

# Exploring barriers and motivators to exercise for people with pre-diabetes or type 2 diabetes

Mackenzie Armfield



A thesis submitted in partial fulfilment of the degree Masters of Applied Science at Otago Polytechnic, Dunedin, New Zealand

I declare that the work submitted for this submission is a result of my own effort. I affirm that there is no plagiarism and copying, either partially or entirely from someone else's designs and works, without giving proper credit and acknowledgements to the source(s)/author(s).

## **Acknowledgements**

I would like to acknowledge and thank the following people that have guided, supported, and assisted me through this thesis process.

To Phil Handcock, my primary supervisor, for being my main support throughout this journey. Your passion, knowledge, and patience made my experience enjoyable and achievable. Thank you for being the best supervisor and helping through every step of the process.

To Dr Codi Ramsey, my secondary supervisor. You helped me finetune my research topic and helped me find my passion in what I decided to pursue.

To my research participants, this thesis would not have been written without you. Your willingness to participate and the openness and honesty you provided throughout the research gathering process provided me with an amazing foundation on which to write my thesis. I am forever grateful for your involvement.

Finally, to my fellow Master students, my friends, and my family for being an amazing support system and giving me the encouragement and confidence to continue and complete this project.

## **Abstract**

The purpose of this study was to understand and acknowledge the barriers and motivators to exercise for people diagnosed with pre-diabetes (PD) or type 2 diabetes (T2DM), and whether these were influenced by stigma associated with diagnosis. Five participants from a diabetes exercise programme were observed in the programme and interviewed. Based on interview data three composite case studies were developed to highlight some of the participants unique responses and experiences with activity barriers and motivators. The main motivators explored were social aspects of exercise, a desire to improve health and fitness, enjoyment, and good weather. The main barriers experienced included cost, injury, lack of time, and lack of enjoyment. Social stigma associated with diabetes appeared to have an impact on some participants. Feeling embarrassed exercising in public decreased motivation to engage in physical activity (PA), whereas the desire to manage their condition or prevent further comorbidities was a great motivator for exercise. Overall, most of the barriers and motivators to exercise for people with PD or T2DM were consistent with those described in the literature, but participants offered some unique perspectives when discussing their barriers and motivators. The stigma associated with diabetes can negatively and positively impact motivation to exercise.

## List of contents

Abstract.....	3
Chapter 1	
Introduction	
Background context.....	8
Barrier and motivators to exercise.....	8
The gap in the literature.....	10
Thesis layout.....	11
Chapter 2	
Literature review	
Introduction.....	12
Diabetes.....	12
Overall benefits of exercise for diabetes management/prevention.....	14
Te Whare Tapa Wha.....	15
Motivators to exercise.....	17
Motivators for individuals with PD/T2DM.....	18
Barriers to exercise for PD/T2DM.....	20
A gap in the literature.....	23
Effects of stigma on participation/motivation.....	23
Chapter 3	
Methods	
Introduction to the method.....	25
Researcher's epistemology.....	25
Participants.....	27

Data collection.....	28
<b>Chapter 4</b>	
<b>Findings.....</b>	<b>31</b>
<b>Themes.....</b>	<b>32</b>
<b>Composite case study: Lily.....</b>	<b>33</b>
<b>Composite case study: Emily.....</b>	<b>37</b>
<b>Composite case study: Josh.....</b>	<b>41</b>
<b>Chapter 5</b>	
<b>Conclusions.....</b>	<b>46</b>
<b>Study limitations.....</b>	<b>47</b>
<b>Implications for practice.....</b>	<b>48</b>
<b>Future research.....</b>	<b>50</b>
<b>References.....</b>	<b>51</b>
<b>Manuscript.....</b>	<b>66</b>

## List of tables

<b>Table 1. Characteristics of five interviewed participants.....</b>	<b>31</b>
<b>Table 2. Characteristics of composite case studies.....</b>	<b>32</b>
<b>Table 3. Motivation and barrier themes from participant interviews.....</b>	<b>32</b>

## List of Figures

Figure 1. Whare Tapa Wha (four sided house) health model.....	17
---	----

# Chapter 1: Introduction

## Background context

Type 2 Diabetes Mellitus (T2DM) is a condition that affects over 6% of New Zealanders (Best Practice Advocacy Centre New Zealand, 2018). T2DM is a condition that can, in some cases, be prevented by leading a healthy and active lifestyle (Jenkins & Jenks, 2017). The groups of individuals who are at higher risk of developing T2DM include those who are over 40 years old, have high blood pressure, a family history of diabetes, have been classified as pre-diabetic (PD), and those who are overweight (Wilmot & Idris, 2014). Based on those risk factor characteristics, individuals should strive to lead healthier and more active lifestyles to avoid the development of PD/T2DM or to manage an already diagnosed condition.

## Barriers and motivators to exercise

Barriers (a factor/factors that leads to a person not wanting to engage in exercise) and motivators (a factor/factors that encourage a person to engage in exercise) to exercise have an impact on an individual's ability to adhere to exercise long-term. It is suggested that exercising at least 150 minutes per week will improve wellbeing and will reduce some of the risk factors associated with developing noncommunicable diseases (Jenkins & Jenks, 2017; Chudyk & Petrella, 2011), however, few researchers have considered why it is easier or harder for some to adhere to these guidelines. Whether or not an individual engages in the recommended amount of exercise per week was not the purpose of this research – rather the focus was on why some individuals are motivated to continue an activity while others are not.

A barrier that may be specific to individuals with diabetes is the potential stigma associated with their condition. Stigma is when a person is seen in a negative way because of a particular characteristic, whether that be skin colour, disability, cultural background, or more specifically to the research, a medical condition (Better Health Channel, 2015). Stigma associated with T2DM may be manifested in various barriers such as feeling blame for contributing to their condition, lack of energy, fear of injury, and psychological distress (Chang, Khurana, Strodel, Camp, Magenheim & Hawley, 2018; Browne, Ventura, Mosely & Speight, 2013). Acknowledging these potential barriers may assist in designing future exercise programmes to facilitate confidence, boost motivation and encourage participants to continue their health journey.

To boost motivation to engage in exercise on a long-term basis, a health professional would benefit from knowing what may motivate their client. For the general population, the most common motivators are social support, the health benefits of exercise, positive outcome expectations, physical appearance changes (weight loss), and competition (Mathews, Laditka, Laditka, Wilcox, Corwin, Liu, Friedman, Hunter, Tseng & Logsdon, 2010; Gavin, McBearty & Seguin, 2006).

Understanding barriers and motivators to exercise requires an holistic approach to health that focuses on a person's lifestyle and emotional health as well as their physical health. The current research project adopted the holistic perspective offered by the Te Whare Tapa Wha health model (Durie, 1994) to explore motivations and barriers. Te Whare Tapa Wha is a Māori health model that influenced the development of the lifestyle

enhancement programme from which the participants for the present study were recruited from. Te Whare Tapa Wha promotes viewing wellbeing as encompassing more than just physical wellness and uses a four-pillar model that emphasises mental, family, spiritual, and physical health (Durie, 1994). Each pillar must be cared for and maintained for a person's health and wellbeing to be at its best. If one pillar suffers, so does the individual's wellbeing and health. This model was used as a theoretical framework to explore motivators and barriers to exercise in this study.

### **The gap in the literature**

An identified gap in the literature was a general lack of understanding of any specific PD or T2DM related barriers and motivators to exercise. The potential for stigmas to impact on physical activity adherence (Jutel, 2014) has been minimally covered in the literature so the current research aims to add weight to that field.

The aim of this research was to explore various barriers and motivators to physical activity (PA) for individuals with pre-diabetes (PD) or type 2 diabetes mellitus (T2DM). Many people experience different barriers and motivators that impact their relationship with PA, so it was the aim of this research to explore and understand those factors. Type 2 diabetes is a condition that often has associated stigma. Therefore, this study aimed to explore whether any perceived stigma affected an individual's motivation to engage in physical activity (PA). It was expected that stigma may have had an impact on participants' willingness and determination to engage in PA. A diabetes diagnosis was expected to either hinder their performance abilities based on social stigma, or to motivate them to engage in physical activity (PA) to improve their health and quality of life.

## **Thesis layout**

In chapter 1 the aim of the research and the background context of exercise and PD and T2DM are introduced. An explanation of barriers and motivators is provided to give the research a clear context and a gap in the literature is identified to support the importance of the information being explored and discussed.

Chapter 2 provides a review of the relevant literature that explores the barriers and motivators to exercise for individuals with pre-diabetes/type 2 diabetes. The review also explores any stigma associated with diabetes and exercise that may relate to barriers or motivators.

Chapter 3 describes the methods used in the study. This chapter explains and justifies the qualitative methods used to gather the information.

Chapter 4 includes the research findings and the discussion of those findings. These findings are presented by outlining common themes and addressing differences in separate composite case studies.

Chapter 5 offers conclusions that summarises all the information that was gathered and interpreted in this study.

## **Chapter 2**

### **Literature Review**

#### **Introduction**

The aim of this research was to explore and understand barriers and motivators to exercise for individuals with pre-diabetes (PD) or type 2 diabetes mellitus (T2DM). PD and T2DM are conditions that effect an individual's overall lifestyle. The social, and other stigmas associated with a diagnosis could potentially have an impact on an individual's motivation to engage in exercise. The aim of the research was to understand the barriers and motivators for exercise and to explore any potential links with their condition.

Exercise professionals need to be aware of participant's barriers and motivators. This is to ensure that exercise is facilitated in a way that minimises barriers and promotes and encourages the motivators, in order to enhance the likelihood of enjoyment and continued participation (Jenkins & Jenks, 2017). This section is to briefly describes the pathophysiology of diabetes and its management through exercise while acknowledging various perceived barriers and motivators that may influence enjoyment and continued participation.

#### **Diabetes**

Diabetes is a complex condition with various stages and types that include pre-diabetes, type 1 diabetes, type 2 diabetes, and gestational diabetes. The overall mechanism that links each type is the body's inability to maintain healthy blood glucose levels (Hameed, Masoodi, Mir, Nabi, Ghazanfar & Ganai, 2015). There are behaviours that can be adopted to assist in the management or prevention of type 2 diabetes (T2D), the condition of interest in the present research. Hameed et al (2015) classify T2DM as the body becoming resistant to

insulin and/or the body slowly becoming unable to produce enough insulin. There is a strong genetic link with T2DM, however there are also modifiable risk factors relating to a person's lifestyle that also have links to the diagnosis (Jenkins & Jenks, 2017).

Characteristics of those at higher risk of developing T2DM include being a European over 40 years of age, having a family history of diabetes, being aged 30 or over and of Māori, Asian, Middle Eastern or Pacific Island descent, high blood pressure, obesity/overweight, or a history of pre-diabetes (Bellou, Belbasis, Tzoulaki & Evangelou, 2018; Joshy & Simmons, 2006). It is a common misconception (e.g. Hameed et al., 2015) that T2DM is primarily a 'lifestyle disease', however based on the list of predisposing characteristics there is more to this condition than simply one's lifestyle behaviours. Other factors such as stress, trauma, and displacement can result in the same outcome (Carruth & Mendenhall, 2018).

Pre-diabetes (PD) is associated with abnormal glucose levels and can be identified through tests such as fasting glucose and glucose tolerance (Al Amir, Abdullatif, Abdulle, Al Bitar, Zaki Afandi, Parish & Darwiche, 2015). Blood glucose (BG) levels in a pre-diabetic are high but are not high enough to be classified as type 2 diabetes. According to the Mayo Clinic (2020) there is hope for individuals with PD to return their BG levels to a healthy range and avoid diabetes through lifestyle changes including regular PA, maintaining a healthy diet and weight management. Symptoms of PD are similar to those for T2DM, including increased thirst, frequent urination, excessive hunger, fatigue, and blurred vision (Mayo Clinic, 2020). Further symptoms that are prevalent for individuals with T2DM are frequent infections and trouble with infection healing (Baltzis, Eleftheriadou & Veves, 2014). Once a person is aware of the signs and symptoms of PD or T2DM, the condition is relatively easy to identify and get medically diagnosed. Before, during, and after the diagnosis period, making

small improvements in lifestyle behaviours (such as increasing physical activity levels, managing weight, consuming a balanced diet) will ultimately improve their wellbeing as they manage the condition (Jenkins & Jenks, 2017). One lifestyle behaviour that can be enhanced and improved is physical activity (PA) participation. Engaging in regular PA has many benefits for the general population and also aids the management and prevention of T2DM.

