they were divisible into three categories: Organisational/healthcare facilitators included improving the referral system (Barradell et al., 2022; Cox et al., 2017; Johnston et al., 2013a; Spitzer et al., 2023; Watson et al., 2020) and provision of financial incentives (Bickton & Shannon, 2022; Watson et al.,

2020). Other facilitators included addressing transport issues (Altaf et al., 2020; Spitzer et al., 2023), following best practice guidelines (Stone et al., 2021), improving public awareness of what PR is and what it offers (Avent et al., 2015; Barradell et al., 2022; Bickton & Shannon, 2022; McCarron et al., 2019) and employing home-based PR and tele-medicine (Aldhahir et al., 2022; Gushken et al., 2021).

Healthcare provider factors such as awareness (Gushken et al., 2021; Johnston et al., 2013a; Wexler et al., 2019), experience (Johnston et al., 2013b; Milner et al., 2018) and training (Bickton & Shannon, 2022; Foster et al., 2016; Milner et al., 2018) facilitated PRPs. As did a belief in the value of PR and good MDT working (Chan et al., 2021; Cox et al., 2017; Oates et al., 2019; Spitzer et al., 2023; Watson et al., 2022).

Lastly patient related factors such as motivation (Bickton & Shannon, 2022; Guo & Bruce, 2014) and improved education around PR (Bickton et al., 2022; Oates et al., 2019; Spitzer et al., 2020) acted as facilitators. When patients had an expectation that they would improve (Bickton et al., 2022; Collaço et al., 2022; Hug et al., 2022; Oates et al., 2019; Sohanpal et al., 2015) and started seeing tangible benefits (Guo & Bruce, 2014; Oates et al., 2019; Spitzer et al., 2020), this facilitated their further participation in PRPs. Positive interactions with healthcare workers (Sohanpal et al., 2015; Spitzer et al., 2020; Spitzer et al., 2023) and support from family and friends (Barradell et al., 2022; Collaço et al., 2022; Cox et al., 2017; Guo & Bruce, 2014; Hoffman et al., 2021; Oates et al., 2019; Spitzer et al., 2020), also acted as facilitators.

However, the participants in this study tended to explain the facilitators to their programmes with the focus on how these related to themselves as people. Therefore, rather than using similar categories to the previous studies these facilitators were better categorised as internal and external factors.

Similarly, to facilitators, the barriers to PRPs described in previous studies can be organised into three categories: organisational/healthcare factors, health-care provider related factors and patient related factors. Our study, however, described them as financial, physical and human. As shown in Table 4 this could be seen as a slightly different division of similar information, with financial and physical factors in this study combining under the organisational/healthcare factors in previous studies, and human factors in this study encompassing both health-care provider- and patient related factors in previous studies.

Table 4: Barriers to PRPs

<table>
<tr><th>This study</th><th>Previously found</th></tr>
<tr><td>Financial
• Initial costs
• Ongoing burden</td><td rowspan="2">Organisational/ Healthcare related
• Planning and structure
• Lack of resources
• Accessibility</td></tr>
<tr><td>Physical
• Space
• Time</td></tr>
<tr><td rowspan="2">Human
• Doctors
• Patients
• Physiotherapists</td><td>Healthcare provider related
• Knowledge and awareness
• Teamwork
• Intra-personal</td></tr>
<tr><td>Patient related
• Internal
• External</td></tr>
</table>

The significant difference between this study and most other studies was that due to its qualitative nature the researcher was able to examine these factors more in-depth, leading to a richer understanding participants' experiences of implementing PRPs.

Previously found organisational/healthcare factors included issues of poor planning and structure, that led to discontinuity of care (Sami et al., 2021), lack of organised programmes (Akinremi & Ogwu, 2015; Chan et al., 2021; Hao et al., 2021), a poor referral process, insufficient hospital capacity (Alsubaiei et al., 2016), and too little consultation time (Barradell et al., 2022; Watson et al., 2020). Additionally lack of other resources, such as trained health-care providers (Akinremi & Ogwu, 2015; Aldhahir et al., 2022; Alsubaiei et al., 2016; Bickton & Shannon, 2022; Chan et al., 2021; Cox et al., 2017; Farah et al., 2021; Johnston et al., 2016), and funding (Alsubaiei et al., 2016; Cox et al., 2017; Rochester et al., 2021; Sami et al., 2021; Spitzer et al., 2023) acted as barriers. Another healthcare organisational barrier was difficulty with accessibility, such as an inadequate amount of PR centres and challenges with their locations (Aldhahir et al., 2022; Augustine et al., 2021; Barradell et al., 2022; Chan et al., 2021; Johnston et al., 2016; Rochester et al., 2021), as well as potential difficulty with the technology required for remote PR (Bickton & Shannon, 2022).

The organisational/healthcare factors found in this study, although showing similarities to those previously found, were presented slightly differently- in a similar manner to how they spoke of the facilitators, the participants tended to view the barriers more from their own individual perspective rather than a broader organisational overview. This likely due to how private practices in South Africa are usually set-up, as independent and individually run businesses, rather than part of an over-arching structure. The participants identified systemic issues with funding, but differed from the previous studies in that they perceived the financial burden to be on themselves, rather than on the healthcare system. This financial burden was identified in the set-up and ongoing provision of the PRP, the suitability of the space they could afford to

access, and the availability of time where they could be doing other paid work. The participants in this study also felt that referrals were difficult to facilitate, leading to discontinuity of care, and that training in PR amongst health-care providers needed more attention. They did not speak to significant accessibility or geographical challenges, likely because many physiotherapy private practices exist, which generally cater to the population around them or to those with means to travel there.

Healthcare provider factors, found in previous studies, included barriers around limited knowledge and awareness of PR, including the referral process (Alsubaiei et al., 2016; Augustine et al., 2021; Barradell et al., 2022; Bickton & Shannon, 2022; Chan et al., 2021; Cox et al., 2017; Farah et al., 2021; Foster et al., 2016; Johnston et al., 2013a; Katagira et al., 2021; Milner et al., 2018; Rochester et al., 2021; Sami et al., 2021; Watson et al., 2022), and teamwork barriers such as differing priorities, lack of co-ordination and communication (Augustine et al., 2021; Barradell et al., 2022; Sami et al., 2021; Watson et al., 2022). A lack of patient-centeredness (Sami et al., 2021), a perception that some barriers, (e.g. the patient's potential lack of motivation or difficulty with access), would not be defeated (Johnston et al., 2013a; Stone et al., 2020; Watson et al., 2020; Watson et al., 2022), as well as a lack of confidence in their own ability to deliver the programme (Akinremi & Ogwu, 2015; Johnston et al., 2016) acted as intrapersonal barriers to PR. While this study found similar barriers amongst health care providers, it additionally found that poor referrals from doctors, perceived lack of interest from physiotherapists, fear and poor senior support acted as barriers.

Previously found patient related barriers were both internal and external. Internal barriers included a lack of knowledge of PR and it's benefits (Augustine et al., 2021; Barradell et al., 2022; Candemir et al., 2017; Chan et al., 2021; Cox et al., 2017; Fox et al., 2019; Hoffman et al., 2021; Katagira et al., 2021; McCarron et al., 2019; Sami et al., 2021; Spitzer et al., 2020). The complexity of their disease and co-morbidities affected adherence (Aldhahir et al., 2022;

Augustine et al., 2021; Cox et al., 2017; Francis & Cumella, 2023; Mathar et al., 2017; Oates et al., 2019; Sami et al., 2021), as did breathlessness, the fear of breathlessness and the belief that they were unable to exercise (Candemir et al., 2017; Cox et al., 2017; Guo & Bruce, 2014; Hoffman et al., 2021; McCarron et al., 2019). Other internal factors that could act as barriers included the patient having anxiety and/or depression (Cox et al., 2017; Yohannes et al., 2022) and poor commitment and motivation (Chan et al., 2021; Oates et al., 2019; Spitzer et al., 2020). External barriers included socio-economic challenges (Augustine et al., 2021; Jhonatan et al., 2023; Oates et al., 2017; Rochester et al., 2021), cultural, racial and language barriers (Fox et al., 2019; George, 2017; Johnston et al., 2016; Levack et al., 2016; McCarron et al., 2019; Rochester et al., 2021). The lack of a support system (Hayton et al., 2013; Oates et al., 2019; Sohanpal et al., 2015) and financial constraints such as transport costs (Augustine et al., 2021; Bickton & Shannon, 2022; Guo & Bruce, 2014; Oates et al., 2019; Sami et al., 2021) were also barriers. This study additionally found that participants felt there was a lack of carry-over from the acute setting to the rehabilitation setting and a negative perception of exercise amongst patients, including both the fear and hopelessness of engaging in exercise.

5.2: Social cognitive theory

Social Cognitive Theory (SCT) presents a method of analysing human function in relation to thought, motivation and action, describing how it is far more than complex than just a balance between inner forces and external stimuli. It suggests that human function is in fact an interaction between behaviour (actions and the internal and external responses gained from them), environmental events (external societal context) and person (individual cognitive and other internal factors). The main construct of SCT is that each of these factors moulds and shape the others in a mutually dependent, inter-related relationship, known as reciprocal determinism, (Bandura, 1986).

A simplistic example of SCT involves a patient who fears breathlessness during activities. This fear (person factor) might cause them to move and exercise less (behaviour), leading to more difficulty when attempting activities that require cardio-vascular endurance (environment), this in turn would increase the fear of breathlessness and decrease the amount they move- all three factors therefore affecting each other. As SCT examines these complex factors in an integrated manner, it has been used in the public health domain in the past to examine how health promotion might be done most effectively in order to improve health outcomes (Bandura, 2004).

Once the themes of this study were found, it was noted that the barriers and facilitators to PRPs could not be suitably described as simplistic lists, but rather as a complex set of circumstances that influenced the behaviour of the participants, and therefore the level of success that they achieved. Some factors even acted as barriers to some participants, but as facilitators to others, a "two sides of the coin" scenario. This complex interplay of factors can therefore be discussed through the lens of SCT as it explores the interplay between internal human characteristics and external factors within the person's context. By discussing the findings through this lens, the researcher will attempt to understand the reasons underpinning the differing actions of the participants. This knowledge can then be used to facilitate actions that overcome barriers and support the successful provision of these programmes in the future.

According to SCT, behaviour is affected by five constructs: Behavioural capability (the ability to actually do a particular behaviour), observational learning (learning from watching modelled behaviour), reinforcements (positive or negative responses that will affect the likelihood of continuing, this can be external or internal), expectations (the expected consequences of a behaviour and value of the outcome) and self-efficacy (confidence in your own ability). Furthermore, two important theories that underpin SCT are human agency and human capability. Human agency suggests that individuals are not only shaped by their environment

or set inner forces (like their drive) but can change by examining and adapting to information and circumstances. Human capability (or a person's underlying ability) suggests that people can gain knowledge and skills both directly and via symbolism (as opposed to trial and error).

Relating to this study, reciprocal determinism can be posited to affect the participant's ability to initiate and provide programmes in all three of its intertwined factors- person, behaviour and environment. These factors affect each other, leading to changes or differences in one area causing shifts or changes in other areas. This expands our understanding of how to more effectively facilitate PRPs in the future by not only focusing on overcoming barriers and using external factors to facilitate programmes, but also addressing the internal factors as they relate to each therapist that attempts a PRP, thereby helping to bring about behavioural change that will lead to meaningful improvement in PRP provision.

5.3: Social Cognitive Theory applied to these findings

This discussion, intends to explore how the aforementioned constructs of SCT have shaped the behaviour of the interview participants, causing them to act differently when attempting to provide PRPs, despite having access to the same guidelines and all practicing in private practices in the Cape Metropole.

5.3.1: Person

Person, or personal factors, can incorporate how someone thinks, how they feel, their mood and temperament. During the interviews participants described how who they were as the "person" impacted on the success of the PRP. For example, they noted that any physiotherapist's interest in PR, responsiveness to change, flexibility, motivation, passion and ability to advocate for PR would positively impact the programme, whereas fear, uncertainty and indecision impact it negatively. The researcher's observation was that those who displayed

an individual disposition that included optimism were more willing to take on the challenge of overcoming the difficulties, compared those who by disposition or weariness were more resigned to the current situation.

Participants acted on the construct of expectation, in that they felt that there was value in providing the PRP, believing that it would provide a better service to their patients. The expectation arose from research they had explored and at times from observation of other programmes that were being run with a measure of success. Although all participants voiced this expectation, not all participants succeeded in providing a PRP, implying that expectation alone was not sufficient to overcome the barriers they encountered.

A factor that appeared to have a very large impact on the participant's success was self-efficacy or a confidence in their own ability to run a programme safely and comfortably. Self-efficacy was often developed through their self-regulating and self-reflective capabilities. Their self-regulating capability allowed them to act according to internal standards (in this case a conviction that patients should get the best possible care), using these to influence the task. Self-reflective capability or the ability to analyse their past experiences, both related and un-related to PR, and thereby derive knowledge about themselves and the environment and predict outcomes, allowed them to judge what to do, how much effort to put in and how long to persevere. It is important to note that neither of these characteristics is faultless, meaning that a person can either over or under-estimate their self-efficacy (Bandura, 1986), leading to barriers not being overcome, potential facilitators not being utilised and programmes not running as smoothly as they could have done.

Their level of self-efficacy influenced their behaviour by dictating whether they gave up at hurdles, or persevered to find a solution, in the confidence that they were capable of doing it. Self-efficacy was influenced both by person factors like responsiveness to change and

environmental factors like the availability of training. This was particularly seen in a positive manner with Sarah, as she was able to reflect that the hurdles that she had faced had been overcome, and consequently her programme was running smoothly and successfully. Where this self-efficacy was present, it was even a factor in overcoming patient related barriers, such as the fear of and/or inability to exercise, poor attendance and unrealistic expectations, as it allowed the participant to encourage their patients in the certainty that the result would be beneficial to them. A lack of self-efficacy could also inhibit success, as was particularly noted by Cindy, where she verbalised that despite the expectation that that a PRP would be worthwhile and valuable, and the knowledge of how one should be run, she did not have the confidence that she had the appropriate nature to run it safely herself, and so did not offer the programme when she could not find a suitable person to do it with her.

While the perceived lack of interest in PR from physios was mentioned as a barrier to programmes being set-up on a wider scale, when it came to the particular barriers and facilitators found individually, the passion of the physiotherapist for respiratory physiotherapy in general and PR in particular was seen an important internal motivator or person factor to overcome barriers to provide the service, with the enjoyment and satisfaction found in practicing this type of therapy acting as a form of internal reinforcement . Their interest in this area of physiotherapy also affected the participant's motivation to attempt to overcome the barriers to providing the programme, for example attempting to improve their behavioural capability by learning and researching about PR, despite having trained in an environment where they perceived that it was not emphasised or taught adequately.

Another "person" factor that was identified in the interviews was responsiveness to change. This factor leans heavily into one of the theoretical foundations of SCT, Human Agency, which posits that change is not only driven by outside forces, but that humans can examine themselves and their reactions and adapt accordingly. This was often presented during the interviews, as it

affected how participants saw the barriers they faced and how they set about overcoming them, for example when Kim explained how she examined her first attempt at setting up a PRP and adapted her methods on the second attempt. It was also shown when environmental factors changed and the participants had to adapt, such as when the referring doctors left the hospital in which Ben and his practice were based, causing him to adapt by branching out into home-based programmes.

It is important to note that not all participants possessed the high degree of self-efficacy and responsiveness to change that was needed to overcome some of the more significant barriers, which may explain why not all of them felt their programmes were successful.

5.3.2: Behaviour

In SCT the term "behaviour" encompasses both the actions done by a person and the responses they receive. Two behaviours that especially affected the provision of PRPs were attempts to advocate for PR and the ability to effectively motivate patients to buy-in to the programme.

Where the behaviour of advocating to the doctors and members of the MDT led to a positive response or external positive reinforcement, the subsequent improved understanding and a good working relationship improved the quality of the referral system, i.e., the "environment" changed for the better. When similar attempts to advocate for PR were met with a negative response such as lack of interest and therefore referrals, this led to despondency from the therapists. This affected their "person" factor of motivation as well as not allowing for improvement of the referral environment, making it more difficult to provide a PRP.

Participants used various methods or behaviours to attempt to get patients to commit, or buy-in, to their programmes. The decisions on which to use were often influenced by the person factors of their own preferences and their individual characters, for example some suggested

practical day to day activities whilst others preferred traditional exercise prescription and some found clinic sessions worked best, while others felt home based programmes improved buy-in.

The construct of re-enforcement was also shown when considering behavioural factors. When therapists experienced what they saw as success in their programmes (irrespective of their definition of success) this positive response improved their motivation to continue and to keep attempting to overcome the barriers that they faced. This in turn facilitated the PRPs ongoing success, further re-enforcing the behaviours that led to the success initially.

5.3.3: Environment

Participants working in an environment that encompassed good support from those in authority (such as practice owners) had the freedom to adjust their behaviours to attempt to overcome the challenges that occurred, and deal with the learning curve of providing a PRP. Good senior support worked in a similar way to securing the guidance of a PR mentor in that it allowed for discussion of ideas, and could even incorporate observational learning, as they could observe how their seniors and mentors had overcome challenges in the past. This is closely linked to human capability, where skills are gained indirectly through symbolism. Additionally, the PR mentor could assist with improving their behavioural capability through guiding them on understanding PR and on how to set up, run and adapt the programme and providing feedback. This would eventually lead to improved self-efficacy, which as previously discussed is important in overcoming barriers that arise.

The available space and time were environmental factors that directly affected the behavioural capability of the participants to provide a PRP. Although they may have had both knowledge and self-efficacy to provide the programme, if a suitable space was unavailable or they could not free the time, then they could not provide it. It is however important to note that some

participants found ways to adapt to what they did have available, showing how their behaviour could affect these environmental factors.

Participants acknowledged that having access to the inpatient setting was environmental factor that went a long way to overcoming the barrier of discontinuity of care, thereby enhancing their behavioural capability. It did this by allowing earlier access to the patients, thus giving the participants the opportunity to do preparatory work and enhancing patient participation. In this case the environment allowed for the behaviour, which influenced the outcome.

The patient's motivation and the support of their family (or lack of these) can also be seen as environmental factors, as they were part of the societal context in which the participants were endeavouring to offer PRPs. These factors acted as a form of reinforcement to the behaviour of the participants- where these interactions were positive, it facilitated the participant's behaviour of working as a team with the patients and their families, which in turn facilitated the provision of the PRP. Where these factors were negative or this support was lacking, the participants encountered more challenges in overcoming other potential barriers.

While the aforementioned environmental factors varied in their significance between participants, a factor that was similar throughout the participant group was the challenge of funding for patient participation in the programme. How this affected the provision of each programme often depended on its interaction with the factors of person and behaviour:

The willingness of funders to pay a portion of the programme was environmental factor used by some participants to emphasise the value of the programme, thereby encouraging patients to self-fund because of this *expectation* of value. This was taken a step further by Sarah, who used the observed value of the programme to stimulate charitable giving, both from her practice and from the community. Conversely, most participants found it very difficult to find ways to overcome what they felt was significant underfunding by the medical aids- with unpredictable

levels of cover, often from the patients already depleted savings, causing out of pocket expenses for the patients, who may not have been able to pay. This affected their behavioural capability in that they felt they were unable to offer the programme as it was not financially viable.

This environment of perceived high financial risk was mitigated with different behaviours from various participants, again acting on their personal knowledge and strengths e.g., charitable donations being sought, efforts being made to negotiate extensions in medical aid cover and allowing for the income from inpatient work to cover the lack of income of PRPs, although this could not be done indefinitely.

As can be seen from this discussion, and summarised in Figure 3 below, many factors, both positive and negative, affected whether a participant was able to provide a PRP, but this was a complex interaction between environmental, personal and behavioural factors, with each participant experiencing this interplay differently.