### **Overall benefits of exercise for diabetes management/prevention**

Although lifestyle has a big part to play in the likelihood of developing diabetic conditions, it is not the primary cause. It is, however, important for those at high risk to manage their lifestyles in ways to reduce the risk of developing PD or T2DM. To help manage health and the potential for developing T2DM through PA, it is important to understand why exercise is so helpful.

For pre-diabetics and type 2 diabetics, exercise can work as a diabetes management tool or as a preventative measure. PA has the ability to improve blood glucose control, improve insulin sensitivity, encourage weight loss, reduce cardiovascular risk factors, and most importantly it can improve overall wellbeing and quality of life (e.g. Colberg, Colberg, Sigal, Yardley, Riddell, Dunstan & Tate, 2016).

Exercise has the benefit of being able to control weight, lower cholesterol, lower blood pressure, strengthen muscles and bones, reduce anxiety and improve overall wellbeing (Jenkins & Jenks, 2017). Bweir, Al-Jarrah, Almalty, Maayah, Smirnova, Novika & Stehno-Bittel (2009) add that exercise for type 2 diabetics can have additional benefits such

as lowering blood glucose levels and HbA1c levels regardless of changes in body weight.

HbA1c (glycated haemoglobin) is a measurement indicating the amount of glucose adhering to the protein haemoglobin. HbA1c indicates the mean glycated haemoglobin value for up to 4 months, and is a valuable diagnostic tool for monitoring long-term blood glucose control. (Weykamp. C, 2013; Diabetes UK).

Engaging in as little as two hours of exercise per week can have a positive impact in HbA1c health by reducing the levels and also reducing the risk of heart disease. Engaging in more vigorous exercise or engaging in exercise for up to 4 hours per week will reduce levels further, however, it is important to note that any form or amount of exercise is far better for one's health than remaining sedentary.

### **Te Whare Tapa Wha**

Te Whare Tapa Wha is a Māori worldview on wellbeing that suggests an individual's overall health and wellness is based on the maintenance and strength of emotional, physical, family, and spiritual wellness (Durie, 1994). Each category symbolises a pillar that supports the overall structure of a whare which is the visual representation of our wellbeing. Based on that visual imagery, if one pillar is not being looked after the whare pillar will crumble, impacting the entire structure of wellbeing. Therefore, we must strive to keep all four pillars strong and make each a priority to ensure our health and wellness is balanced (Durie, 1994). This worldview challenges modern approaches to health and emphasises overall wellness as opposed to physical fitness levels or aesthetic measures (Durie, 1994).

The four pillars of Te Whare Tapa Wha are Taha Tinana (physical health), Taha Wairua (spiritual health), Taha Whanau (family health), and Taha Hinengaro (mental health). Taha Tinana explores an individual's physical health, but more specifically, the bodily

dimension (Durie, 1994). Although the physical pillar focusses on bodily health and wellness as a structure that shelters the other factors, it is also emphasised that there is still a strong mind-body connection that must be intact for wellbeing to be optimal (Durie, 1994).

Taha Wairua is the capacity for spiritual health and faith and focuses on a person's spiritual essence (Durie, 1994). If a person is unwell, the holistic approach of Te Whare Tapa Wha will consider the spiritual health to determine whether or not damage here is manifesting itself as a physical illness.

Taha Whanau is a person's ability to belong to and care for a wider community. It is our direct link to our ancestors, our past, present and future and our connection to whanau (family) that can assist in acknowledging a person's health and can assist in resolving illness (Durie, 1994).

Finally, Taha Hinengaro is defined by mental health and our understanding that mind and body are inseparable. Taha Hinengaro ties into identity, thoughts, feelings and emotions, as well as how people view the world as Māori and how that is unique to the culture and differs from other cultures (Durie, 1994). Health and wellness are arguably better understood using Te Whare Tapa Wha as the model (Figure 1) explores an individual's state of wellness as being simply more than an absence of disease (Durie, 1994).

Now that Te Whare Tapa Wha is understood, it is then important to understand what might motivate a person to engage in PA to ensure that many of these pillars are being strengthened.

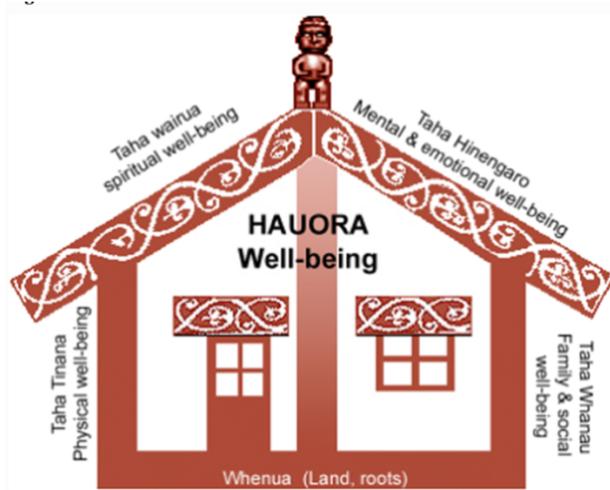


Figure 1.

Whare Tapa Whā (Four sided house) health model (Durie 1994).

### Motivators to exercise

Despite most people knowing the importance of exercise and keeping fit, some people find it harder than others to find the motivation to do so (Duncan, Hall, Wilson & Jenny, 2010). Motivation can be categorised as intrinsic and extrinsic (Deci & Ryan, 2002). Intrinsic motivation is based on the overall sense of satisfaction that comes with the behaviour of performing an activity, as opposed to extrinsic motivation which determines behaviour based on reinforcements or rewards that are a result of the activity performed (Deci & Ryan, 2002). As an exercise professional or as a support person, understanding an individual's motivation for exercise is a way to encourage them to participate in PA for their health and wellbeing, especially for the health of those diagnosed with PD or T2DM.

Each day some individuals decide to engage in some form of physical activity; others are already involved in an activity and make the decision to continue. The reasons why individuals begin an activity and the reasons why individuals then choose to commit to that activity will vary from person to person. Factors motivating exercise may include social

support, health benefits, and positive outcome expectations (Mathews et al., 2010). Factors that drive a person in the general population to want to exercise are consistent within the literature, however few studies have explored how a diabetic diagnosis influences motivation to engage in PA. Gavin, McBrearty and Seguin (2006) describe what motivates people to exercise and what keeps them coming back as positive health, the universal appeal of health, the importance of physical appearance (motivation declines with age), competition (particularly young men), social support from friends and family, gaining weight (adolescent boys), and losing weight (adolescent girls). These common motivators are perceived to increase an individual's determination to engage in regular physical activity, and by understanding individual motivators, it is easier to encourage long-term participation.

### **Motivators for individuals with PD/T2DM**

Engaging in regular exercise is beneficial for one's physical and mental health, especially for those with PD or T2DM (Jenkins & Jenks, 2017). Many individuals are aware of such benefits, and it is based on those benefits that their motivation to maintain a regular relationship with exercise remains relatively high. However, there are motivating factors individuals experience other than intrinsic motivators such as purely wanting to engage in PA for the love of it and for improving one's health and wellness. The most common motivators some individuals in the general population experience include enjoyment of being with others, a routine that promotes accountability, encouragement, affordability, and location (Biedenweg, Meischke, Bohl, Hammerback, Williams, Poe & Phelan, 2013). These motivators encourage individuals to feel motivated to engage in regular PA. Breaking

down the most common motivators provides an opportunity to understand how those with PD or T2DM might cope with exercise as a whole, and how they harness their motivators to encourage regular movement.

### Common Physical Activity Motivators for General Population

#### Social aspects of PA

According to Korhonen and colleagues (2011) a person's enjoyment during exercise is linked to the friends a person can make in the exercise environment, as well as the encouragement one receives from those friends during the activity. Making friends can also present itself as finding social support, a common motivator described by Matthews and colleagues (2010). Overall, the feeling of encouragement and support is what motivates some people to continue taking part in certain activities (Resnick, Orwig, Magaziner & Wynne, 2002).

#### Health

Given that lifestyle factors are one of many causes of T2DM and PD (Peirce, 1999), increasing levels of PA and leading a healthy lifestyle can decrease the likelihood of developing T2DM for some people. By understanding the general causes or factors leading to the development of PD and T2DM, some individuals gain motivation to work on the factors that are in their control to steady their health or limit the condition's progression (Peirce, 1999).

The desire to improve general health and fitness is a key motivator that encourages people to introduce exercise into their lifestyle and can motivate people to remain active (Jenkins & Jenks, 2017). The outcome expectation of exercise is positive and if that outcome

is achievable, a person is more likely to feel determined to continue (Mathews et al., 2010). People who engage in regular PA understand the incredible feeling of being healthy and fit, so maintaining healthy lifestyle behaviours becomes important for their overall wellbeing and state of wellness.

### Enjoyment

It has been found that enjoyment during exercise had a positive relationship with individual exercise levels in a person, meaning the more a person enjoyed exercise, the more they would engage in it (Hagberg, Lindahl, Nyberg & Hellénus, 2009; Williams, Papandonatos, Napolitano & Marcus, 2006). Tailoring exercise programmes to increase enjoyment will consequently increase motivation and encourage consistent engagement in PA.

### **Barriers to exercise for pre-diabetics/type 2 diabetics**

There are reasons why some individuals decide to stop performing an activity, often referred to as barriers. Barriers to exercise for the general population and for individuals with PD or T2DM may share common threads, but there may also be some condition-specific barriers. Individuals with PD or T2DM could experience barriers that have a strong link to a lack of self-esteem, lack of support, and other medical concerns/injuries that may arise from the exercise performed (Duclos et al., 2015).

The barriers described by Duclos et al. (2015) were based on general population observations and were not necessarily for individuals with a medical condition. Although, each barrier could be explored further to explore whether they may differ when experienced by an individual with PD or T2DM.

## Common Physical Activity Barriers for General Population

### Injury

Little, Paterson, Humphreys & Stathokostas (2013) stated that fear of injury is a major barrier to exercise, meaning people are often so afraid of causing an injury that they do not engage in PA at all. A study completed by Finch, Owen & Price (2000) revealed that injury or disability affecting motivation to exercise was directly linked to increased age and increased BMI. BMI (Body Mass Index) is a formula used to measure body fat based on weight and height (Rothman, 2008).

### Financial

The financial cost of exercise can be high depending on the activity a person selects. With many forms of exercise there are costs for clothes, equipment/gear, memberships, and one-to-one (personal training) sessions. These costs add up and can negatively impact motivation to engage in that activity. In New Zealand, the average fitness centre membership is between \$34 and \$285 per month (Consumer New Zealand, 2020) and some of these centres will involve additional costs for personal training fees, cancellation fees, and access card fees. Based on the high cost of many exercise options, many people are discouraged from engaging in PA as they cannot afford to maintain it as part of their lifestyle (Rimmer, Wang & Smith, 2008).

### Time

Multiple sources in the literature explore a lack of time impacting on a person's motivation and ability to engage in regular PA (e.g. Macniven, Pye, Merom, Milat, Monger,

Bauman & van der Ploeg, 2014). Some people tend to struggle to find time in their day/week to prioritise exercise (Macniven et al., 2014). It can be difficult to balance work life, exercise, and leisure time, so exercise can quite quickly become an activity that is not prioritised. In their study, Macniven et al. (2014) found that 9% of their 2225 participants expressed difficulty in finding time to exercise. Work-related factors are a barrier which can go hand in hand with a lack of time, as highlighted by Korhakangas, Alahuhta, Husman, Keinänen-Kiukaanniemi, Taanila & Laitinen (2011). Egan, Mahmood, Fenton, Redziniak, Kyaw Tun, Sreenan & McDermott (2013) described barriers to physical activity experienced by obese diabetics, with the most prevalent barrier being lack of time and overall discomfort performing an exercise. Although it is well known that exercise is a key factor in diabetes management and prevention, a lot of people struggle to prioritise a portion of their day/week for exercise activities.

### Absence of motivation

Many people do not experience the excitement of exercising and do not wish to engage due to lack of motivation and enjoyment (Deci & Ryan, 2002). This was explained as a lack of interest by Korhakangas et al. (2011). A lack of enjoyment in a specific activity could subsequently result in the individual abandoning that activity entirely (Frederick, Morrison & Manning, 1996). If there is an overall lack of interest, enjoyment or motivation in an activity, an individual is not likely to engage at all, which subsequently reduces the likelihood of that person managing or preventing their condition with exercise.