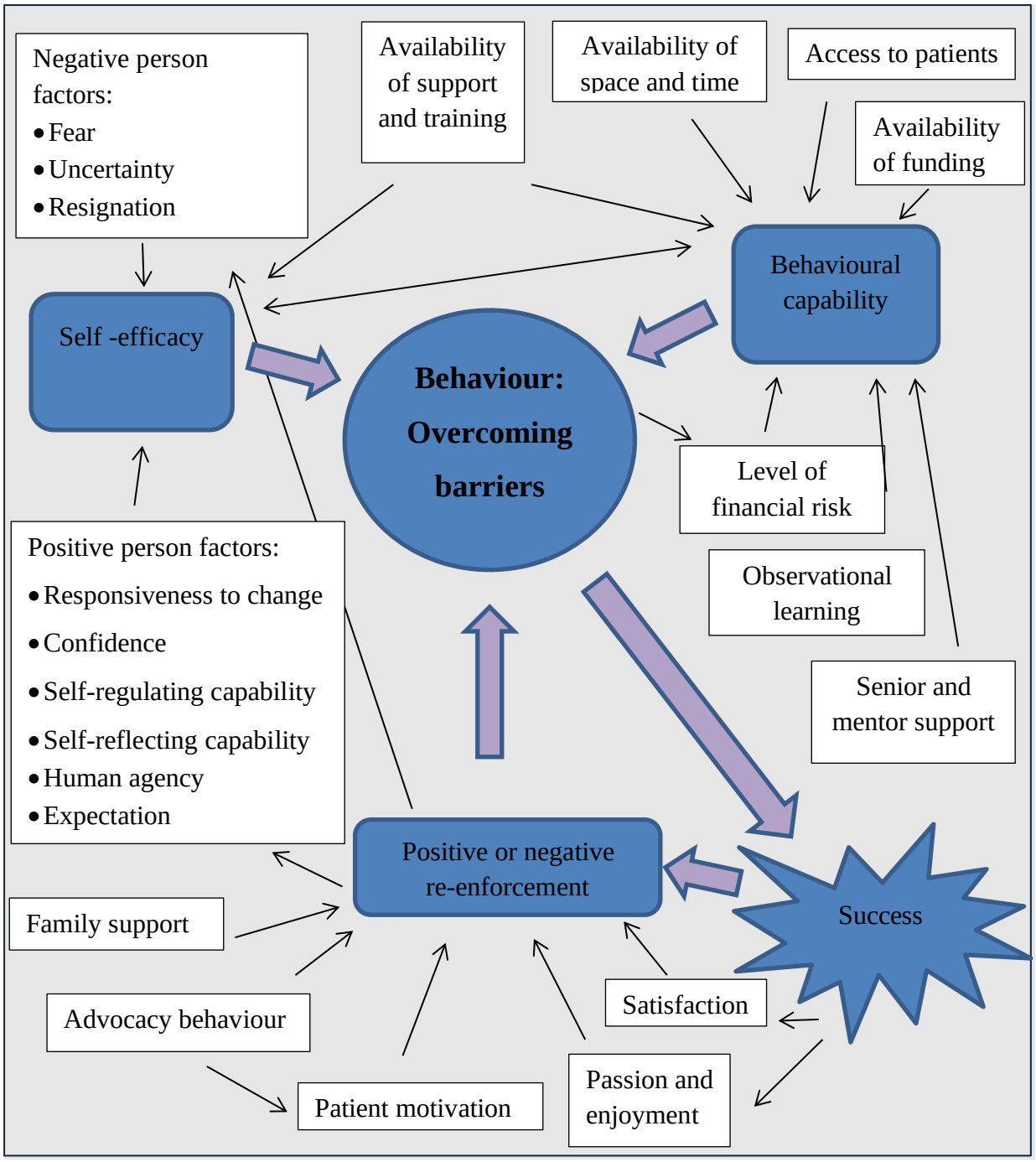

Figure 3: The complex interplay of factors in overcoming barriers to PRPs

5.3.4: Conclusion

SCT describes how the three factors of person, behaviour and environment have a complex interaction, impacting on each other when attempting to provide PRPs. This can be seen throughout the discussion of the results found in this study, as they show how no barrier or facilitator is experienced in isolation, but rather that these three factors interact with them to make it easier or more difficult to deliver a PRP. The following chapter will make recommendations regarding what can be done to assist in these various areas, in order to facilitate the over-coming of barriers to providing PRPs.

Chapter 6: Conclusion

In conclusion, the factors the acting as facilitators to the implementation of PRPs can be grouped as internal factors and external factors. Internal factors include the motivators for attempting PR, responsiveness to change, and other mental and psychological factors such as personal motivation, the existing knowledge base around PR and the nature of the physiotherapist attempting to implement the PR. External factors can be seen as those relating to resources- financial, space and physical resources; and those relating to teamwork- between the therapist and other physiotherapists, other health care professionals and the patient and their family. Barriers to the implementation of PRPs can be divided into the financial barriers, including both the initial cost of setup, and the ongoing financial burden, physical barriers such as time and space, and the barriers relating to humans- doctors, patients and physiotherapists.

Furthermore, this study has shown that although there is much variation in how pulmonary rehabilitation is practiced in the Cape Metropole, those that practice it are motivated by a passion for respiratory physiotherapy and care for the patients that present to them. This leads to a drive to improve the current situation for these patients- to do better than just the accepted practice. The barriers to closing the knowledge-practice gap and providing a PRP that is effective are diverse and may seem extremely challenging, however some participants were able to adapt to the particular health-care landscape in this area of South Africa, and to the continuous changes in the health-care system, to overcome these barriers and provide effective PRPs. This was chiefly seen when participants possessed a higher level of self-efficacy regarding PR and so were able to improve their behavioural capability in offering it. It follows then that interventions to facilitate the provision of PRPs more widely, should focus not only on the over-coming of barriers presented, but also on the development of this self-efficacy in physiotherapists looking to implement PRPs. This may impact not only on individual patient

well-being, but also has the potential to impact positively on the health-care system, with a decreased impact of the morbidity associated with CRDs.

6.1: Strengths and limitations of the study

A strength of this study was that its qualitative nature allowed the researcher to describe the barriers and facilitators to PRPs more richly than would have been allowed by the numerical descriptions offered by a quantitative study. It also allowed for a deeper understanding of the nature and extend of these barriers as they could be discussed with the participants during the interview.

An additional strength of this study was that it examined the barriers and facilitators in the specific context of the Western Cape, South Africa- an area that had not yet been exclusively discussed, with minimal studies including any South African participants at all.

Concerning limitations, it was unfortunate that no physiotherapists from the public health sector consented to being interviewed for this study, therefore all participants were from the private sector. This means that PRPs in the public health sector were not explored, if they are even being provided. Since it is a very different system, the PRPs may have been implemented differently, with different barriers and facilitators being described. It would have been beneficial to explore this as most of the South African population is served by the public sector health-care system.

Had online meetings been normative practice at the time of writing the research proposal, this would have provided an opportunity to conduct interviews with physiotherapists working across a wider geographical area. This would have strengthened the study, by increasing the generalisability of the findings.

Those that had not considered attempting a PRP were not interviewed, as they had not had opportunity to encounter the barriers and facilitators to the provision of a programme. The information that could have been explored with these physiotherapists may have assisted with insight into why there appears to be a relative lack of interest in PR. It may also have spoken to lack of awareness of- and knowledge about PR, and possible reasons for this.

The barriers and facilitators to PRPs were explored only from the viewpoint of physiotherapists, whereas valuable information may have been gained had the MDT and patient perspectives been included.

6.2: Recommendations for practice

Due to the strong existing literature base regarding the efficacy of PR in the management of CRDs, the author recommends that any physiotherapists dealing with these patients should strongly consider offering PR as part of their service. International guidelines are available, but the therapist must show flexibility in order to apply them to their own resources and circumstances, and that of the patients. It is beneficial to seek out an experienced pulmonary rehabilitation therapist to act as a mentor, who can guide and assist in the process.

An area that was identified by participants as being both vital and currently inadequate in practice was the promotion of PR. It is therefore recommended that physiotherapists providing these programmes place a strong focus on advocating for PR, both with the MDT, especially doctors, and with patients and their families.

6.3: Recommendations for research

During the literature review, it was found that there is relatively little research on the effectiveness of PR in the South African context, despite its unique patient profile. Further research should explore the effectiveness of PR in this setting.

This study focused on the barriers and facilitators found by physiotherapists. Further studies that include the MDT and patient perspective would add valuable information to the body of research, thereby informing good clinical practice.

As this study focused on physiotherapists who had already attempted to set up programmes, it would also be useful to explore the thoughts and attitudes to PR of those that had never attempted to do so- to find out why it PRPs are so seldom endeavoured. This would be especially useful in the public health-care setting, as we were unable to gather data from those therapists in this study.

To the researcher's knowledge PRPs in the public health sector in the Cape Metropole are only occurring at the two tertiary hospitals- being run by the researcher at Groote Schuur Hospital, and by one of the supervisors at Tygerberg Hospital via the University of Stellenbosch Health Sciences faculty. Further research should again attempt to access the public sector physiotherapists to assess if there are in fact any other PRPs being provided in this setting.

6.4: Further recommendations

Given this complex interaction of factors, there are various points in the process where a physiotherapist wishing to provide a PRP could be assisted in overcoming the barriers encountered.

The author recommends that dialogue should occur with the Health Science Faculties of the various Universities in South Africa in order to ascertain to what extent and how effectively PR is being taught. Further discussion on improving any inadequacies would assist in laying a better foundation for the understanding of this subject from an undergraduate level, promoting self-efficacy from early on. At a post-graduate level, discussion could be entered into with, for example, the Cardio-Pulmonary Rehabilitation Group (CPRG) which is a special interest

branch of SASP, to organise courses and training. Additionally, it would be beneficial to set-up a network of PR mentors that would be accessible to those attempting to provide PRPs in the future. This would lead to an environment where behavioural capability can be nurtured.

Furthermore, it would be useful to enter into discussion with both doctors and the medical aid companies to motivate for a pulmonary rehabilitation package of care that would pay for the appropriate number of sessions, but not out of patients' often depleted savings. This would lower the level of financial risk experienced by those pursuing a PRP, and it could be argued that this would benefit both medical aid companies (with fewer admissions to hospital) and patients (with improved quality of life and effort tolerance).

6.5: Conclusion

It has been shown by an abundance of research that in patients with a variety of CRDs, PR is effective in improving effort tolerance and quality of life and decreasing the impact of these diseases on the health-care system. Therefore, in a country like South Africa, which suffers from a high incidence of these diseases, it should be offered at a substantial level, but unfortunately in practice this is not the case. In an attempt to understand this imbalance, and thereby lay a foundation that might eventually improve the situation, the researcher set out to answer the question “What factors affecting the establishment and provision of an outpatient pulmonary rehabilitation programme are experienced by physiotherapists in the Cape Metropole? In answering this question, it has been shown that there are many diverse barriers that affect the provision of these programmes negatively, but also a variety of facilitators that affect them positively. If self-efficacy and behavioural capability are nurtured, physiotherapists intending to provide PRPs are more likely to be able use the facilitators to their advantage, and to overcome the barriers that they face, to the benefit of many patients and the wider Health-care system.

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Tables

Figures

Appendices

Appendix A: Permission to approach public sector healthcare workers

Western Cape Government
Health

STRATEGY & HEALTH SUPPORT
Health.Research@westerncape.gov.za
tel: +27 21 483 0866; fax: +27 21 483 6058
5th Floor, Norton Rose House, 8 Riebeek Street, Cape Town, 8001
www.capegateway.gov.za

REFERENCE: WC_202103_022
ENQUIRIES: Dr Sabela Petros

University of Cape Town
Anzio Road
Observatory
Cape Town
7925

For attention: Ms Ilse Du Plessis, Ms Lisa Labuschagne

Re: Factors affecting the establishment and provision of an outpatient Pulmonary Rehabilitation Programme, as viewed by physiotherapists in the Cape Metropole

Thank you for submitting your proposal to undertake the above-mentioned study. We are pleased to inform you that the department has granted you approval for your research.
Please contact the following people to assist you with any further enquiries in accessing the following sites:

Health Impact Assessment	**Dr Melvin Moodley**	**021 483 9366**

Kindly ensure that the following are adhered to:

1. Arrangements can be made with managers, providing that normal activities at requested facilities are not interrupted.
2. Researchers, in accessing provincial health facilities, are expressing consent to provide the department with an electronic copy of the final feedback (**annexure 9**) within six months of completion of research. This can be submitted to the provincial Research Co-ordinator (Health.Research@westerncape.gov.za).
3. In the event where the research project goes beyond the estimated completion date which was submitted, researchers are expected to complete and submit a progress report (**Annexure 8**) to the provincial Research Co-ordinator (Health.Research@westerncape.gov.za).
4. The reference number above should be quoted in all future correspondence.

Yours sincerely

DR M MOODLEY
DIRECTOR: HEALTH IMPACT ASSESSMENT
DATE:
CC

Dr Melvin Moodley
Director: Health Impact Assessment
21 APR 2021

Appendix B: Informed consent information letter

Introduction

My name is Lisa Labuschagne, and I am a postgraduate student at the University of Cape Town, in the Faculty of Health Sciences. I am doing research about physiotherapist's experiences in establishing and providing pulmonary rehabilitation programmes. In this letter I will give you further information and am inviting you to be a part of this research. You may speak to anyone you feel comfortable with about the research, and do not need to decide today whether you will participate or not. If you decide to participate, we will ask you to sign an informed consent form and will offer you a copy of the signed form. You may also ask further questions at any stage of the research process.