There are motivators and barriers explored for the general population, however, the literature is not as saturated with information regarding specific information for people with PD or T2DM.

### **A gap in the literature**

A gap identified in the literature is that specific motivators for individuals with T2DM or PD have not really been considered. There is evidence of similarities with motivators suggested for the general population, but there is a lack of information exploring motivators for people with specific medical conditions. It is expected that barriers experienced by individuals with PD or T2DM may not differ too greatly, however there could be unique or modified barriers for individuals diagnosed with these conditions.

### **Effects of stigma on participation/motivation**

Diagnosis related stigma may be more relevant in regard to an individual's overall perception of their condition, as opposed to specifically having an impact on the individual's likelihood to want to engage in PA. Liu, Brown, Younge, Guzman, Close & Wood (2017) explored stigma experienced by individuals with Type 1 and Type 2 Diabetes and how this differed between the conditions. They found that individuals with Type 2 Diabetes with higher BMIs, higher HbA1c reading, poorer control of their blood glucose, and on insulin medication, experienced much higher levels of stigma effect. A potential link between stigma and a lack of motivation to engage in exercise can be surmised from the effects that stigma can have on a person emotionally. Individuals with diabetes who experience stigma express feelings of fear, guilt, anxiety, low self-esteem, all of which can lead to depression (Liu et al., 2017). There is considerable evidence suggesting exercise is helpful for individuals

with depression (e.g. Firth, Rosenbaum, Stubbs, Gorczynski, Yung & Vancampfort, 2016), however what is acknowledged a little less is a lack of motivation to engage in PA if someone is experiencing depression. Firth et al. (2016) explored barriers and motivators to exercise in individuals with severe mental illness, and some of the main barriers identified were feelings of stress and low mood. Stigma associated with T2DM could evoke similar feelings and might therefore reduce motivation to engage in regular PA, despite the commonly known benefits of PA on such symptoms. In summary, the current researcher anticipated that stigma associated with T2DM could impact on motivators and barriers to exercise, yet there has been very little research on this concept.

It is to be reiterated that the purpose of the research is to understand specific motivators and barriers to exercise for people with PD or T2DM. The research aims to help future exercise professionals harness their PD or T2DM client's motivators and avoid their barriers, whilst also maintaining the understanding that social stigma surrounding T2DM may influence the presence of barriers.

## **Chapter 3**

### **Methods**

#### **Introduction to the method**

The purpose of this study was to seek to understand and acknowledge the barriers and motivators to exercise for people with PD/T2DM, and whether these were influenced by any stigma associated with a diagnosis. A person's perceived barriers and motivators to exercise directly impact their participation and engagement in physical activity (PA), and it was the aim of this research to explore how different barriers and motivators can influence attitudes to physical activity. Interviews and participant observations were employed to explore participant perceptions and approaches to exercise that either led to their decline in PA engagement, or an increase in engagement and enjoyment in PA.

#### **Researcher's epistemology**

As an exercise professional and researcher, I believe that health and fitness should be about a person's overall wellbeing and quality of life as opposed to their weight, BMI, or waist circumference. Based on my own experiences, I find that taking attention away from measures such as weight or waist circumference and putting an emphasis on energy levels, how clothes fit, and overall outlook on life leads to more positive changes. As a person who has been conscious of health, fitness and body image from a young age, I have approached the topic from many angles; from relying on scales and measurements, to relying on calorie intake, to finally relying on happiness and feeling content. The trial and error that I have experienced has guided how I view health and fitness today. By advocating positivity and educating people about the benefits of regular exercise for reasons other than aesthetics, I

have been able to help individuals find happiness in their skin and be proud of their fitness and health journey.

I was raised in a very health and fitness conscious family. I was always incredibly competitive and had a deep love for movement and sports. I was a competitive water polo player and also dabbled in soccer, softball, touch, rugby, dance, and swimming. Despite my incredibly active habits and my overall perceived healthy lifestyle, I was diagnosed with insulin resistance (IR) at the age of 17 which shifted my outlook on the way I was living my life. I had always been active, but my emotional and nutritional health were not being maintained to the same level, and there was also a strong genetic link to T2DM in my family. Due to my diagnosis and the potential reality of a future with type 2 diabetes if changes were not made, I made the decision to look at health as an overarching idea that encompassed many different aspects of wellbeing. Within one year I was able to come off Metformin, change my lifestyle, and reverse my insulin resistance which in turn positively impacted my emotional wellbeing.

Before experiencing complications with my health, I was unsure what I wanted to study at University. It was due to these complications that I realised I wanted to study health further and find a niche in the industry that I could specialise in. I went on to study a Bachelor of Physical Education majoring in Professional Studies and Physical Activity and Health. Following my degree, I then studied at Otago Polytechnic completing a diploma in Exercise and Health where I focused on my passion for helping type 2 diabetics improve their lifestyles to manage their condition. After working closely with clients in my lifestyle programme, it was essential for me to acknowledge how important overall health is to

wellbeing as opposed to simply focusing on physical measures of health and fitness. By acknowledging this within myself and witnessing it with my clients I was encouraged that this outlook on health was beneficial long-term.

Through adopting this more holistic outlook I was introduced to the Te Whare Tapa Wha model (Durie, 1994) This model explores wellness as being the constant maintenance of spiritual (Taha Wairua), physical (Taha Tinana), emotional (Taha Hinengaro), and family health (Taha Whanau) and suggests that if one pillar is not being maintained or supported, overall wellness and health is unlikely to be optimal or stable (Durie, 1994). This model encompasses all aspects of health, and the holistic approach ensures a person's wellness is not simply based on an absence of illness (Durie, 1994).

My worldview on health and wellness and my passion to help others are all consequences of being diagnosed with IR and working on my personal journey back to health. The topic of diabetes, barriers, motivators, and stigma are dear to my heart because I dealt with many barriers myself and often had to seek new motivators to encourage consistent engagement in exercise. I am now driven to explore various other points of view on the matter, to create participant profiles based off consenting Type 2 Diabetic people's experiences, and to help others lead a healthier and more fulfilling life.

## **Participants**

Study participants were recruited from an existing lifestyle enhancement programme of weekly group exercise classes tailored for individuals with PD or T2DM. This programme provided participants with social support, a safe space to interact and discuss any challenges they were presented with, an opportunity to share stories or struggles, and

an environment that was judgement free. Participants underwent 30-40-minute circuit style training sessions twice weekly. Participants also had the opportunity to make use of the services provided each month through Diabetes Otago drop-in clinics that included help from nutritionists, nurses, and podiatrists.

The programme design was influenced by the Te Whare Tapa Wha health model and did not focus on weight, BMI, or physical measures. Instead, energy levels, the way clothes fit, the way a person felt overall in their body, their outlook on life, and quality of life were emphasised. This holistic outlook on health was considered to offer individuals a more maintainable and achievable relationship with exercise and health.

Institutional ethical approval was obtained for this project from the Otago Polytechnic Human Ethics Committee with Māori consultation approved by the Kaitohutohu representative in the institute of Sport, Exercise and Health. Potential participants from the lifestyle enhancement programme were invited to participate in the present study by an independent third party acting as a gatekeeper to avoid any sense of coercion. The purpose of the research and interviews were explained to the participants.

## **Data collection**

### **Interviews**

Face-to-face semi-structured interviews were conducted at a mutually convenient time and venue. Interviews lasted between 30 and 60 minutes and were audio recorded. Due to Covid-19 and the New Zealand lockdown restrictions in place, one interview had to be conducted via telephone. That interview of just over 30 minutes followed the same semi-structured interview format. Semi-structured interviews were the preferred interview style. It allowed the researcher to guide the conversation and get the necessary answers from the

participant, and it also gave the participant the freedom to elaborate and talk freely where they felt comfortable.

Interview topics included exercise history, reasons for deciding to take part in physical activity, reasons for discontinuing physical activity, and the influence of a diagnosis on engagement with physical activity. Interviews were transcribed and key themes were identified and highlighted.

### **Programme Observations**

As a safe space for the participants to behave and share their thoughts, additional observational and conversational information was collected by the researcher using a reflective journal during exercise sessions. Participant's barriers or motivators to exercise were often demonstrated during the programme. For example, a participant may have experienced an injury which in turn led to a slow decline in their enjoyment of the activity as well as a decline in their participation. Such observations gave the researcher an opportunity to observe how some of the barriers and motivators manifested themselves and how deeply they may have affected each participant. Similarly, if the environment was fun with participants talking and laughing with loud music, the perceived enjoyment and motivation would noticeably increase. Through observations the researcher was able to better understand some of the barriers and motivators described by participants during interviews.

The information gathered from the interviews and the observations were analysed by finding and highlighting key themes, and recorded in the form of participant case studies.

Each case study outlined that participant's age, gender, exercise history and their perceived barriers and motivators. The research material offered by each participant was stored in the researchers locked and private laptop. Any physical material that was gathered was stored in a locked drawer that only the researcher had access to. This was done to ensure confidentiality and safety of material.

## Chapter 4

### Findings

The aim of this study was to understand and acknowledge the barriers and motivators to exercise for people with PD/T2DM, and whether these were influenced by stigma associated with the diagnosis. Five individuals diagnosed with either PD or T2DM were interviewed (Table 1). As these participants were recruited from a small, well-established and visible exercise group, individuals were potentially easily identifiable. To minimise that potential, three composite case studies (Table 2) were developed based on the five participant interviews and observations of those participants within exercise classes.

Several barriers and motivators were common to the participants (Table 3), and these had generally been reported in previous research (e.g. Korhonen et al., 2011; Liu et al., 2017; Jenkins & Jenks, 2017). However, some barriers and motivators discussed by the participants were not as prevalent in the research literature and these have been discussed in more detail within the case studies.

	<b>Age</b>	<b>Gender</b>	<b>Diabetes diagnosis</b>
Participant 1	74	Male	T2DM
Participant 2	72	Female	T2DM
Participant 3	50	Male	T2DM
Participant 4	53	Male	PD
Participant 5	50	Female	T2DM

<b>Name</b>	<b>Age</b>	<b>Gender</b>	<b>Diabetes diagnosis</b>
Lily	61	Female	T2DM
Joshua	57	Male	PD
Emily	53	Female	T2DM

## Themes

Based on the literature and the interviews with each participant, there were many clear themes of barriers and motivators that were reported by participants. Common motivators were social aspects, a desire to improve health and fitness, the aim to avoid developing T2DM (if PD), and competing against past personal performance (Biedenweg et al., 2014; Korkiakangas et al., 2011). Barriers that were consistent across interviews included injury, cost, lack of time, and boredom (Duclos et al., 2015; Jenkins & Jenks, 2017).

	<b>Motivators</b>	<b>Barriers</b>
<b>Common</b>	Music as a facilitator	Injury
	Social aspect of activity	Cost
	Becoming part of a daily/weekly routine	Scheduling issues/work commitments
	Wanting to improve health and fitness	Bad weather
	Competition with self	Boredom
	Avoiding developing T2DM	
	Good weather	
<b>Potentially unique</b>	Not wanting to look lazy → wanting to be good role model for family	Social aspect was interpreted as intimidating
	To get leaner/lose weight	Disliked exercise instructor
	Cost	Disliked participating in exercises alone
	Benefits for mental health	Social stigma
		Poor mental health
		Overly competitive/serious environments

		Not having active peers to encourage PA or to engage in PA with
--	--	---

**Composite case study one**

**Lily: 62-year-old female**

Lily had always been very active. She was raised in a family that encouraged movement and exercise from a young age. Growing up in such a household meant Lily never felt the need to alter her lifestyle habits a great deal, especially when diagnosed with T2DM as she was already regularly active. Throughout school she was involved in structured activities such as soccer, gymnastics, and swimming. She enjoyed sports so much that she actually became the school sport captain and was heavily involved in most activities in the school. Lily had a great relationship with competition and was very determined to perform at her best which would commonly result in her winning. Her sense of competition was expressed in a way that focused on her own performance and improvements as opposed to beating other people or teams.

After leaving school, she continued with her regular exercise in the form of running/walking and exercise classes such as aerobics classes. Because exercise had always been a part of her routine she did not struggle going from structured school sport to seeking new modes of exercise. Her activities of choice were not competitive and did not factor in a winning or losing side, so Lily shifted her focus from competing against others to competing against her own past performances. By doing so, Lily was able to identify her strengths and weaknesses and work at improving her performance and her fitness. She found this sense of

self-improvement was a great way to hold herself accountable for her fitness and kept her very active - she consistently got fitter and stronger.