Purpose of the research

We would like to find out the extent to which Pulmonary Rehabilitation Programmes are offered in the Cape Metropole. We would also like to explore the factors that have affected the establishment and provision of existing programmes. We hope that this knowledge will assist in the establishment of these programmes in the future.

Type of Research Intervention

This is a qualitative study, and there is no study intervention.

Participant Selection

You are being invited to take part in this research because you are a physiotherapist in the Cape Metropole. The information you provide will contribute to our understanding of the local practice in this discipline.

Voluntary Participation

Your participation in this research is entirely voluntary, and consent can be withdrawn at any time without any consequences.

Procedures

Initially you will be asked to fill out an informed consent form and screening questionnaire on Survey Monkey. The answers from this survey will be used to purposively select participants who will be invited to attend an interview with the researcher, as well as a follow up interview at a later stage.

I will conduct the interviews at a place and time that is safe and convenient for both myself and the participant. If social distancing practices still require that meetings are electronic, this will be arranged to both our convenience. The interview will last 45- 60 minutes. If you do not wish to answer any questions you can say so, and I will move on. The interviews will be audio-recorded for later transcription and analysis. All information and recordings will be stored confidentially and only the researcher and supervisors will have access to this. Follow up interviews will be held under the same conditions. All recordings will be destroyed after 5 years.

Duration

The interviews will take place over a period of 4 months during which you will be invited to the initial interview and a follow up interview if you are selected. You may be asked to participate in the pilot interview. This will take place under the same conditions as the other interviews, but you will additionally be asked to provide feedback on the experience. As far as possible, data from the pilot interview will be included in the analysis of the research.

Risks

If there is still a risk of covid-19 spread at the time of the interviews we will adhere to government regulations in order to mitigate this risk. This may be done by conducting the interviews electronically via Zoom, or by adhering to distancing, mask and sanitizing regulations. The information you share will not be available to your employer in any way that identifies you, so there is no risk of retribution. No other risks are anticipated and an atmosphere of non-judgmental sharing will be encouraged.

Benefits

You will receive no direct benefits for participation, but indirect benefits to yourself and your patients will include an increase in the knowledge base, which will act as a foundation for improving the availability of pulmonary rehabilitation programmes in the future. At the conclusion of the study, you will be invited to a private presentation of the findings, with opportunity for discussion and networking. You will have access to the researcher, to allow for questions and exchange of ideas around pulmonary rehabilitation in the future.

Reimbursements

You will not be provided with any monetary reimbursements for participation in this study, but reimbursement for travel can be arranged with the researcher, and will be paid according to the current UCT re-imbursement rate of R3.98 per KM.

Confidentiality

Should you wish to participate your anonymity will be protected. All information provided by the survey will be strictly confidential- electronic information will be stored on a laptop that

is password protected and not in shared use, whilst paper records will be kept in a locked drawer, to which no-one other than the researcher has access. Information will only be shared with the research supervisors.

Sharing the Results

At the conclusion of the study, you will be invited to a presentation of the results. A similar presentation will also be made to the staff at my place of employment (Groote Schuur Hospital) as part of the Continuing Professional Development programme. The results may also be presented at the University of Cape Town, Faculty of Health Science Post-graduate Research day, and at relevant conferences and meetings of special interest groups. The research will be written up as an article and submitted to the appropriate journals for publication. No presentations or publications will use your name or identify you personally.

Right to Refuse or Withdraw

You do not have to take part in this research if you do not wish to do so, and you may stop participating in the questionnaire or interviews at any time that you wish without penalty. I will give you an opportunity at the end of the interview to review your remarks, and you can ask to modify or remove portions of those, if you do not agree with my notes or if I did not understand you correctly.

Who to Contact

If you have any questions, you can ask them now or at any time during the research process. If you wish to ask questions later, you may contact Lisa Labuschagne via email at pulmonaryrehabresearch@gmail.com or Ilse Du Plessis at ilse.duplessis@uct.ac.za

This proposal has been reviewed and approved by The University of Cape Town Human Research Ethics Committee, which is a committee tasked with making sure that research participants are protected from harm. If you wish to find about more about the HREC or if you have any questions concerning your rights as a research participant, you may contact the University of Cape Town Human Research Ethics Committee at: +27214066338.

Appendix C: Screening questionnaire

1: Which of these describes your current, main work context? Please chose one:

- Western Cape Department of Health
  - Tertiary level hospital
  - Secondary level hospital
  - District Health Centre
  - Community Health Clinic
- Private practice
- Other: Please specify_____

2: What best describes your role in your practice or department? (e.g. HOD, Community service therapist)

3: Does your department or practice provide cardio-pulmonary outpatient services to any degree?

- Yes
- No

4: Have you ever, or do you currently, offer any form of outpatient Pulmonary Rehabilitation Programme (PRP) for adults?

- Yes
- No

5: If the answer to question 3 is "Yes", please give a brief description of what your programme entailed or entails:

6: If your answer to question 3 is "No", have you ever attempted to offer any form of outpatient PRP for adults before, but were unsuccessful?

- Yes

- o No

7: Would you be willing to participate in interviews to discuss your experience and thoughts on pulmonary rehabilitation programmes, whether or not you currently provide a programme?

- o No
- o Yes, please provide your preferred contact details_____

Appendix D: Semi-structured interview guide

1: Grand tour question:

Tell me about your understanding of Pulmonary Rehabilitation Programmes

2: Core question:

Tell me about the context you worked in when you attempted to institute an outpatient pulmonary rehabilitation programme?

3: About the programme:

- What made you want to set up the programme
- What did/does it entail
- Was it successful? Prompt for what they mean by success
- What worked well (facilitators)? Prompt for elaboration if needed
- What barriers or difficulties did you find in attempting to set up your programme? Prompt for elaboration if needed
- What do you wish you knew then or did differently at the time?

4: If "unsuccessful":

- Would you to attempt to set up a pulmonary rehabilitation programme again? Prompt for elaboration if needed
- How would you proceed differently if you tried again?

5: Any unplanned follow up questions

6: Additional questions (added after pilot interview):

- Why do you think there are so few PRPs currently in existence
- Do you know of any other physio's we could talk to about this?

Appendix E: Written informed consent form

I, _____ have been invited to participate in research about Pulmonary Rehabilitation Programmes in the Cape Metropole. I have read the information sheet and I have had the opportunity to ask questions about it and any questions I have been asked have been answered to my satisfaction. I understand that my participation in this study is completely voluntary, and that I can withdraw from the survey at any point without any consequences in doing so.

Signed:

Print Name of Participant_____

Signature of Participant _____

Date _____

Day/month/year

Appendix F: Ethics approval letter

UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee

Room G50- Old Main Building
Groote Schuur Hospital
Observatory 7925
Telephone [021] 406 6492
Email: hrec-enquiries@uct.ac.za
Website: www.health.uct.ac.za/fhs/research/humanethics/forms

08 February 2021

HREC REF: 026/2021

Ms Ilse du Plessis
Department of Health & Rehab Sciences
Division of Physiotherapy
F-Floor, OMB
Email: ilse.duplessis@uct.ac.za
Student: lisaphysiosa@gmail.com

Dear Ms du Plessis

PROJECT TITLE: FACTORS AFFECTING THE ESTABLISHMENT AND PROVISION OF AN OUTPATIENT PULMONARY REHABILITATION PROGRAMME, AS VIEWED BY PHYSOTHERAPISTS IN THE CAPE METROPOLE-MSC CANDIDATE -LISA LABUSCHAGNE

Thank you for submitting your study to the Faculty of Health Sciences Human Research Ethics Committee (HREC) for review.

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study.

This approval is subject to strict adherence to the HREC recommendations regarding research involving human participants during COVID -19, dated 17 March 2020 & 06 July 2020.

Approval is granted for one year until the 28 February 2022.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

The HREC acknowledge that the student: - Ms Lisa Labuschagne will also be involved in this study.

Please quote the HREC REF 026/2021 in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please note that for all studies approved by the HREC, the principal investigator **must** obtain appropriate institutional approval, where necessary, before the research may occur.

Yours sincerely

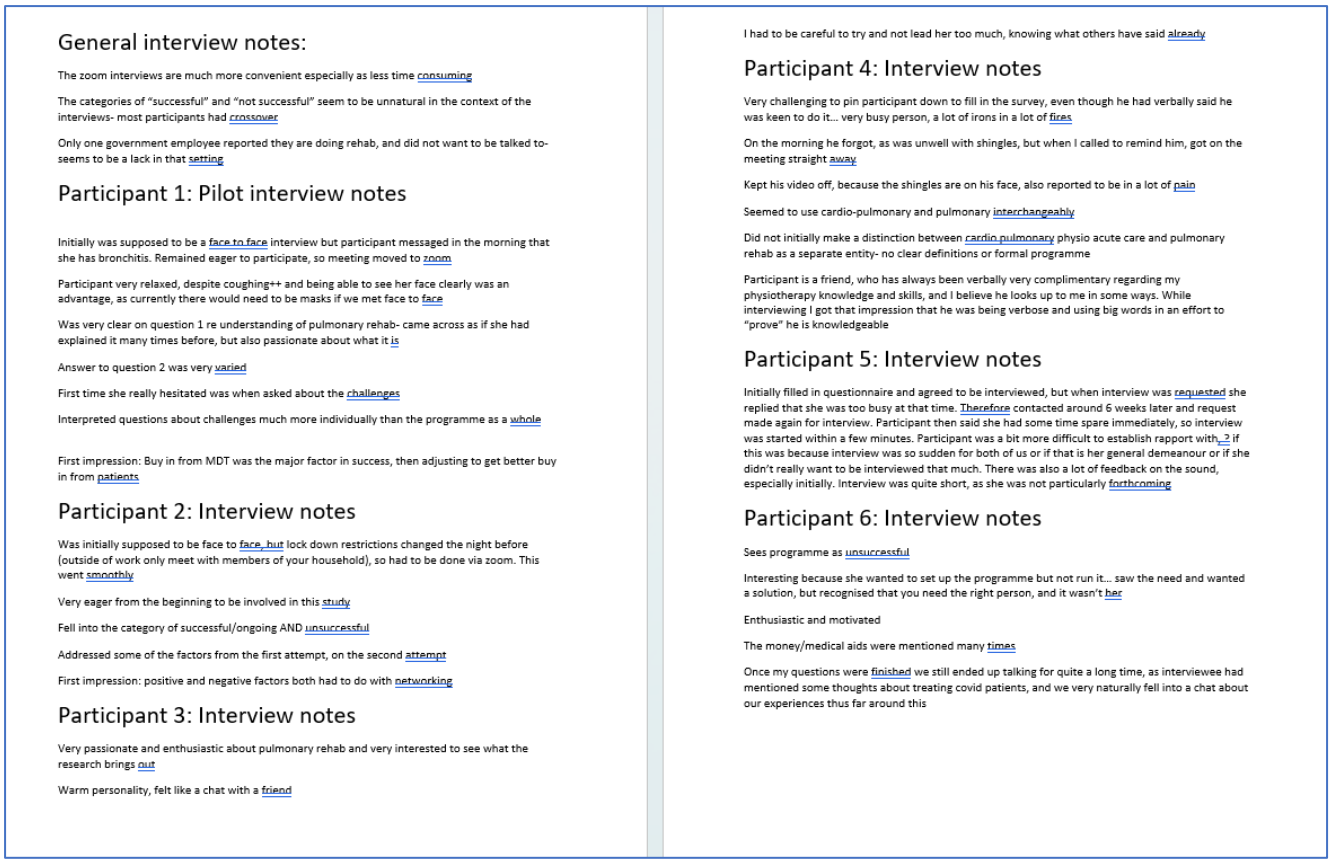
pp **PROFESSOR M BLOCKMAN**
CHAIRPERSON, FACULTY OF HEALTH SCIENCES HUMAN RESEARCH ETHICS COMMITTEE
Federal Wide Assurance Number: FWA00001637.
Institutional Review Board (IRB) number: IRB00001938
NHREC-registration number: REC-210208-007

This serves to confirm that the University of Cape Town Human Research Ethics Committee complies to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical Research Council (MRC-SA), Food and Drug Administration (FDA-USA), International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use: Good Clinical Practice (ICH GCP), South African Good Clinical Practice Guidelines (DoH 2006), based on the Association of the British Pharmaceutical Industry Guidelines (ABPI), and Declaration of Helsinki (2013) guidelines. The Human Research Ethics Committee granting this approval is in compliance with the ICH Harmonised Tripartite Guidelines E6: Note for Guidance on Good Clinical Practice (CPMP/ICH/135/95) and FDA Code Federal Regulation Part 50, 56 and 312.