Being diagnosed with T2DM after having PD for years, Lily did not feel the need to alter her activity levels because she was already highly active. There was a genetic link to T2DM in Lily's family, and she struggled with maintaining a balanced, nourishing diet. These factors impacted her development of T2DM despite her high PA levels. She did however have a new outlook on her active lifestyle and was aware that her engagement in regular PA was not only good for her overall fitness but was also a way to manage and control her condition. Initially, Lily was aware that engaging in PA was good for her health and she participated to maintain her level of fitness. Post diagnosis she had a more thorough understanding of the importance of her relationship to exercise thanks so her medical professional arming her with the knowledge surrounding exercise, its benefits, and how it can manage PD or T2DM.

Despite being aware of how essential exercise was for her health and wellbeing, there were still some factors that altered the amount of time per week Lily could engage in PA. The common barriers that Lily discussed included cost, injury, weather, and a lack of time. At the same time, there were many reasons and factors in her life that also drove Lily to participate in exercise activities. The common motivators described were competition, weather, and the desire to improve her health and fitness.

### **Lily's approach to motivators**

Apart from the fact that PA was engrained in Lily's lifestyle from a young age, there were other factors that motivated her to continue her routine on a daily/weekly basis

(Jenkins & Jenks, 2017). A level of competition, whether it was between her and an opponent or her own personal performance, kept Lily determined to continue engaging in that activity. This competition was supported by Egli, Bland, Melton & Czech (2011) observations. A sense of competition can drive people to continue bettering their performance (Egli et al., 2011), and this was the case for Lily in all her activities. As observed by the researcher during weekly exercise sessions, Lily enjoyed counting the number of push ups or sit-to-stands (squats with chair) that she accomplished in a given timeframe and would then aim to improve each time she performed that activity. That personal competition meant she consistently aimed to improve her times/reps and was always striving for a new, higher goal.

If the weather was nice, Lily was more inclined to engage in exercise. This motivator depended on the mode of exercise she had planned for that day. If she was participating in an indoor activity, the weather would not be a factor in her attendance, but nice weather meant she was more motivated to go for a walk outside. Belza (2004) also acknowledged good weather as a common motivator for exercise.

Another motivator was her overall desire to be fit and healthy (Jenkins & Jenks, 2017; Mathews et al., 2010). Her employment was very physically taxing, so it was in her best interests to remain fit to be able to perform her job to the best of her ability. Achieving this goal also had benefits for her diabetes management which was now more under her control. Being determined to maintain or improve health through exercise was Lily's main motivation and kept her interested in exercise on a regular basis.

An aspect of Lily's life that was unique was her relationship with her diabetes diagnosis and lifestyle, which she compared to her brother's lifestyle. She expressed

frustration that despite being incredible healthy, fit, and lean, she was still diagnosed with T2DM while her brother, who was overweight and sedentary, was diabetes free. Fortunately for Lily, her active lifestyle meant her diagnosis did not mean she was then thrust into an unaccustomed lifestyle. However, it was confusing and annoying for her to understand why she developed the condition and her brother did not. Despite that frustration, Lily maintained her active lifestyle and continued to be active on a daily basis to manage her condition.

Lily's relationship with exercise and health was seen to override perceived barriers and the frustration of a diabetes diagnosis simply encouraged her to continue leading a healthy and active lifestyle.

### **Lily's approach to barriers**

Although Lily discussed a number of perceived barriers to exercise, these did not in fact stop her from engaging in PA altogether. As discussed, an injury can stop a person from engaging in all forms of exercise (Little et al., 2013) while they give their body time to heal. However, in Lily's case, an injury simply encouraged her to alter her exercise activity so as not to aggravate that injury any further, and to make sure she was still able to move her body. For example, if she had a shoulder injury, she would avoid arm exercises and would instead focus on lower body activities. Injuries were experienced by Lily, but they did not stop her from moving her body in some way.

Lily also mentioned a lack of time as a barrier (Macniven et al., 2014; Korkiakangas et al, 2011). Working a physically taxing job for long hours meant that she struggled to find time to engage in high intensity exercise on a daily or weekly basis. For some, that can lead

to a complete lack of involvement in exercise, but for Lily it simply meant she would replace high intensity exercise after work with a brisk walk. She was still determined to include exercise in her daily routine (Jenkins & Jenks, 2017), so she made time at the end of the day to go walking for anywhere between 20-60 minutes.

It is important for an exercise programme creator to acknowledge time restraints such as Lily's. Exercise programmes should be flexible and should work around a person's schedule. Assuming many participants in a programme will have children, work, and many other commitments, the exercise programme must be flexible enough for someone to be able to complete at a time that suits them around their busy schedule.

It was clear that Lily's relationship with exercise was one where she found ways to work around barriers. She prioritised exercise regardless of time constraints or injury and ensured that engaging in PA was a part of her lifestyle most days.

## **Composite case study two**

### **Emily: 53-year-old female**

Emily was not always a very active person. She was not raised in a household that stressed the importance of exercise, so movement was never part of her daily routine. Despite this, she still took part in some school sports such as netball and gymnastics but did not enjoy sport at school as a whole. Instead, Emily enjoyed going for jogs or walks with her friends and also found joy in swimming. Although she was not passionate about exercise, she still managed to take part in various activities, especially if it involved being with a friend. Emily did not care for competition in sport; she was not interested in winning or losing at all, so team sports were not enjoyable for her. She did not find personal

competition very motivating either; she wanted to engage in PA to be with friends and to feel well in herself rather than wanting to beat a personal best or beat an opponent.

After finishing school, Emily continued walking and swimming, but was also introduced to other forms of exercise that she came to really enjoy. A neighbour of hers invited her to join her Zumba classes, and Emily found a real passion for modes of exercise like Zumba and aerobics classes. Emily really enjoyed the fun environment, being led by a motivational exercise leader and being surrounded by like-minded people and wanted to continue. She also started participating in water aerobics classes with her daughter which was just as much fun and was exciting.

By engaging in exercises with her daughter, she encouraged her family to be more fit and active. As well as being a good role model for her children, exercising with someone was essential for Emily. She found an exercise partner that helped hold her more accountable for her attendance. After discovering exercise classes such as Zumba, group exercise classes and water aerobics, Emily had been able to maintain a very active lifestyle that was fun, engaging, and achievable. She also made an effort to continue walking with friends most days.

Her relationship with exercise wound up being very positive despite not valuing activity a lot in her younger years. Although she found a passion for regular exercise, there were still some barriers that presented themselves and impacted her ability to perform exercise regularly. The main barriers Emily mentioned were injury/illness and eventually the financial commitment of being active with things such as equipment/clothing needed and gym memberships. The motivators that pushed Emily to engage in PA regularly were the social aspects of PA, the exciting environment during group classes, wanting to get the value

from the cost of the gym membership, and her desire to be a good role model to her children.

### **Emily's approach to motivators**

The cost of gym memberships is often a barrier to exercise for some as memberships are expensive to maintain long-term (Macniven et al., 2014; Rimmer, Wang & Smith, 2008). However, Emily had a unique outlook on gym membership cost that actually converted it from a barrier to a motivator. In Emily's mind, she was paying a lot of money each week to be a part of a gym, so she might as well go to the gym as much as possible to get her money's worth. Rather than ending the membership early, she made use of it in the best way possible by going to as many group classes as possible and making the most of the membership while she had it. This added motivation meant she was exercising on a daily basis which was good for managing her T2DM. The gym membership did, however, become too expensive to maintain long-term so ultimately it was a barrier for that specific mode of exercise in that environment. Although the gym was no longer an environment Emily could exercise in due to cost, she did remain active by going for walks regularly.

Emily had a passion for exercising with friends or family and it was made clear that her involvement in exercise was only certain if her exercise partner also attended. Many people enjoy exercising with a friend (Korkiakangas et al., 2011; Matthews et al., 2010), but in Emily's case she would only engage in an exercise activity provided her friend or family member encouraged her to attend and went with her. This level of dependence meant if her friend could not attend an activity, neither would Emily. Interestingly, the social aspect of exercise was a motivator as well as a barrier if it turned out that Emily would have to go

alone to an activity. However, having a peer to exercise with made the task much more enjoyable for Emily which in turn increased her attendance and motivation (Hagberg et al, 2009; Williams et al, 2006). However, having a peer to exercise with made the task much more enjoyable for Emily which in turn increased her attendance and motivation (Hagberg et al, 2009; Williams et al, 2006).

A key motivator for Emily was her desire to engage in exercise to be a good role-model for her children (Korkiakangas et al., 2011). Emily did not want to appear lazy to her children by not exercising, so she decided to join exercise groups and find new ways to move her body to ensure her children witnessed and understood the importance of regularly exercise. By being a good role-model, she hoped her children would also participant in more PA. It was also a great way for her to encourage her children to engage in PA with her; this meant she was not only getting her children active but was also recruiting exercise partners.

### **Emily's approach to barriers**

The main barrier the affected exercise for Emily was injury, and this was consistent with what has been described in the literature (e.g. Little et al., 2013; Finch et al, 2000). Due to an injury, she had to be careful once she was recovered to ensure that she did not aggravate that injury. Although injury stopped her from being able to take part in any form of exercise, once she had recovered, she was motivated to get moving once again. However, her injury dictated the modes of exercise that she could employ. From her description the injury affected her knees, so high impact and high leg-loading exercises were not possible.

Emily adapted exercises by modifying the movements to work around her injury. This was supported by the researcher's observations where the exercise leader provided Emily with alternative exercises during sessions to avoid loading her injury site.

Having been diagnosed with T2DM 15 years prior to the current study, Emily was in a routine with her medication. Emily had also established an exercise routine that kept her consistently active and that aided her diabetes management (Peirce, 1999). Sometimes people experience feelings of shame, guilt, or embarrassment because of their diagnosis, and that can become a barrier to exercise (Browne et al., 2013). However, Emily did not experience any of those emotions and simply took the diagnosis in her stride. If anything, it highlighted for her the importance of maintaining her activity levels and made her more aware of how essential it was to lead a fit and healthy lifestyle (Jenkins & Jenks, 2017).

### **Composite case study three**

#### **Joshua: 57-year-old male**

Joshua was always an active individual. He participated in jogging, cycling, swimming, and hockey as a child and found structured exercise enjoyable, but had a real passion for being in the outdoors and trying new activities. Growing up he did not have access to a car, so his mode of transport was to either walk, jog, or cycle. Although this was mainly a means to get from A to B, Joshua loved being in nature and found it incredibly therapeutic to have that solo time moving his body. Joshua did not enjoy competing against other people or other teams at all, and in fact would sometimes shy away from competitive environments during his school years. Joshua enjoyed improving his own performance but was not interested in engaging in competitive team sports.

Once he left school, he decided to take his passion for the outdoors further by engaging in hiking on a weekly basis with a group of others. As well as hiking, Joshua also expressed an interest in group exercise classes like aerobics. There were so many modes of exercise to experiment with, and Joshua was open to try as many as possible. Joshua would always engage in exercise by himself, so was motivated to try new forms of exercise to make new friends and to see if he was interested in an activity that he had never tried before. Making new friends was a motivator for Joshua, but it was also very intimidating for him and he found it overwhelming being in social environments where he did not know anyone. Joshua suffered from poor mental health and low self-esteem which affected his confidence in social situations. Although he acknowledged lacking confidence, this did not stop him from joining various groups and participating in multiple activities.

Joshua engaged in PA for his overall health and wellbeing, rather than for aesthetic reasons or to be the fittest man. Fitness meant a lot to him, but he preferred the feeling of exercising and the positive impact it had on his mental health rather than what it might be doing for his body aesthetically. That positive relationship with exercise made it easy for Joshua to exercise on a regular basis and he was consistently motivated to get outside or attend his exercise class to move his body. Being intrinsically motivated to exercise was great for him, but there were still some barriers and motivators that impacted his performance now and again.

The common barriers experienced by Joshua were cost, the social aspect of exercise, and injury. The main motivators for Joshua that encouraged him to exercise regularly were the fear of developing T2DM and the social aspect of exercise. Although these barriers and

motivators could in theory have affected his motivation to engage in PA, Joshua remained consistent with his physical activity.