HREC/REF 026/2021sa

Appendix G: Code book

Directly after conducting each interview and on transcribing the interviews, some initial ideas were jotted down in interview notes and analytical memos, as well as some observations about the interviews themselves.



General interview notes:

The zoom interviews are much more convenient especially as less time consuming

The categories of "successful" and "not successful" seem to be unnatural in the context of the interviews- most participants had crossover

Only one government employee reported they are doing rehab, and did not want to be talked to- seems to be a lack in that setting

Participant 1: Pilot interview notes

Initially was supposed to be a face to face interview but participant messaged in the morning that she has bronchitis. Remained eager to participate, so meeting moved to zoom

Participant very relaxed, despite coughing++ and being able to see her face clearly was an advantage, as currently there would need to be masks if we met face to face

Was very clear on question 1 re understanding of pulmonary rehab- came across as if she had explained it many times before, but also passionate about what it is

Answer to question 2 was very varied

First time she really hesitated was when asked about the challenges

Interpreted questions about challenges much more individually than the programme as a whole

First impression: Buy in from MDT was the major factor in success, then adjusting to get better buy in from patients

Participant 2: Interview notes

Was initially supposed to be face to face, but lock down restrictions changed the night before (outside of work only meet with members of your household), so had to be done via zoom. This went smoothly

Very eager from the beginning to be involved in this study

Fell into the category of successful/ongoing AND unsuccessful

Addressed some of the factors from the first attempt, on the second attempt

First impression: positive and negative factors both had to do with networking

Participant 3: Interview notes

Very passionate and enthusiastic about pulmonary rehab and very interested to see what the research brings out

Warm personality, felt like a chat with a friend

I had to be careful to try and not lead her too much, knowing what others have said already

Participant 4: Interview notes

Very challenging to pin participant down to fill in the survey, even though he had verbally said he was keen to do it... very busy person, a lot of irons in a lot of fires

On the morning he forgot, as was unwell with shingles, but when I called to remind him, got on the meeting straight away

Kept his video off, because the shingles are on his face, also reported to be in a lot of pain

Seemed to use cardio-pulmonary and pulmonary interchangeably

Did not initially make a distinction between cardio pulmonary physio acute care and pulmonary rehab as a separate entity- no clear definitions or formal programme

Participant is a friend, who has always been verbally very complimentary regarding my physiotherapy knowledge and skills, and I believe he looks up to me in some ways. While interviewing I got that impression that he was being verbose and using big words in an effort to "prove" he is knowledgeable

Participant 5: Interview notes

Initially filled in questionnaire and agreed to be interviewed, but when interview was requested she replied that she was too busy at that time. Therefore contacted around 6 weeks later and request made again for interview. Participant then said she had some time spare immediately, so interview was started within a few minutes. Participant was a bit more difficult to establish rapport with, ? if this was because interview was so sudden for both of us or if that is her general demeanour or if she didn't really want to be interviewed that much. There was also a lot of feedback on the sound, especially initially. Interview was quite short, as she was not particularly forthcoming

Participant 6: Interview notes

Sees programme as unsuccessful

Interesting because she wanted to set up the programme but not run it... saw the need and wanted a solution, but recognised that you need the right person, and it wasn't her

Enthusiastic and motivated

The money/medical aids were mentioned many times

Once my questions were finished we still ended up talking for quite a long time, as interviewee had mentioned some thoughts about treating covid patients, and we very naturally fell into a chat about our experiences thus far around this

Ideas on re-reading the transcriptions

The feeling I get from each interview (what it represents to me subjectively)		
1	Individualised	Different approach and manner to other participants- very free
2	Optimistic	Trying for a second time, fixing previous mistakes and overcoming barriers as she goes
3	Competence	Experienced, coming from a place of a successful practice that is the most well known
4	Big picture	Innovative and forward thinking, almost to the point of not really answering the question but discussing around it
5	Stoic	Resigned. A bit of an "it is what it is" mind-set, and pushing through without a fuss to keep things going
6	Enthusiastic	Passion for facilitating something that will bring lasting change, even though she thinks she is not the person to run it

Other random ideas that stood out:

South African context and expectations different to overseas

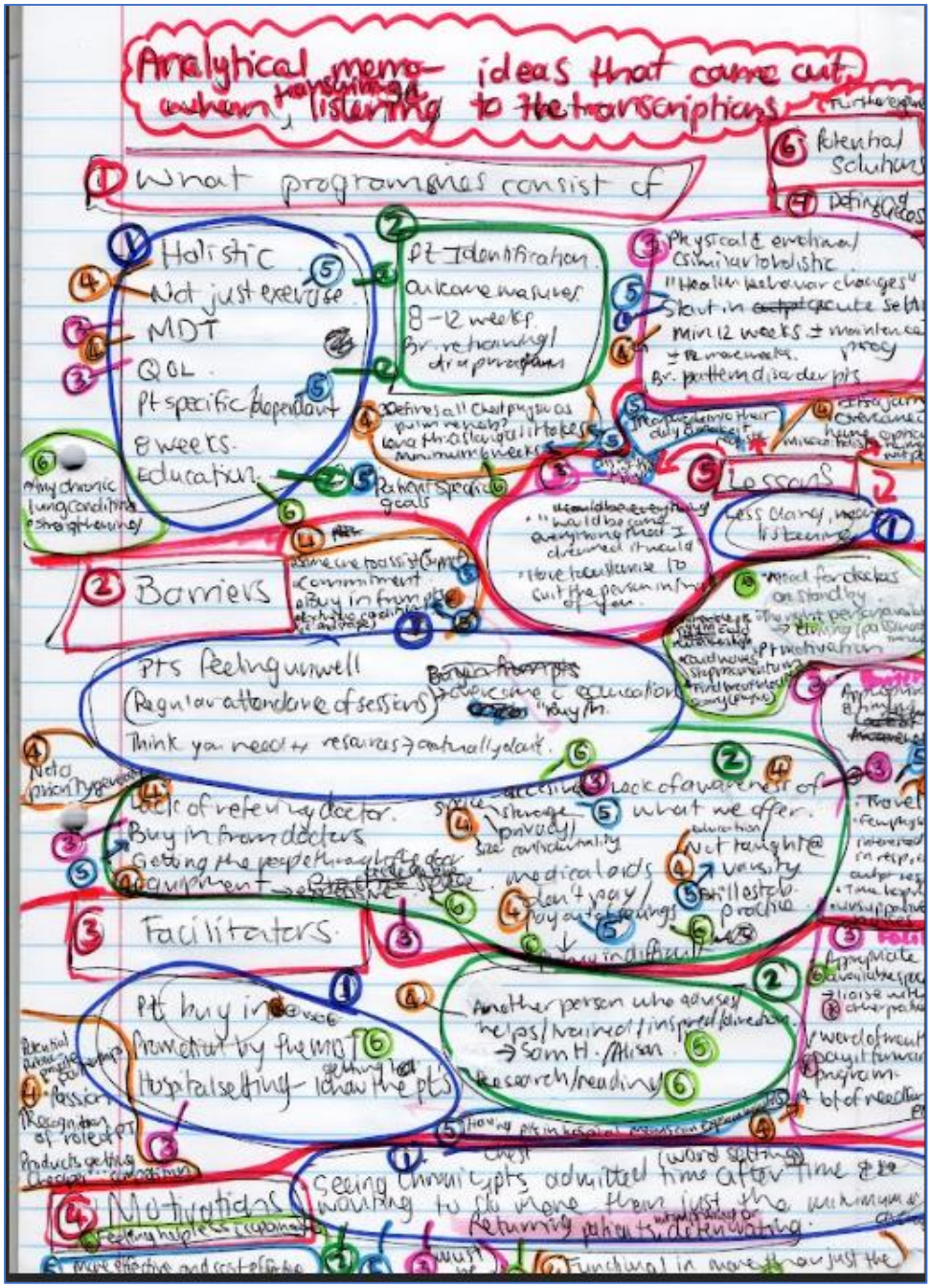
Small amount of physios interested in CPR and most of those prefer inpt/icu work> OPD, need for physios outweighs supply

Support of seniors can be positive or negative

The idea that a lot of long term chest pts (especially COPD) have accepted the status quo and don't think they can improve

Set up costs and ongoing financial viability might be 2 separate issues

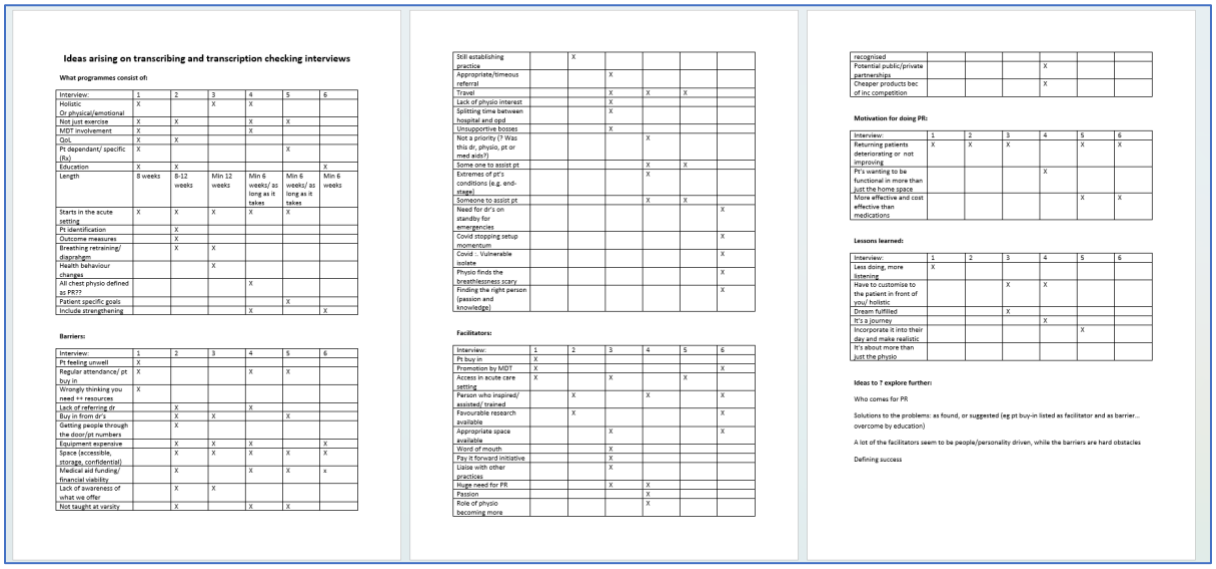
On relistening to, and transcribing the interviews, the ideas that stood out to the researcher were jotted down manually and expanded into a form of mind map, using colours to show which interviews the ideas had been present in (1= Dark blue, 2= Dark green, 3= Pink, 4= Orange, 5= Light blue, 6= Light green). This was not a precise process, but rather a messy one that helped me visually to start to see patterns and ideas.