### **Joshua's approach to motivators**

For Joshua his main motivator was his overarching fear of T2DM that ultimately led to his desire to be fit and healthy. Joshua was aware of the comorbidities of T2DM such as peripheral neuropathy, kidney failure, and retinopathy (Long & Dagogo-Jack, 2011) as significant health problems. Joshua was so terrified of developing diabetes and developing comorbidities that he was determined to remain active and healthy. Although it was fear-based motivation, he nonetheless was encouraged by that fear to be as active as possible which meant his health was easily maintained. His PD was manageable with this amount of exercise and his HbA1c levels did in fact decrease to the point where he was on the cusp of 'normal' and 'pre-diabetic'. Engaging in PA to improve health is a common motivator, according to Jenkins & Jenks (2017), & Peirce (1999), however, Joshua's motivation presented itself as a fear of developing T2DM, as opposed to generally seeking to improve his overall health and wellbeing.

### **Joshua's approach to barriers**

Joshua had a passion for engaging in exercise outdoors and decided to take up hiking on a weekly basis. That mode of exercise was very enjoyable for Joshua (Hagberg et al, 2009; Williams et al, 2006) and he made an effort to go hiking almost every week. The problem with hiking was that it was an expensive passion, and he could not continue to afford the equipment, gear, or time off work. Due to the high cost of this hobby, he was not able to go hiking as often or for as long as he would have liked. Cost was a barrier (Macniven

et al., 2014; Rimmer, Wang & Smith, 2008) because it stopped him from engaging in this activity as consistently as he had to begin with. He compromised by participating in day trips every month or so. With that in mind, it was acknowledged that the cost was not an absolute barrier.

The other barrier for Joshua was in fact a motivator for other participants in the study, and for many other individuals described in the literature. The social aspect of exercise is exciting for most (Korkiakangas et al., 2011; Matthews et al., 2010) as it is a chance to make new friends and be surrounded by equally motivated people. However, for Joshua, being surrounded by people he didn't know was intimidating and overwhelming for him; the thought of being thrust into a group of strangers to engage in exercise was a barrier. As previously mentioned, Joshua did enjoy making new friends during his sporting endeavours, however, the initial introduction of new people and being surrounded by different personalities and egos was overwhelming. For that reason, the presence of other people was in fact also a barrier for Joshua as he felt intimidated by other people and did not always feel welcomed or supported in every activity he joined.

Due to Joshua's self-described low self-esteem, the thought of being introduced to competitive people in an exercise group made the thought of joining that group less desirable. If he was in an environment where people were not supportive toward one-another or where negative comments were likely, Joshua would be tempted to discontinue the exercise. However, if the individuals in the group were encouraging, kind, and supportive, the social aspect of exercise would be a motivator for Joshua.

Joshua had a unique relationship with his PD diagnosis and body-image. In Joshua's 30's, he was diagnosed with PD and had also gained quite a lot of weight. He reacted to his weight gain and PD diagnosis by not engaging in exercise during that time. He was anxious about his appearance and how others might judge him for his weight, so his relationship with his weight and PD became a barrier to exercise for him for a few months (Bruk, 2014). This barrier did not stop him from exercising long-term as he was able to regain control of his health and was able to rise above any perceived judgement.

The main motivators and barriers for Joshua were consistent with those found in the research literature, but his unique take on his relationship with exercise set Joshua aside from many of those described in the literature. The barriers he experienced ultimately did not stop him from performing an exercise which was beneficial for his health; his motivators commonly overwhelmed the barriers. Due to his positive relationship with exercise and his overarching fear of developing T2DM, Joshua was determined to remain active and healthy to benefit his health and wellbeing (Jenkins & Jenks, 2017).

## Chapter 5

### Conclusions

The current research project aimed to understand the barriers and motivators to exercise that were experienced by individuals with pre-diabetes or type 2 diabetes mellitus, and whether or not associated stigma impacted their barriers or motivators. Prior to reviewing literature or observing and conversing with class participants, the researcher had anticipated a high level of stigma associated with a diagnosis that would impact individuals' motivations to exercise. It was expected that barriers and motivators to exercise experienced by people with PD or T2DM would differ from the general population. Most research has focused on the general population barriers and motivators and has not specifically addressed barriers and motivators experienced by individuals with PD or T2DM. For that reason, this research offers readers the opportunity to identify how attitudes to exercise can differ depending on health levels and conditions.

Five participants volunteered to participate in interviews (made into three composite studies of Lily, Emily and Josh) and were also observed (over a 12 week period) during weekly exercise sessions. The information gathered from the interviews, weekly observations, and the literature provided a well-rounded understanding of how each participant perceived various barriers and motivators. Based on the interview transcripts and observations, three composite case studies were created to preserve confidentiality for this potentially identifiable cohort. The key barriers expressed included injury, cost, lack of time, and lack of enjoyment (Little et al, 2013; Rimmer et al, 2008; Macniven et al, 2014; Korkiakangas et al, 2011), and the key motivators discussed were to improve health and fitness, social interactions, and to avoid developing PD or T2DM (Peirce, 1999; Korkiakangas

et al, 2011; Resnick et al, 2002). However, stigma associated with PD/T2DM did appear to alter motivation levels for the participants in a way that has not to our knowledge been explored in the literature. A diagnosis of either PD or T2DM sparked frustration, fear, or embarrassment in some participants. This reaction to their diagnosis either encouraged them to exercise more to avoid further health complications, or it was a barrier as they felt embarrassed to be in public exercising in front of people who were slimmer, and who may not have had health conditions such as PD or T2DM.

The research literature does not offer specific insight into specific barriers, motivators and associated stigma for people with PD or T2DM. It was found in the current study that people experience differences in what motivates them to engage in exercise. The participants interviewed had various relationships with exercise. Some were not active as children but became active in their adult years for health reasons, whereas others were raised in active families and were consistently taking part in PA because it was ingrained in their daily routine from such a young age. Due to their different relationships with exercise and active living, they each had unique barriers and motivators that are not routinely acknowledged in the literature.

## **Study limitations**

It is important to acknowledge that the researcher was also the programme director for the lifestyle programme from which participants were recruited. As such, there was a potential conflict of interest in conducting interviews with participants from the programme. Given this dual role, transparency was essential between the researcher and

participants. Participants were made aware that the researcher's research interest was in their personal reasons for discontinuing or continuing exercise, with no intended connection to the existing exercise programme.

A potential strength or weakness was the researcher's relationship with the participants. Due to this pre-existing relationship it could be argued that the tone of the interviews may have been influenced by those relationships. However, these relationships likely facilitated a more open level of communication during interviews which permitted a deeper understanding of barriers and motivators.

### **Implications for practice**

#### **How exercise practitioners can make use of knowledge of motivators and barriers and potential associated stigma**

There is no 'one size fits all' approach with exercise, and it is important to acknowledge each participant's specific needs when designing a programme that encourages long-term adherence. Part of the exercise professional's role is to understand their clients mental and physical status relative to exercise and lifestyle behaviours. Exercise leaders should have free flowing communication with participants so as to understand the various barriers and motivators likely to be experienced by those participants. This should help with the exercise professional's role of motivating motivate participants to exercise consistently and helping to identify and avoid barriers to habitual physical activity. Intrinsic motivation stems from an individual's enjoyment of an activity and motivation to continue based on that pure enjoyment, whereas extrinsic motivation is described as a form of motivation that stems from the consequences of the action as opposed to the enjoyment of

that activity (Gagne & Deci., 2005). Understanding where a participant's motivation begins makes it easier to harness and encourage that motivation.

Based on the information gathered in this research project, individuals diagnosed with PD or T2DM have a relationship with exercise that at times differs from those without the condition. The underlying barriers or motivators may be similar to those experienced by general population; however, it is their perspective of those factors that often changes specific to the condition. In some cases, the presence of PD or T2DM can alter motivation to exercise on a regular basis, which gives this specific population a slightly nuanced approach to motivators and barriers to exercise.

In some cases, a PD or T2DM diagnosis increased motivation; some were motivated to engage in more regular PA to manage their condition and improve their health.

The barriers that were expressed by participants in this study, such as injury, cost, lack of time, and bad weather can be avoided or managed in a structured exercise setting by an exercise professional. By acknowledging barriers, a safe and supportive working relationship and environment can be achieved. Similarly, identifying motivators allows those to be considered in order to provide an activity environment that clients are happy to return to.

It can be concluded that approaches to exercise should not be the same for everyone, and that there is no 'cookie-cutter' solution to boost motivation and avoid barriers. Individuals have their own unique relationship with exercise. Some barriers and motivators discussed may be consistently experienced but that does not mean that an individual's perception of that factor will match those experiences and may be altered based on a diagnosis of diabetes risk. People who live with PD or T2DM may experience

additional levels of barriers such as associated stigma and judgement from others, and motivators that can be exacerbated by the social stigma associated with their condition.

### **Future research**

Moving forward, more consideration should be given to those diagnosed with PD or T2DM to better understand how relationships to exercise may differ from the general population. When providing exercise for any group of people with medical conditions, it is essential to understand their condition and how that may affect their motivation to engage in exercise on a regular basis. Dedicating more research to understanding specific barriers and motivators for exercise within the diabetic community would increase awareness and would subsequently improve exercise relationships as a result.

## References

- Adeniyi, F. A., Anjana, M. R., & Weber, B. M. (2016). Global Account of Barriers and Facilitators of Physical Activity Among Patients with Diabetes Mellitus: A Narrative Review of the Literature. *Current Diabetes Reviews*, *12*(4), 440–448.
- Al Amiri, E., Abdullatif, M., Abdulle, A., Al Bitar, N., Afandi, E. Z., Parish, M., & Darwiche, G. (2015). The prevalence, risk factors, and screening measure for prediabetes and diabetes among Emirati overweight/obese children and adolescents. *BMC Public Health*, *15*(1).
- Alves, C., Casqueiro, J., & Casqueiro, J. (2012). Infections in patients with diabetes mellitus: A review of pathogenesis. *Indian Journal of Endocrinology and Metabolism*, *16*(7), 27.
- Aguiar, E. J., Morgan, P. J., Collins, C. E., Plotnikoff, R. C., Young, M. D., & Callister, R. (2014). The PULSE (Prevention Using LifeStyle Education) trial protocol: a randomised controlled trial of a Type 2 Diabetes Prevention programme for men. *Contemporary Clinical Trials*, *39*(1), 132–144.
- Bacon, L. (2010). *Health At Every Size: The Surprising Truth About Your Weight* (Second ed.). BenBella Books.
- Bagheri, F., Siassi, F., Koohdani, F., Mahaki, B., Qorbani, M., Yavari, P., Shaibu, O. M., & Sotoudeh, G. (2016). Healthy and unhealthy dietary patterns are related to pre-diabetes: a case–control study. *British Journal of Nutrition*, *116*(5), 874–881.

- Baltzis, D., Eleftheriadou, I., & Veves, A. (2014). Pathogenesis and Treatment of Impaired Wound Healing in Diabetes Mellitus: New Insights. *Advances in Therapy*, 31(8), 817–836.
- Barry, E., Roberts, S., Oke, J., Vijayaraghavan, S., Normansell, R., & Greenhalgh, T. (2017). Efficacy and effectiveness of screen and treat policies in prevention of type 2 diabetes: systematic review and meta-analysis of screening tests and interventions. *British Medical Journal*, 356, i6538.
- Bellou, V., Belbasis, L., Tzoulaki, I., & Evangelou, E. (2018). Risk factors for type 2 diabetes mellitus: An exposure-wide umbrella review of meta-analyses. *PLOS ONE*, 13(3), e0194127.
- Belza, B., Walkwich, J., Schwartz, S., LoGerfo, J., Shiu-Thornton, S., & Taylor, M. (2004). Peer reviewed: older adult perspectives on physical activity and exercise: voices from multiple cultures. *Preventing Chronic Disease*, 1(4).
- Best Practice Advocacy Centre New Zealand (2018) A rising tide of type 2 diabetes in young people: what can primary care do?. Bpac NZ better medicine.  
<https://bpac.org.nz/2018/diabetes.aspx>
- Biedenweg, K., Meischke, H., Bohl, A., Hammerback, K., Williams, B., Poe, P., & Phelan, E. A. (2013). Understanding Older Adults' Motivators and Barriers to Participating in Organized Programs Supporting Exercise Behaviors. *The Journal of Primary Prevention*, 35(1), 1–11.