This led to 5 ideas that seemed to be expressed in the text:

1. What programmes consist of
2. Barriers
3. Facilitators
4. Motivations
5. Lessons

This was then cleaned up in table form, to make it easier for others to follow:



Ideas arising on transcribing and transcription checking interviews

What programmes consist of:

Interview:	1	2	3	4	5	6
Holistic Or physical/emotional	X		X	X		
Not just exercise	X	X		X	X	
MDT involvement	X			X		
QoL	X	X				
Pt dependant/ specific (fb)	X				X	
Education	X	X				X
Length	8 weeks	8-12 weeks	Min 12 weeks	Min 6 weeks/ as long as it takes	Min 6 weeks/ as long as it takes	Min 6 weeks
Starts in the acute setting	X	X	X	X	X	
Pt identification		X				
Outcome measures		X				
Breathing retraining/ dispnahgn		X	X			
Health behaviour changes			X			
All chest physio defined as PR??				X		
Patient specific goals					X	
Include strengthening				X		X

Barriers:

Interview:	1	2	3	4	5	6
Pt feeling unwell	X					
Regular attendance/ pt buy in	X			X	X	
Wrongly thinking you need ++ resources	X					
Lack of referring dr		X		X		
Buy in from dr's		X	X		X	
Getting people through the door/pt numbers		X				
Equipment expensive		X	X	X		X
Space (accessible, storage, confidential)		X	X	X	X	X
Medical aid funding/ financial viability		X		X	X	x
Lack of awareness of what we offer		X	X			
Not taught at varsity		X		X	X	

Still establishing practice		X				
Appropriate/timeout referral			X			
Travel			X	X	X	
Lack of physio interest			X			
Splitting time between hospital and opd			X			
Unsupportive bosses			X			
Not a priority (? Was this dr, physio, pt or med aids?)				X		
Some one to assist pt				X	X	
Extremes of pt's conditions (e.g. end-stage)				X		
Someone to assist pt				X	X	
Need for dr's on standby for emergencies						X
Covid stopping setup momentum						X
Covid :. Vulnerable isolate						X
Physio finds the breathlessness scary						X
Finding the right person (passion and knowledge)						X

Facilitators:

Interview:	1	2	3	4	5	6
Pt buy in	X					
Promotion by MDT	X					X
Access in acute care setting	X		X		X	
Person who inspired/ assisted/ trained		X		X		X
Favourable research available		X				X
Appropriate space available			X			X
Word of mouth			X			
Pay it forward initiative			X			
Liaise with other practices			X			
Huge need for PR			X	X		
Passion				X		
Role of physio becoming more recognised				X		
Potential public/private partnerships				X		
Cheaper products bec of inc competition				X		

Motivation for doing PR:

Interview:	1	2	3	4	5	6
Returning patients deteriorating or not improving	X	X	X		X	X
Pt's wanting to be functional in more than just the home space				X		
More effective and cost effective than medications					X	X

Lessons learned:

Interview:	1	2	3	4	5	6
Less doing, more listening	X					
Have to customise to the patient in front of you/ holistic			X	X		
Dream fulfilled			X			
It's a journey				X		
Incorporate it into their day and make realistic					X	
It's about more than just the physio						

Ideas to ? explore further:

Who comes for PR

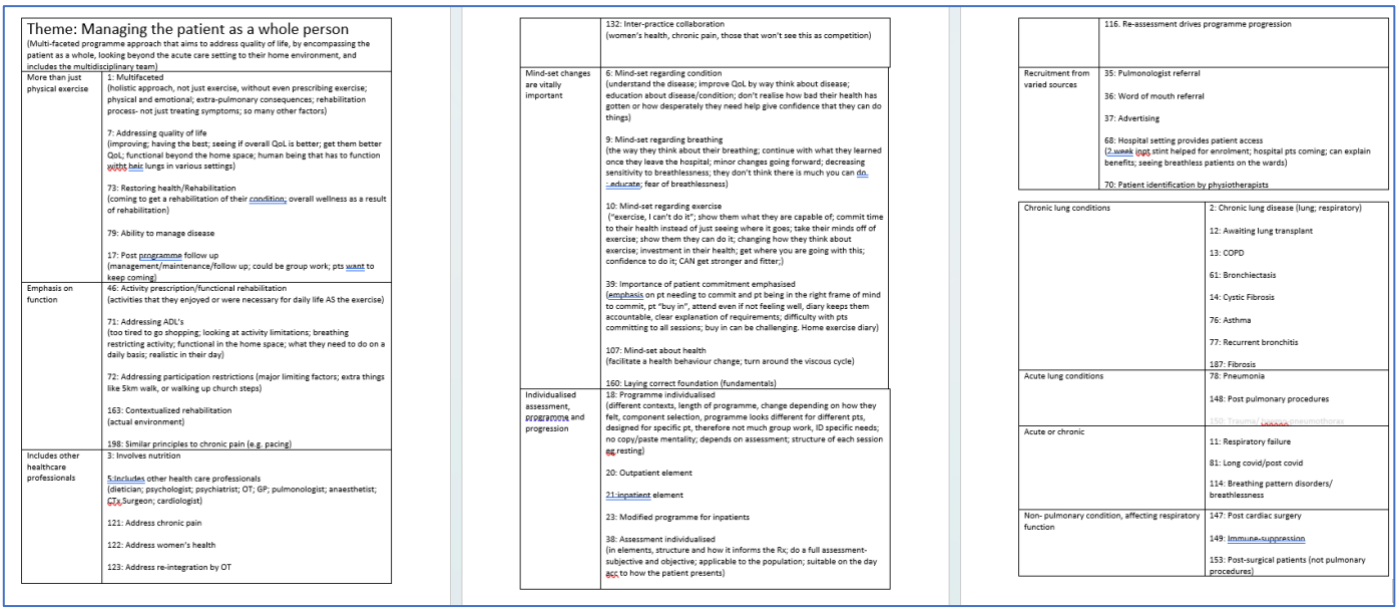
Solutions to the problems: as found, or suggested (eg pt buy-in listed as facilitator and as barrier… overcome by education)

A lot of the facilitators seem to be people/personality driven, while the barriers are hard obstacles

Defining success

The coding for the interviews was done after transcription and repeated relistening and then with re-reading and discussion with the supervisors. The final code list consisted of 208 codes.

These codes were sorted into initial categories and themes:



Theme: Managing the patient as a whole person (Multi-faceted programme approach that aims to address quality of life, by encompassing the patient as a whole, looking beyond the acute care setting to their home environment, and includes the multidisciplinary team)	
More than just physical exercise	1: Multifaceted (holistic approach, not just exercise, without even prescribing exercise; physical and emotional; extra-pulmonary consequences; rehabilitation process- not just treating symptoms; so many other factors) 7: Addressing quality of life (improving; having the best; seeing if overall QoL is better; get them better QoL; functional beyond the home space; human being that has to function with basic lungs in various settings) 73: Restoring health/Rehabilitation (coming to get a rehabilitation of their condition; overall wellness as a result of rehabilitation) 79: Ability to manage disease 17: Post programme follow up (management/maintenance/follow up; could be group work; pts want to keep coming)
Emphasis on function	46: Activity prescription/functional rehabilitation (activities that they enjoyed or were necessary for daily life AS the exercise) 71: Addressing ADL's (too tired to go shopping; looking at activity limitations; breathing restricting activity; functional in the home space; what they need to do on a daily basis; realistic in their day) 72: Addressing participation restrictions (major limiting factors; extra things like 5km walk, or walking up church steps) 163: Contextualized rehabilitation (actual environment) 198: Similar principles to chronic pain (e.g. pacing)
Includes other healthcare professionals	3: Involves nutrition 5:Includes other health care professionals (dietician; psychologist; psychiatrist; OT; GP; pulmonologist; anaesthetist; CTx Surgeon; cardiologist) 121: Address chronic pain 122: Address women's health 123: Address re-integration by OT

	132: Inter-practice collaboration (women's health, chronic pain, those that won't see this as competition)
Mind-set changes are vitally important	6: Mind-set regarding condition (understand the disease; improve QoL by way think about disease; education about disease/condition; don't realise how bad their health has gotten or how desperately they need help give confidence that they can do things) 9: Mind-set regarding breathing (the way they think about their breathing; continue with what they learned once they leave the hospital; minor changes going forward; decreasing sensitivity to breathlessness; they don't think there is much you can do, ..educate; fear of breathlessness) 10: Mind-set regarding exercise ("exercise, I can't do it"; show them what they are capable of; commit time to their health instead of just seeing where it goes; take their minds off of exercise; show them they can do it; changing how they think about exercise; investment in their health; get where you are going with this; confidence to do it; CAN get stronger and fitter;) 39: Importance of patient commitment emphasised (emphasis on pt needing to commit and pt being in the right frame of mind to commit, pt "buy in", attend even if not feeling well, diary keeps them accountable, clear explanation of requirements; difficulty with pts committing to all sessions; buy in can be challenging. Home exercise diary) 107: Mind-set about health (facilitate a health behaviour change; turn around the viscous cycle) 160: Laying correct foundation (fundamentals)
Individualised assessment, programme and progression	18: Programme individualised (different contexts, length of programme, change depending on how they felt, component selection, programme looks different for different pts, designed for specific pt, therefore not much group work, ID specific needs; no copy/paste mentality; depends on assessment; structure of each session eg resting) 20: Outpatient element 21:Inpatient element 23: Modified programme for inpatients 38: Assessment individualised (in elements, structure and how it informs the Rx; do a full assessment- subjective and objective; applicable to the population; suitable on the day acc to how the patient presents)

	116. Re-assessment drives programme progression
Recruitment from varied sources	35: Pulmonologist referral 36: Word of mouth referral 37: Advertising 68: Hospital setting provides patient access (2 week inpt stint helped for enrolment; hospital pts coming; can explain benefits; seeing breathless patients on the wards) 70: Patient identification by physiotherapists
Chronic lung conditions	2: Chronic lung disease (lung; respiratory) 12: Awaiting lung transplant 13: COPD 61: Bronchiectasis 14: Cystic Fibrosis 76: Asthma 77: Recurrent bronchitis 187: Fibrosis
Acute lung conditions	78: Pneumonia 148: Post pulmonary procedures 150: Trauma/ [illegible] pneumothorax
Acute or chronic	11: Respiratory failure 81: Long covid/post covid 114: Breathing pattern disorders/ breathlessness
Non- pulmonary condition, affecting respiratory function	147: Post cardiac surgery 149: Immune-suppression 153: Post-surgical patients (not pulmonary procedures)