- Bird, S. R., & Hawley, J. A. (2017). Update on the effects of physical activity on insulin sensitivity in humans. *BMJ Open Sport & Exercise Medicine*, 2(1).
- Browne, J. L., Ventura, A., Mosely, K., & Speight, J. (2013). 'I call it the blame and shame disease': a qualitative study about perceptions of social stigma surrounding type 2 diabetes. *BMJ Open*, 3(11), e003384.
- Bruk, J. (2014). Shame is Not an Effective Diet Plan. *Narrative Inquiry in Bioethics*, 4(2), 91–93.
- Bweir, S., Al-Jarrah, M., Almalty, A.-M., Maayah, M., Smirnova, I. V., Novikova, L., & Stehno-Bittel, L. (2009). Resistance exercise training lowers HbA1c more than aerobic training in adults with type 2 diabetes. *Diabetology & Metabolic Syndrome*, 1(1), 27.
- Carruth, L., & Mendenhall, E. (2018). Social aetiologies of type 2 diabetes. *BMJ*, k1795.
- Chang, C., Khurana, S., Strodel, R., Camp, A., Magenheimer, E., & Hawley, N. (2018). Perceived Barriers to Physical Activity Among Low-Income Latina Women at Risk for Type 2 Diabetes. *The Diabetes Educator*, 44(5), 444–453.
- Chudyk, A., & Petrella, R. J. (2011). Effects of Exercise on Cardiovascular Risk Factors in Type 2 Diabetes: A meta-analysis. *Diabetes Care*, 34(5), 1228–1237.
- Colberg, S. R., Sigal, R. J., Yardley, J. E., Riddell, M. C., Dunstan, D. W., ... & Tate, D. F. (2016). Physical activity/exercise and diabetes: a position statement of the American Diabetes Association. *Diabetes care*, 39(11), 2065-2079.

- Coppell, K. J., Kataoka, M., Williams, S. M., Chisholm, A. W., Vorgers, S. M., & Mann, J. I. (2010). Nutritional intervention in patients with type 2 diabetes who are hyperglycaemic despite optimised drug treatment--Lifestyle Over and Above Drugs in Diabetes (LOADD) study: randomised controlled trial. *BMJ*, *341*(jul20 2), c3337.
- Dave, D., Soni, S., & Irani, A. (2015). Identification of barriers for adherence to exercise in type 2 diabetes mellitus—a cross sectional observational study. *Physiotherapy*, *101*, e297.
- Deci, E. L., & Ryan, R. M. (2002). *Handbook of Self-Determination Research* (1st ed.). University of Rochester Press.
- Diabetes Prevention Program Research Group. (2002). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *New England Journal of Medicine*, *346*(6), 393-403.
- Dube, J. J., Fleishman, K., Rousson, V., Goodpaster, B. H., & Amati, F. (2012). Exercise dose and insulin sensitivity: relevance for diabetes prevention. *Medicine and science in sports and exercise*, *44*(5), 793.
- Duclos, M., Dejager, S., Postel-Vinay, N., di Nicola, S., Quere, S., & Fiquet, B. (2015). Physical activity in patients with type 2 diabetes and hypertension – insights into motivations and barriers from the MOBILE study. *Vascular Health and Risk Management*, *11*, 361.
- Duncan, L. R., Hall, C. R., Wilson, P. M., & O, Jenny. (2010). Exercise motivation: a cross-sectional analysis examining its relationships with frequency, intensity, and duration

of exercise. *International Journal of Behavioral Nutrition and Physical Activity*, 7(1), 7.

Dunkley, A. J., Bodicoat, D. H., Greaves, C. J., Russell, C., Yates, T., Davies, M. J., & Khunti, K. (2014). Diabetes prevention in the real world: effectiveness of pragmatic lifestyle interventions for the prevention of type 2 diabetes and the impact of adherence to guideline recommendations: a systematic review and meta-analysis. *American Diabetes Association*, 37(4), 922-933.

Durie, M. (1994). Māori perspectives on health and illness. *Social dimensions of health and disease: New Zealand perspectives*, 194-203.

Egan, A. M., Mahmood, W. A. W., Fenton, R., Redziniak, N., Kyaw Tun, T., Sreenan, S., & McDermott, J. H. (2013). Barriers to exercise in obese patients with type 2 diabetes. *QJM*, 106(7), 635–638.

Egli, T., Bland, H. W., Melton, B. F., & Czech, D. R. (2011). Influence of Age, Sex, and Race on College Students' Exercise Motivation of Physical Activity. *Journal of American College Health*, 59(5), 399–406.

Elkington, T. J., Cassar, S., Nelson, A. R., & Levinger, I. (2017). Psychological Responses to Acute Aerobic, Resistance, or Combined Exercise in Healthy and Overweight Individuals: A Systematic Review. *Clinical Medicine Insights: Cardiology*, 11, 117954681770172.

Evert, A. B., Dennison, M., Gardner, C. D., Garvey, W. T., Lau, K. H. K., MacLeod, J., Mitri, J., Pereira, R. F., Rawlings, K., Robinson, S., Saslow, L., Uelmen, S., Urbanski, P. B., &

- Yancy, W. S. (2019). Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report. *Diabetes Care*, 42(5), 731–754.
- Finch, C., Owen, N., & Price, R. (2001). Current injury or disability as a barrier to being more physically active. *Medicine and Science in Sports and Exercise*, 33(5), 778-782.
- Firth, J., Rosenbaum, S., Stubbs, B., Gorchynski, P., Yung, A. R., & Vancampfort, D. (2016). Motivating factors and barriers towards exercise in severe mental illness: a systematic review and meta-analysis. *Psychological Medicine*, 46(14), 2869–2881.
- Frederick, C. M., Morrison, C., & Manning, T. (1996). Motivation to Participate, Exercise Affect, and Outcome Behaviors toward Physical Activity. *Perceptual and Motor Skills*, 82(2), 691–701.
- Franken, R. E., & Brown, D. J. (1995). Why do people like competition? The motivation for winning, putting forth effort, improving one's performance, performing well, being instrumental, and expressing forceful/aggressive behaviour. *Personality and Individual Differences*, 19(2), 175–184.
- Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behaviour*, 26(4), 331–362.
- Galvim, A. L., Oliveira, I. M., Martins, T. V., Vieira, L. M., Cerri, N. C. et al. (2019). Adherence, Adhesion, and Dropout Reasons of a Physical Activity Program in a High Social Vulnerability Context. *Journal of Physical Activity and Health*, 16(2), 149–156.

Gavin, J., McBrearty, M., & Seguin, D. (2006). The psychology of exercise: a review of the latest research provides clues about what motivates people to exercise and what keeps them coming back. *IDEA Fitness Journal*, 3(2), 38-48.

*Get ripped, not ripped off: gym memberships compared.* (2020). Consumer NZ.

[https://www.consumer.org.nz/articles/gym-contracts?gclid=CjwKCAiAiML-BRAAEiwAuWVggkCb11gpq6wvB5MUPfnYB9B0ACK3W7fF2Ukwpk4-frvULGjgXKDROhoCyY4QAvD\\_BwE](https://www.consumer.org.nz/articles/gym-contracts?gclid=CjwKCAiAiML-BRAAEiwAuWVggkCb11gpq6wvB5MUPfnYB9B0ACK3W7fF2Ukwpk4-frvULGjgXKDROhoCyY4QAvD_BwE)

Gredig, D., & Bartelsen-Raemy, A. (2016b). Diabetes-related stigma affects the quality of life of people living with diabetes mellitus in Switzerland: implications for healthcare providers. *Health & Social Care in the Community*, 25(5), 1620–1633.

Gregg, E. W., Chen, H., Wagenknecht, L. E., Clark, J. M., Delahanty, L. M., Bantle, J., ... & Pi-Sunver, F. X. (2012). Association of an intensive lifestyle intervention with remission of type 2 diabetes. *Jama*, 308(23), 2489-2496.

Gredig, D., & Bartelsen-Raemy, A. (2016). Diabetes-related stigma affects the quality of life of people living with diabetes mellitus in Switzerland: implications for healthcare providers. *Health & Social Care in the Community*, 25(5), 1620–1633.

Hagberg, L. A., Lindahl, B., Nyberg, L., & Hellénus, M.-L. (2009). Importance of enjoyment when promoting physical exercise. *Scandinavian Journal of Medicine & Science in Sports*, 19(5), 740–747.

Hameed, I., Masoodi, S. R., Mir, S. A., Nabi, M., Ghazanfar, K., & Ganai, B. A. (2015). Type 2 diabetes mellitus: From a metabolic disorder to an inflammatory condition. *World Journal of Diabetes, 6*(4), 598.

Hansen, E., Landstad, B. J., Hellzén, O., & Svebak, S. (2010). Motivation for lifestyle changes to improve health in people with impaired glucose tolerance. *Scandinavian Journal of Caring Sciences, 25*(3), 484–490.

*HbA1c test*. (2020, August). Diagnosing and Monitoring Diabetes | Healthdirect.

<https://www.healthdirect.gov.au/hba1c-test>

Heinrich, K. M., Patel, P. M., O’Neal, J. L., & Heinrich, B. S. (2014). High-intensity compared to moderate-intensity training for exercise initiation, enjoyment, adherence, and intentions: an intervention study. *BMC Public Health, 14*(1), 789.

Heisz, J. J., Tejada, M. G. M., Paolucci, E. M., & Muir, C. (2016). Enjoyment for High-Intensity Interval Exercise Increases during the First Six Weeks of Training: Implications for Promoting Exercise Adherence in Sedentary Adults. *PLOS ONE, 11*(12), e0168534.

Higgs, C., Gisselman, A. S., Hale, L., & Mani, R. (2017). Health outcomes of the Dunedin Community Exercise Programme for people with type 2 diabetes and prediabetes: a single-group study. *European Journal of Physiotherapy, 19*(sup1), 64–65.

Hordern, M. D., Dunstan, D. W., Prins, J. B., Baker, M. K., Singh, M. A. F., & Coombes, J. S. (2012). Exercise prescription for patients with type 2 diabetes and pre-diabetes: A position statement from Exercise and Sport Science Australia. *Journal of Science and Medicine in Sport, 15*(1), 25–31

- Joshya, G., & Simmons, D. (2006). Epidemiology of diabetes in New Zealand: revisit to a changing landscape. *NZ Med J*, *119*.
- Jenkins, D. W., & Jenks, A. (2017). Exercise and Diabetes: A Narrative Review. *The Journal of Foot and Ankle Surgery*, *56*(5), 968–974.
- Jekauc, D. (2015). Enjoyment during Exercise Mediates the Effects of an Intervention on Exercise Adherence. *Psychology*, *06*(01), 48–54.
- Jutel, A. G., & Conrad, P. (2014). *Putting a Name to It: Diagnosis in Contemporary Society* (Reprint ed.). Johns Hopkins University Press.
- Kato, A., Fujimaki, Y., Fujimori, S., Izumida, Y., Suzuki, R., Ueki, K., Kadowaki, T., & Hashimoto, H. (2016). A qualitative study on the impact of internalized stigma on type 2 diabetes self-management. *Patient Education and Counseling*, *99*(7), 1233–1239.
- Khazae-pool, M., Sadeghi, R., Majlessi, F., & Rahimi Ferooshani, A. (2014). Effects of physical exercise programme on happiness among older people. *Journal of Psychiatric and Mental Health Nursing*, *22*(1), 47–57.
- Kirwan, J. P., Sacks, J., & Nieuwoudt, S. (2017). The essential role of exercise in the management of type 2 diabetes. *Cleveland Clinic Journal of Medicine*, *84*(7 suppl 1), S15–S21.
- Korkiakangas, E. E., Alahuhta, M. A., Husman, P. M., Keinänen-Kiukaanniemi, S., Taanila, A. M., & Laitinen, J. H. (2011). Motivators and barriers to exercise among adults with a

high risk of type 2 diabetes - a qualitative study. *Scandinavian Journal of Caring Sciences*, 25(1), 62–69.

Larson, H. K., McFadden, K., McHugh, T.-L. F., Berry, T. R., & Rodgers, W. M. (2017). You can't always get what you want: expectations, outcomes, and adherence of new exercisers. *Qualitative Research in Sport, Exercise and Health*, 9(3), 389–402.

Larson, H. K., McFadden, K., McHugh, T. L. F., Berry, T. R., & Rodgers, W. M. (2018). When you don't get what you want – and it's really hard: Exploring motivational contributions to exercise dropout. *Psychology of Sport and Exercise*, 37, 59-66.