Theme: Financial barriers	
Medical aids	40. Need medical aid authorisation 60. Not fully covered by medical aid (as negative) (medical aids don't pay/don't pay out of PMB- comes from savings; can be a big expense; don't cover fully; unpredictable level of cover; n0t covered by hospital benefits as is an outpt; savings used up as chronically ill, so no cover)
Costs	90. Cost related to equipment 127. High initial financial outlay (upfront investment) 129. Space- cost 152. Post-graduate education required
Income	173. Ongoing financial risk (not just initial or early) (financial risk outweighs potential clinical reward; potential for crippling financial loss) 130. Slow early income

Theme: Human related Barriers	
Doctor related	80. Lack of referrals 97. Lack of awareness about what PR offers 106. PR not valued by doctors 134. Pulmonologists location
Patient related	Perceptions and feelings: 165. Lack of trust in health care industry 166. Perceived over-servicing 169. Ingrained bad patterns 186. Acceptance of health status quo 192. Patients feel helpless 202. Patient's not taking responsibility for accessing health-care 45. Negative patient perception of exercise Physical challenges: 103. Fluctuating patient performance 145. Cycle of deterioration 170. Disease progression inhibits effectiveness 184. Limited effort tolerance Deficits: 97. Lack of awareness about what PR offers 162. Need assistance to attend (lack independence) 55. Poor individual attendance 86. Lack of carry-over from acute to rehabilitation setting
Physio related	Perceptions and feelings: 44. Negative perception of formal exercise prescription (by physio) 136. Comparative lack of interest in respiratory by physios

	137. Preference in resp for inpt vs outpt setting 180. Cannot control all outcomes 194. Physio not driving force 196. Perceived online treatment as unsafe 203. Uncertainty about follow-up responsibility 206. Physio fear for patient safety Deficits: 99. Lack of undergraduate training 199. Particular physio access to space Misunderstanding of essence of PR: 150: Trauma/ haemo-pneumothorax were included 156. Cardiac patients were included 179. Conflating respiratory and cardio-pulmonary with pulmonary rehab 200. Indecision about scope of PR practice
Other	57. PR not the easy option 92. Poor senior support

Theme: Lack of physical resources:	
Space	91. Space- accessible 93. Space- privacy 94. Space- storage 129. Space- cost 172. Space- size
Other	133. Patient transport/travel 138. Time constraints 190. Access to emergency medical assistance
Context	54. Not ideal-world setting (Amazing centres across the world, but not sustainable in SA; despite guidelines need to customise because they are not always practical in SA; public/private imbalance- more than enough pt's in public)

Theme: The mental and psychological facilitators	
Motivation	For the physio: 29. Hope 195. Motivated patients 207. Success is rewarding For the patients: 47. Improvement 49. Fear of regression 50. Support network 205. Being "part of something"
The physio providing PRP	69. Mind-set change for therapist 143. Flexibility- customised for affordability 135. Passion for respiratory physio 197. Confident respiratory physio
Knowledge	30. The research advocates for PR 96. Huge need for PR 101. Knowledge resources are accessible 102. Subject matter is interesting 182. PR more effective than medication 208. Comprehensive postgraduate training package would facilitate

Theme: Resources	
Financial	62. Some medical aid cover (as positive) 64. Willingness to self-fund 65. Comparatively in-expensive intervention for patients 128. Financial cover from inpt work 171. Structured programme funding (possible global fees structure/package from med aid- does not yet exist) 175. More competitive equipment pricing 204. Group work to improve financial viability
Other resources	68. Hospital setting provides patient access (also on describing list) 95. Appropriate space as a facilitator 104. Minimal physical resources needed

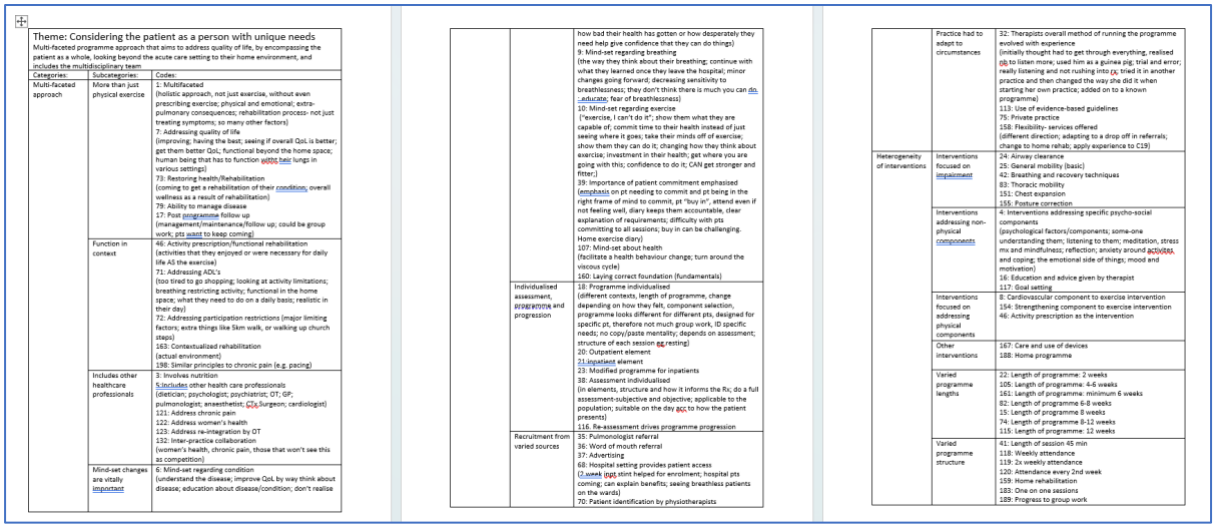
Theme: Teamwork	
Other physio's	100. PR mentor 139. Team/senior support
Other healthcare professionals	66. Promotion by the MDT 67. PR seen as part of wider management of conditions 124. MDT in close proximity 144. Appropriate early referrals 174. Developing professional relationships
Patient and family	168. Family involvement (as a positive) 193. Patients advocate for PR
All/other	176. Improved perception of physio in respiratory care 177. Potential private/public collaboration

Theme: Flexibility is required	
Overcoming barriers	Physical barriers: 59. Using technology to advantage 140. Flexibility- patient payments 142. Charitable actions- allows more patients to benefit 181. Med aid cover available at step down 191. Considered bio-kinethetists to run programme Non-physical barriers: 58. Managing expectations of the patient 88. Physiotherapy in an advocacy role- (educate, promote and champion) 164. Home rehab overcoming poor attendance
Changes occurred over time	The patient: 31. Physical improvement noted (descriptive, not as motivator) 33. Non- physical improvement noted 85. Different presentation of long covid The programme: 19. Covid changed things 34. Programme growth happened

Theme: Respiratory services need improvement	
Why did it start	26. Recurring patients not improving on multiple admissions 27. Standard management not adequate 28. Transplant programme- trigger for change 108. Lack of PR services in SA 109. PR services available internationally, so need to align with international standards 157. Available services of hospital affects practice direction 201. Facilitate set-up, not run programme
Where you are affects things	110. Gym facility needed 111. Physio is the setting for PR 131. Differing costs according to area 141. Demographic differences 146. Varied exposure (of the physio) to respiratory physio 178. NHI- possible opportunity

Things that don't fit in anywhere	156. Cardiac patients- faster recovery 179. Conflating respiratory and cardio-pulmonary with pulmonary rehab

This went through multiple rounds of discussion and refining, for example:



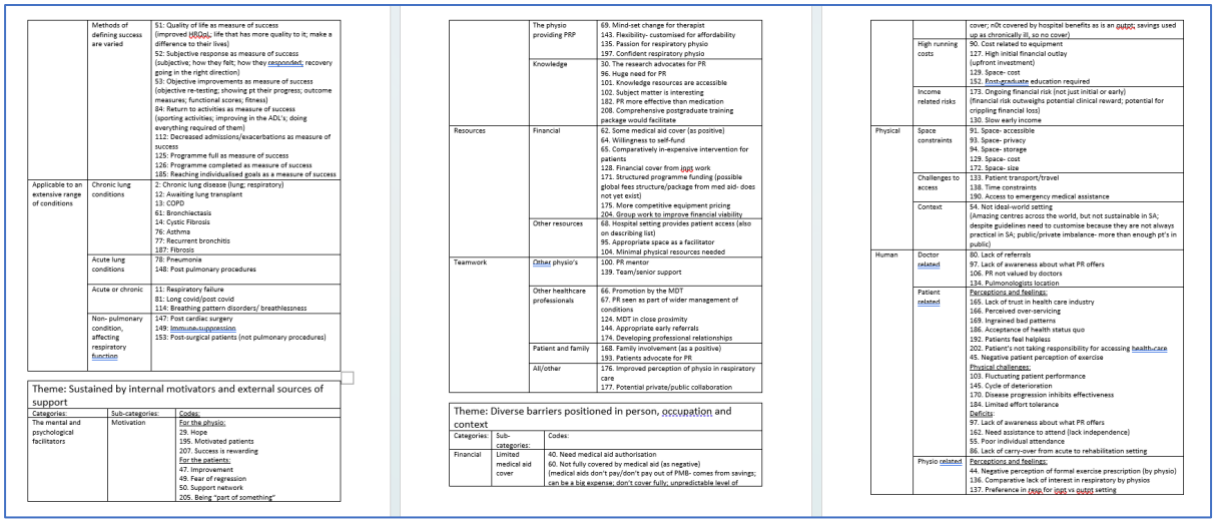
Theme: Considering the patient as a person with unique needs

Multi-faceted programme approach that aims to address quality of life, by encompassing the patient as a whole, looking beyond the acute care setting to their home environment, and includes the multidisciplinary team