Little, R. M. D., Paterson, D. H., Humphreys, D. A., & Stathokostas, L. (2013). A 12-month incidence of exercise-related injuries in previously sedentary community-dwelling older adults following an exercise intervention. *BMJ Open*, 3(6), e002831.

Liu, N. F., Brown, A. S., Younge, M. F., Guzman, S. J., Close, K. L., & Wood, R. (2017). Stigma in people with type 1 or type 2 diabetes. *Clinical Diabetes*, 35(1), 27-34.

Long, A. N., & Dagogo-Jack, S. (2011). Comorbidities of Diabetes and Hypertension: Mechanisms and Approach to Target Organ Protection. *The Journal of Clinical Hypertension*, 13(4), 244–251. <https://doi.org/10.1111/j.1751-7176.2011.00434.x>

Look AHEAD Research Group. (2010). Long term effects of a lifestyle intervention on weight and cardiovascular risk factors in individuals with type 2 diabetes: four-year results of the Look AHEAD trial. *Archives of internal medicine*, 170(17), 1566.

- Look AHEAD Research Group. (2013). Cardiovascular effects on intensive lifestyle intervention in type 2 diabetes. *New England Journal of Medicine*, *369*(2), 145-154.
- Macniven, R., Pye, V., Merom, D., Milat, A., Monger, C., Bauman, A., & van der Ploeg, H. (2014). Barriers and Enablers to Physical Activity Among Older Australians Who Want to Increase Their Physical Activity Levels. *Journal of Physical Activity and Health*, *11*(7), 1420–1429.
- Mainous, A. G., Yadav, S., Xie, Z., Huo, J. (2020). Cost or revenue: is diabetes prevention doomed due to misalignment of incentives? *Family Medicine and Community Health*,
- Mathews, A. E., Laditka, S. B., Laditka, J. N., Wilcox, S., Corwin, S. J., Liu, R., Friedman, D. B., Hunter, R., Tseng, W., & Logsdon, R. (2010). Older Adults' Perceived Physical Activity Enablers And Barriers: A Multicultural Perspective. *Medicine & Science in Sports & Exercise*, *41*, 373–374.
- Mendes, R., Sousa, N., Almeida, A., Subtil, P., Guedes-Marques, F., Reis, V. M., & Themudo-Barata, J. L. (2015). Exercise prescription for patients with type 2 diabetes—a synthesis of international recommendations: narrative review: Table 1. *British Journal of Sports Medicine*, *50*(22), 1379–1381.
- Miller, W., & Brown, P. R. (2017). Motivators, Facilitators, and Barriers to Physical Activity in Older Adults. *Holistic Nursing Practice*, *31*(4), 216–224.
- National Diabetes Prevention Program | Diabetes | CDC*. (2019). Centers for Disease Control and Prevention. <https://www.cdc.gov/diabetes/prevention/index.html>

O'Hagan, C., De Vito, G., & Boreham, C. A. G. (2012). Exercise Prescription in the Treatment of Type 2 Diabetes Mellitus. *Sports Medicine*, 43(1), 39–49.

Peirce, N. S. (1999). Diabetes and exercise. *British Journal of Sports Medicine*, 33(3), 161–172.

Pool, I. (n.d.). *Effects of colonisation on Māori*. Te Ara The Encyclopedia of New Zealand. <https://teara.govt.nz/en/death-rates-and-life-expectancy/page-4>

Potter, L., Wallston, K., Trief, P., Ulbrecht, J., Juth, V., & Smyth, J. (2015). Attributing discrimination to weight: associations with well-being, self-care, and disease status in patients with type 2 diabetes mellitus. *Journal of Behavioral Medicine*, 38(6), 863–875.

Pojednic, R. M., Polak, R., Arnstein, F., Kennedy, M. A., Bantham, A., & Phillips, E. M. (2017). Practice patterns, counseling and promotion of physical activity by sports medicine physicians. *Journal of Science and Medicine in Sport*, 20(2), 123–127.

Ren, Y., & Li, M. (2020). Influence of physical exercise on social anxiety of left-behind children in rural areas in China: The mediator and moderator role of perceived social support. *Journal of Affective Disorders*, 266, 223–229.

Resnick, B., Orwig, D., Magaziner, J., & Wynne, C. (2002). The Effect of Social Support on Exercise Behavior in Older Adults. *Clinical Nursing Research*, 11(1), 52–70.

Rimmer, J. H. (2008). Barriers associated with exercise and community access for individuals with stroke. *The Journal of Rehabilitation Research and Development*, 45(2), 315–322.

Rothman, K. J. (2008). BMI-related errors in the measurement of obesity. *International Journal of Obesity*, 32(S3), S56–S59.

Schabert, J., Browne, J. L., Mosely, K., & Speight, J. (2013). Social stigma in diabetes. *The Patient-Patient-Centred Outcomes Research*, 6(1), 1-10.

Sohal, T., Sohal, P., King-Shier, K. M., & Khan, N. A. (2015). Barriers and Facilitators for Type-2 Diabetes Management in South Asians: A Systematic Review. *PLOS ONE*, 10(9), e0136202.

*Stigma, discrimination and mental illness | betterhealth.vic.gov.au.* (2015, September 18).

Better Health Channel.

<https://www.betterhealth.vic.gov.au/health/servicesandsupport/stigma-discrimination-and-mental-illness>

*Te Whare Tapa Wha.* (2020). [Image].

<https://tearairesearchgroup.wordpress.com/2020/02/21/the-bicultural-whare-tapa-wha-older-persons-palliative-care-model/>

Teixeira, M. E., & Budd, G. M. (2010). Obesity stigma: A newly recognized barrier to comprehensive and effective type 2 diabetes management. *Journal of the American Academy of Nurse Practitioners*, 22(10), 527–533.

- Thoman, N., Alder, E., & Leese, G. P. (2004). Barriers to physical activity in patients with diabetes. *Postgraduate medical journal*, *80*(943), 287-291.
- Tiev, M., Manire, S.A., Robert, J. R., & Barbara, W. (2010). Effect of music and dialogue on perception of exertion, enjoyment, and metabolic responses during exercise. *International Journal of Fitness*, *6*(2).
- Type 2 diabetes - Symptoms and causes*. (2020, August 26). Mayo Clinic.  
<https://www.mayoclinic.org/diseases-conditions/type-2-diabetes/symptoms-causes/syc-20351193>
- Unick, J. L., Gaussoin, S. A., Hill, J. O., Jakicic, J. M., Bond, D. S., Hellgren, M., ... & Bossart, S. (2016). Four-year physical activity levels among intervention participants with type 2 diabetes. *Medicine and science in sports and exercise*, *48*(12), 2437.
- van der Vlist, B., Bartneck, C., & Mäueler, S. (2011). moBeat: Using Interactive Music to Guide and Motivate Users During Aerobic Exercising. *Applied Psychophysiology and Biofeedback*, *36*(2), 135–145.
- Viljoen, J. E., & Christie, C. J. A. (2015). The change in motivating factors influencing commencement, adherence and retention to a supervised resistance training programme in previously sedentary post-menopausal women: a prospective cohort study. *BMC public health*, *15*(1), 1-8.
- Visram, S., Bremner, A. S., Harrington, B. E., & Hawthorne, G. (2008). Factors affecting uptake of an education and physical activity programme for newly diagnosed type 2 diabetes. *European Diabetes Nursing*, *5*(1), 17–22.

- Weykamp, C. (2013). HbA1c: A Review of Analytical and Clinical Aspects. *Annals of Laboratory Medicine, 33*(6), 393–400.
- Williams, D. M., Papandonatos, G. D., Napolitano, M. A., & Marcus, B. H. (2006) Perceived enjoyment moderated the efficacy of an individually tailored physical activity intervention. *Journal of Sport and Exercise Psychology, 28*(3), 300-309.
- Wilmot, E., & Idris, I. (2014). Early onset type 2 diabetes: risk factors, clinical impact and management. *Therapeutic Advances in Chronic Disease, 5*(6), 234–244.
- Winkley, K., Ewlierhoma, C., Amiel, S. A., Lempp, H. K., Ismail, K., & Forbes, A. (2014b). Patient explanations for non-attendance at structured diabetes education sessions for newly diagnosed Type 2 diabetes: a qualitative study. *Diabetic Medicine, 32*(1), 120–128.
- Zelege Negera, G., & Charles Epiphany, D. (2020). Prevalence and Predictors of Nonadherence to Diet and Physical Activity Recommendations among Type 2 Diabetes Patients in Southwest Ethiopia: A Cross-Sectional Study. *International Journal of Endocrinology, 2020*, 1–8.

**Exploring barriers and motivators to exercise for people with pre-  
diabetes or type 2 diabetes**

Mackenzie Armfield

A thesis submitted in partial fulfilment of the degree Masters of Applied Science at Otago  
Polytechnic, Dunedin, New Zealand

## **Abstract**

The purpose of this study was to understand and acknowledge the barriers and motivators to exercise for individuals with pre-diabetes or type 2 diabetes, and to understand if those factors were affected by stigma associated with a diagnosis. Five participants from a diabetes exercise programme were interviewed and observed. Using a thematic analysis of interviews and observations, three composite case studies were developed to highlight some of the unique barriers and motivators experienced. The main barriers experienced included cost, injury, lack of time, and lack of enjoyment. The main motivators explored were social aspects of exercise, a desire to improve health and fitness, enjoyment, and good weather. Social stigma associated with diabetes, such as judgement for having the condition, appeared to have an impact on some participants. Feeling embarrassed exercising in public decreased motivation to engage in physical activity (PA), whereas the desire to manage their condition or prevent further comorbidities was a great motivator for exercise. Overall, most barriers and motivators to exercise for people with PD or T2DM were in agreement with the literature but participants offered some unique perspective with their lived barriers and motivators. The stigma associated with diabetes can negatively and positively impact motivation to exercise.

## **Introduction**

Type 2 diabetes (T2DM) is a condition that affects over 6% of New Zealanders (Better Practice Advocacy New Zealand, 2018). The most common risk factor characteristics that lead to an increased likelihood of developing T2DM include being over 40 years old, having high blood pressure, a family history of diabetes, being classified as pre-diabetic (PD), and being overweight (Wilmot & Idris, 2014). Some factors such as age or family history cannot be avoided, but excess weight, high blood pressure, and PD development are characteristics that can be managed or controlled provided the individual leads a healthier and more active lifestyle. However, leading a healthy lifestyle is not easy for some as there are various barriers people must overcome to feel confident in a consistent routine of physical activity. Unique individual barriers and motivators are experienced that encourage engagement in an activity, that intimidate or fail to excite someone into engaging in exercise or to continue an activity. The purpose of this study was to understand and acknowledge the barriers and motivators to exercise for individuals with pre-diabetes or type 2 diabetes, and to understand if those factors were affected by stigma associated with a diagnosis.

To understand barriers and motivators to exercise, it is important to then learn more about how some people view health and wellness, and how that might impact their relationship with barriers and motivators to exercise.

## **Te Whare Tapa Wha**

Te Whare Tapa Wha is a Māori worldview on wellbeing that suggests an individual's overall health and wellness is based on the maintenance and strength of emotional, physical, family, and spiritual wellness (Durie, 1994). Each category symbolises a pillar that support the overall structure of a whare which is the visual representation of our wellbeing.

The four pillars are Taha Tinana (physical health), Taha Wairua (spiritual health), Taha Whanau (family health), and Taha Hinengaro (mental health). Based on that visual imagery, if one pillar is not being looked after the whole will crumble, impacting the entire structure of wellbeing.

Taha Tinana explores an individual's physical health, but more specifically, the bodily dimension (Durie, 1994). Although the physical pillar focusses on bodily health and wellness as a structure that helps stabilise the other factors, it is also emphasised that there is still a strong mind-body connection that must be intact for wellbeing to be optimal (Durie, 1994). Taha Wairua is the capacity for spiritual health and faith and focuses on a person's spiritual essence (Durie, 1994). If a person is unwell, the holistic approach of Te Whare Tapa Wha may shift focus to spiritual health to determine whether or not damage here is manifesting itself as a physical illness. Taha Whanau is a person's ability to belong to and care for a wider community. It is our direct link to our ancestors, our past, present and future and our connection to whanau (family) that can assist in acknowledging a person's health and can assist in curing illness (Durie, 1994). Finally, Taha Hinengaro is defined by mental health and our ability to communicate and acknowledge that mind and body are inseparable. It ties into identity, our thoughts, feelings and emotions, as well as how people view the world as Māori and how that is unique to the culture and differs from other cultures (Durie, 1994). Health and wellness are perhaps better understood using this model which explores a person's state of wellness more broadly than simply determining health as being an absence of disease.