Categories:	Subcategories:	Codes:
Multi-faceted approach	More than just physical exercise	1: Multifaceted (holistic approach, not just exercise, without even prescribing exercise; physical and emotional; extra-pulmonary consequences; rehabilitation process- not just treating symptoms; so many other factors) 7: Addressing quality of life (improving; having the best; seeing if overall QoL is better; get them better QoL; functional beyond the home space; human being that has to function with/ their lungs in various settings) 73: Restoring health/Rehabilitation (coming to get a rehabilitation of their condition; overall wellness as a result of rehabilitation) 79: Ability to manage disease 17: Post programme follow up (management/maintenance/follow up; could be group work; pts want to keep coming)
	Function in context	46: Activity prescription/functional rehabilitation (activities that they enjoyed or were necessary for daily life AS the exercise) 71: Addressing ADL's (too tired to go shopping; looking at activity limitations; breathing restricting activity; functional in the home space; what they need to do on a daily basis; realistic in their day) 72: Addressing participation restrictions (major limiting factors; extra things like 5km walk, or walking up church steps) 163: Contextualized rehabilitation (actual environment) 198: Similar principles to chronic pain (e.g. pacing)
	Includes other healthcare professionals	3: Involves nutrition 5:Includes other health care professionals (dietician; psychologist; psychiatrist; OT; GP; pulmonologist; anaesthetist; CTx Surgeon; cardiologist) 121: Address chronic pain 122: Address women's health 123: Address re-integration by OT 132: Inter-practice collaboration (women's health, chronic pain, those that won't see this as competition)
	Mind-set changes are vitally important	6: Mind-set regarding condition (understand the disease; improve QoL by way think about disease; education about disease/condition; don't realise

		how bad their health has gotten or how desperately they need help give confidence that they can do things) 9: Mind-set regarding breathing (the way they think about their breathing; continue with what they learned once they leave the hospital; minor changes going forward; decreasing sensitivity to breathlessness; they don't think there is much you can do, ..educate; fear of breathlessness) 10: Mind-set regarding exercise ("exercise, I can't do it"; show them what they are capable of; commit time to their health instead of just seeing where it goes; take their minds off of exercise; show them they can do it; changing how they think about exercise; investment in their health; get where you are going with this; confidence to do it; CAN get stronger and fitter;) 39: Importance of patient commitment emphasised (emphasis on pt needing to commit and pt being in the right frame of mind to commit, pt "buy in", attend even if not feeling well, diary keeps them accountable, clear explanation of requirements; difficulty with pts committing to all sessions; buy in can be challenging. Home exercise diary) 107: Mind-set about health (facilitate a health behaviour change; turn around the viscous cycle) 160: Laying correct foundation (fundamentals)
	Individualised assessment, programme and progression	18: Programme individualised (different contexts, length of programme, change depending on how they felt, component selection, programme looks different for different pts, designed for specific pt, therefore not much group work, ID specific needs; no copy/paste mentality; depends on assessment; structure of each session eg resting) 20: Outpatient element 21:Inpatient element 23: Modified programme for inpatients 38: Assessment individualised (in elements, structure and how it informs the Rx; do a full assessment-subjective and objective; applicable to the population; suitable on the day acc to how the patient presents) 116. Re-assessment drives programme progression
	Recruitment from varied sources	35: Pulmonologist referral 36: Word of mouth referral 37: Advertising 68: Hospital setting provides patient access (2 week inpt stint helped for enrolment; hospital pts coming; can explain benefits; seeing breathless patients on the wards) 70: Patient identification by physiotherapists

	Practice had to adapt to circumstances	32: Therapists overall method of running the programme evolved with experience (initially thought had to get through everything, realised ok to listen more; used him as a guinea pig; trial and error; really listening and not rushing into rx; tried it in another practice and then changed the way she did it when starting her own practice; added on to a known programme) 113: Use of evidence-based guidelines 75: Private practice 158: Flexibility- services offered (different direction; adapting to a drop off in referrals; change to home rehab; apply experience to C19)
Heterogeneity of interventions	Interventions focused on impairment	24: Airway clearance 25: General mobility (basic) 42: Breathing and recovery techniques 83: Thoracic mobility 151: Chest expansion 155: Posture correction
	Interventions addressing non-physical components	4: Interventions addressing specific psycho-social components (psychological factors/components; some-one understanding them; listening to them; meditation, stress mx and mindfulness; reflection; anxiety around activities and coping; the emotional side of things; mood and motivation) 16: Education and advice given by therapist 117: Goal setting
	Interventions focused on addressing physical components	8: Cardiovascular component to exercise intervention 154: Strengthening component to exercise intervention 46: Activity prescription as the intervention
	Other interventions	167: Care and use of devices 188: Home programme
	Varied programme lengths	22: Length of programme: 2 weeks 105: Length of programme: 4-6 weeks 161: Length of programme: minimum 6 weeks 82: Length of programme 6-8 weeks 15: Length of programme 8 weeks 74: Length of programme 8-12 weeks 115: Length of programme: 12 weeks
	Varied programme structure	41: Length of session 45 min 118: Weekly attendance 119: 2x weekly attendance 120: Attendance every 2nd week 159: Home rehabilitation 183: One on one sessions 189: Progress to group work



	Methods of defining success are varied	51: Quality of life as measure of success (improved HRQoL: life that has more quality to it; make a difference to their lives) 52: Subjective response as measure of success (subjective; how they felt; how they responded; recovery going in the right direction) 53: Objective improvements as measure of success (objective re-testing; showing pt their progress; outcome measures; functional scores; fitness) 84: Return to activities as measure of success (sporting activities; improving in the ADL's; doing everything required of them) 112: Decreased admissions/exacerbations as measure of success 125: Programme full as measure of success 126: Programme completed as measure of success 185: Reaching individualised goals as a measure of success
Applicable to an extensive range of conditions	Chronic lung conditions	2: Chronic lung disease (lung; respiratory) 12: Awaiting lung transplant 13: COPD 61: Bronchiectasis 14: Cystic Fibrosis 76: Asthma 77: Recurrent bronchitis 187: Fibrosis
	Acute lung conditions	78: Pneumonia 148: Post pulmonary procedures
	Acute or chronic	11: Respiratory failure 81: Long covid/post covid 114: Breathing pattern disorders/ breathlessness
	Non- pulmonary condition, affecting respiratory function	147: Post cardiac surgery 149: Immune-suppression 153: Post-surgical patients (not pulmonary procedures)

Theme: Sustained by internal motivators and external sources of support

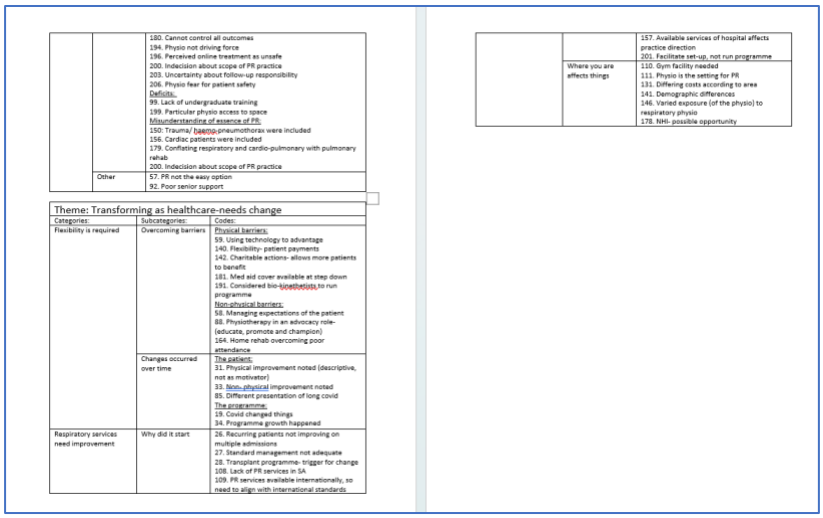
Categories:	Sub-categories:	Codes:
The mental and psychological facilitators	Motivation	For the physio: 29. Hope 195. Motivated patients 207. Success is rewarding For the patients: 47. Improvement 49. Fear of regression 50. Support network 205. Being "part of something"

	The physio providing PRP	69. Mind-set change for therapist 143. Flexibility- customised for affordability 135. Passion for respiratory physio 197. Confident respiratory physio
	Knowledge	30. The research advocates for PR 96. Huge need for PR 101. Knowledge resources are accessible 102. Subject matter is interesting 182. PR more effective than medication 208. Comprehensive postgraduate training package would facilitate
Resources	Financial	62. Some medical aid cover (as positive) 64. Willingness to self-fund 65. Comparatively in-expensive intervention for patients 128. Financial cover from inpt work 171. Structured programme funding (possible global fees structure/package from med aid- does not yet exist) 175. More competitive equipment pricing 204. Group work to improve financial viability
	Other resources	68. Hospital setting provides patient access (also on describing list) 95. Appropriate space as a facilitator 104. Minimal physical resources needed
Teamwork	Other physio's	100. PR mentor 139. Team/senior support
	Other healthcare professionals	66. Promotion by the MDT 67. PR seen as part of wider management of conditions 124. MDT in close proximity 144. Appropriate early referrals 174. Developing professional relationships
	Patient and family	168. Family involvement (as a positive) 193. Patients advocate for PR
	All/other	176. Improved perception of physio in respiratory care 177. Potential private/public collaboration

Theme: Diverse barriers positioned in person, occupation and context

Categories:	Sub-categories:	Codes:
Financial	Limited medical aid cover	40. Need medical aid authorisation 60. Not fully covered by medical aid (as negative) (medical aids don't pay/don't pay out of PMB- comes from savings; can be a big expense; don't cover fully; unpredictable level of

		cover; nOt covered by hospital benefits as is an outpt; savings used up as chronically ill, so no cover)
	High running costs	90. Cost related to equipment 127. High initial financial outlay (upfront investment) 129. Space- cost 152. Post-graduate education required
	Income related risks	173. Ongoing financial risk (not just initial or early) (financial risk outweighs potential clinical reward; potential for crippling financial loss) 130. Slow early income
Physical	Space constraints	91. Space- accessible 93. Space- privacy 94. Space- storage 129. Space- cost 172. Space- size
	Challenges to access	133. Patient transport/travel 138. Time constraints 190. Access to emergency medical assistance
	Context	54. Not ideal-world setting (Amazing centres across the world, but not sustainable in SA; despite guidelines need to customise because they are not always practical in SA; public/private imbalance- more than enough pt's in public)
Human	Doctor related	80. Lack of referrals 97. Lack of awareness about what PR offers 106. PR not valued by doctors 134. Pulmonologists location
	Patient related	Perceptions and feelings: 165. Lack of trust in health care industry 166. Perceived over-servicing 169. Ingrained habits 186. Acceptance of health status quo 192. Patients feel helpless 202. Patient's not taking responsibility for accessing healthcare 45. Negative patient perception of exercise Physical challenges: 103. Fluctuating patient performance 145. Cycle of deterioration 170. Disease progression inhibits effectiveness 184. Limited effort tolerance Deficits: 97. Lack of awareness about what PR offers 162. Need assistance to attend (lack independence) 55. Poor individual attendance 86. Lack of carry-over from acute to rehabilitation setting
	Physio related	Perceptions and feelings: 44. Negative perception of formal exercise prescription (by physio) 136. Comparative lack of interest in respiratory by physios 137. Preference in resp for inpt vs outpt setting



		180. Cannot control all outcomes 194. Physio not driving force 196. Perceived online treatment as unsafe 200. Indecision about scope of PR practice 203. Uncertainty about follow-up responsibility 206. Physio fear for patient safety Deficits: 99. Lack of undergraduate training 199. Particular physio access to space Misunderstanding of essence of PR: 150: Trauma/ haemo-pneumothorax were included 156. Cardiac patients were included 179. Conflating respiratory and cardio-pulmonary with pulmonary rehab 200. Indecision about scope of PR practice
	Other	57. PR not the easy option 92. Poor senior support

Theme: Transforming as healthcare-needs change

Categories:	Subcategories:	Codes:
Flexibility is required	Overcoming barriers	Physical barriers: 59. Using technology to advantage 140. Flexibility- patient payments 142. Charitable actions- allows more patients to benefit 181. Med aid cover available at step down 191. Considered bio-kinesthetists to run programme Non-physical barriers: 58. Managing expectations of the patient 88. Physiotherapy in an advocacy role-(educate, promote and champion) 164. Home rehab overcoming poor attendance
	Changes occurred over time	The patient: 31. Physical improvement noted (descriptive, not as motivator) 33. Non- physical improvement noted 85. Different presentation of long covid The programme: 19. Covid changed things 34. Programme growth happened
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Eventually, the subcategories, categories and themes were decided on, and the final product presented in the finished thesis.