The figure below (Figure 1) provides a visual representation of the Māori health model Te Whare Tapa Wha.



Figure 1.

Whare Tapa Whā (Four sided house) health model (Durie 1994).

Now that Te Whare Tapa Wha is understood, it is then important to understand what might motivate a person to engage in PA to ensure that many of these pillars are being strengthened.

### **Benefits of exercise for diabetes management/prevention**

Managing lifestyle habits and striving to lead a healthy routine are key factors in diabetes management and prevention. Regular PA is an essential tool for diabetes management as it has the ability to improve glucose control, improve insulin sensitivity, encourage weight loss, reduce cardiovascular risk factors, and improve overall wellbeing and quality of life (Colberg, Sigal, Yardley, Riddell, Dunstan & Tate, 2016). According to the Te Whare Tapa Wha model, mental health is an important aspect of our wellness that should be looked after and it is acknowledged that exercise can aid in that wellness. Exercise is a great tool to reduce stress and increase feelings of happiness and excitement (Khazaei-Pool et al, Alahuhta, Husman, Keinänen-Kiukaanniemi, Taanila, Laitinen, 2014) and will also lead to an overall desire to continue the activity.

### **Motivators for exercise**

Motivation to engage in anything in life can be broken down into intrinsic and extrinsic motivation (Deci & Ryan, 2002). Intrinsic motivation is based on the overall sense of satisfaction that comes with the behaviour of performing an activity, and extrinsic motivation determines behaviour based on reinforcements or rewards that are a result of the activity performed (Deci & Ryan, 2002). A great way to improve a person's adherence to an activity is to understand their motivation type and encourage them in a way that suits their relationship to exercise and motivation as a whole.

The most common motivators experienced by the general population include social support, health benefits, and positive outcome expectations (Mathews, Laditka, Laditka, Wilcox, Corwin, Liu, Friedman, Hunter, Tseng & Logsdon, 2010). Further motivators to exercise described by Gavin, McBrearty & Seguin (2006) include the universal appeal of health, the importance of physical appearance, competition, gaining weight (adolescent boys), and losing weight (adolescent girls). A gap in the literature is that specific motivators for individuals with PD or T2DM do not appear to have been considered. Nonetheless, it is important to understand that there is a wide range of motivators experienced across the board and understanding them helps encourage long-term adherence to an activity.

### **Barriers to exercise**

There are reasons why some people decide to engage in exercise, and there are also reasons why some people then decide to discontinue an activity - or decide to not start an activity at all - these could be referred to as barriers. People with PD or T2DM may experience barriers that differ slightly to the general population as social stigma associated with diabetes may impact their motivation to participate. The feelings that a person with PD

or T2DM may experience and that may limit their motivation to engage could include a lack of self-esteem, a lack of support, and other medical concerns/injuries that may arise from the exercise performed (Duclos, Postel-Vinay, di Nicola, Quere & Fiquet, 2015).

For the general population, the most common barriers experienced are lack of time, family and friends not sharing the same interest in PA, lack of energy, lack of resources, family caregiving obligations, and frequent work or leisure travel (Duclos et al, 2015; Korhakangas, Alahuhta, Husman, Keinänen-Kiukaanniemi, Taanila, Laitinen, 2017). These barriers have the ability to stop a person from engaging in all forms of exercise, which ultimately could limit their control over the management or prevention of diabetes. It is in the health professionals' best interest to understand potential barriers to exercise to ideally create an environment that aims to avoid barriers and strives to harness motivators.

## **Methods**

Institutional ethical approval was obtained for this study. Interviews and participant observations were employed to explore participant approaches to exercise that either led to their decline in PA engagement, or an increase in engagement and enjoyment in PA. Face-to-face semi-structured interviews were conducted at a mutually convenient time and place. Interviews lasted between 30 and 60 minutes and were audio recorded. Semi-structured interviews were the preferred interview style. It allowed the researcher to guide the conversation and get the necessary answers from the participant, and it also gave the participant the freedom to elaborate and talk freely where they felt comfortable.

The interviews aimed to uncover unique barriers and motivators experienced by each participant. Due to Covid-19 and the New Zealand lockdown laws having been put in place, one interview had to be conducted via telephone. Interview topics included exercise

history, reasons for deciding to take part in physical activity, reasons for discontinuing physical activity, and the influence of a diagnosis on engagement with physical activity. Interviews were transcribed and key themes were identified and highlighted.

The researcher was able to analyse journalled observations to further explore barriers and motivators described during interviews. Barriers or motivators to exercise were often clearly demonstrated during the programme which made the researcher's understanding of them clearer. For example, a participant may have experienced an injury which in turn led to a slow decline in their enjoyment of the activity as well as a decline in their participation. Such observations gave the researcher an opportunity to see how some of the barriers and motivators manifested themselves and how deeply they may have affected each participant

To help ensure anonymity, three composite case studies were created using data and accounts from the five interviews conducted. These case studies summarise individual experiences with exercise by outlining barriers and motivators and their experiences with how diabetes affected their relationships with physical activity.

The purpose of this study was to understand and acknowledge the barriers and motivators to exercise for individuals with pre-diabetes or type 2 diabetes.

## **Findings**

### **Composite case study one; Lily a 62-year-old female**

Being physically active was always a valued part of Lily's life, so maintaining her activity levels was something she did not struggle with. Her inherently active lifestyle made

for easy diabetes management after her diagnosis, and she valued her body's ability to function at a high level because of her positive relationship with physical activity. When Lily was diagnosed with T2DM, it came as a shock because of her healthy and active lifestyle, however, she persevered with her exercise habits and noticed the benefits it had on her physical and mental health. Although Lily had a passion for exercise, there were still some barriers that came up in her life that limited her motivation or willingness to engage in PA from time to time.

The main motivators Lily described included competition with herself, nice weather, and the overall desire to be fit and healthy (Egli, Bland, Melton & Czech, 2011; Belza, 2004; Jenkins & Jenks, 2017). With these motivators in mind, Lily's engagement in PA was consistent and her enjoyment in PA also impacted her adherence to the activity. Her motivators mostly outweighed her barriers which positively impacted her relationship to exercise and her diabetes management was maintained as a direct result.

The main barriers Lily experienced were injury and lack of time (Little, Paterson, Humphreys & Stathokostas, 2013; Macniven, Pye, Merom, Monger, Bauman & van der Ploeg, 2014). However, these barriers did not halt her engagement altogether. If Lily was experiencing an injury, she altered her mode of exercise to ensure that she was still being active but in a way that would not aggravate her injury. At times she would struggle to prioritise exercise but would still find a moment in the day to at least put aside 20 minutes for a brisk walk.

### **Composite case study two: Emily a 53-year-old female**

Emily was not always an active person and did not always understand the value of regularly engaging in PA for her overall health. It took Emily a few years into her adulthood

to find modes of exercise that increased her enjoyment and desire to participate. After being diagnosed with T2DM, Emily was made aware of the benefits of exercise from her general practitioner (GP) and was encouraged and determined to get into a routine of healthy living and taking part in regular exercise activities that sparked joy.

Common motivators experienced by Emily were initially the money spent on a gym membership, peer support and social aspects, and being a good role-model to her children (Macniven et al., 2014; Korhonen et al., 2011; Matthews et al., 2010). The cost of the gym membership initially was a motivator for Emily. Her view was, if she was paying for the membership, she might as well attend as many classes as possible to get her money's worth. For that reason, her exercise engagement levels were high. Making friends and participating in exercises with other people offered a great deal of joy for Emily, and being in that environment motivated her to continue. Her greatest motivator was to ensure she was a healthy role-model for her children and for her children to see and join their mother in regular acts of PA. This was another way to promote healthy living to her offspring by demonstrating how much fun and maintainable a healthy lifestyle could be.

The barriers Emily explained included injury/illness, and eventually cost (Little et al., 2013; Macniven et al., 2014). Injuries and illnesses that Emily experienced were so severe that they at times impacted her involvement in PA entirely. She had stints of being inactive while she had to let her body recover. Once recovered though, she returned to exercise. Some exercises had to be modified to ensure old injuries were not aggravated, but her engagement in PA was once again consistent. The cost of a gym membership can be a hurdle and difficult for many people to afford. This was a barrier for Emily. After trying to adhere to a gym membership, Emily had no choice but to cancel due to the high cost which in turn became a barrier to that mode of exercise.

### **Composite case study three: Joshua a 57-year-old male**

Joshua was always an incidental exerciser as his mode of transport for most of his childhood was either cycling, walking, or jogging. Subsequently, he grew to love being outdoors and participating in modes of exercise that were in nature. Joshua had a great emotional connection with being outdoors and exercising and understood the way those environments could positively impact mental health and overall wellbeing.

One motivation that Joshua experienced was his overall fear of developing T2DM (Jenkins & Jenks, 2017; Peirce, 1999). Joshua had been diagnosed with PD and was terrified of T2DM and the comorbidities, so was motivated to maintain his activity level as a means to avoid developing T2DM.

The barriers Joshua mentioned included cost, social aspects of activity, and the stigma associated with weight gain and PD (Macniven et al., 2014; Korkiakangas et al., 2011). Joshua got very involved in hiking and had a real passion for it, but it was an expensive pastime that he had to discontinue the activity due to the cost. Being around other people during an exercise activity sometimes caused Joshua to feel intimidated and overwhelmed, especially if the dialogue was competitive. If others in the exercise group were competitive or judgemental, Joshua would not feel as motivated or determined to continue that activity. Joshua was concerned about his weight gain at one point in his life and this concern led to him feeling embarrassed and not comfortable exercising in public.

### **Study limitations**

It is important to acknowledge that the researcher was also the programme director for the lifestyle programme from which participants were recruited. As such, there was a potential conflict of interest in conducting interviews with participants from the programme. Given this dual role, transparency was essential between the researcher and participants. Participants were made aware that the researcher's research interest was in their personal reasons for discontinuing or continuing exercise, with no intended connection to the existing exercise programme.

A potential strength or weakness was the researcher's relationship with the participants. Due to this pre-existing relationship it could be argued that the tone of the interviews may have been influenced by those relationships. However, these relationships likely facilitated a more open level of communication during interviews which permitted a deeper understanding of barriers and motivators.

## **Conclusions**

It was found that the differences between the experiences, rather than similarities, often shed more light on the individual relationships these participants had with exercise. The different approaches to exercise and the various barriers and motivators experienced provided an in-depth understanding of how differently people experience motivation to engage in PA.

In this study, the barriers and motivators experienced by those with PD or T2DM do not appear to differ too greatly from the general population, but the participants offered unique perspectives that are often not acknowledged in the current literature. Social stigma associated with diabetes impacted some participants' exercise journeys in negative ways.

These were expressed as feelings of embarrassment and shame exercising in public around others who may not have the condition. Overall, individuals with PD or T2DM experience some condition-specific barriers and motivators to exercise, and social stigma can in fact negatively impact one's relationship with exercise.

## **References**

A rising tide of type 2 diabetes in young people: what can primary care do? (2018). Bpac NZ better medicine. <https://bpac.org.nz/2018/diabetes.aspx>

Adeniyi, F. A., Anjana, M. R., & Weber, B. M. (2016). Global Account of Barriers and Facilitators of Physical Activity Among Patients with Diabetes Mellitus: A Narrative Review of the Literature. *Current Diabetes Reviews*, 12(4), 440–448.

Alves, C., Casqueiro, J., & Casqueiro, J. (2012). Infections in patients with diabetes mellitus: A review of pathogenesis. *Indian Journal of Endocrinology and Metabolism*, 16(7), 27.

Aguiar, E. J., Morgan, P. J., Collins, C. E., Plotnikoff, R. C., Young, M. D., & Callister, R. (2014). The PULSE (Prevention Using LifeStyle Education) trial protocol: a randomised controlled trial of a Type 2 Diabetes Prevention programme for men. *Contemporary Clinical Trials*, 39(1), 132–144.

Bacon, L. (2010). *Health At Every Size: The Surprising Truth About Your Weight* (Second ed.). BenBella Books.

- Bagheri, F., Siassi, F., Koohdani, F., Mahaki, B., Qorbani, M., Yavari, P., Shaibu, O. M., & Sotoudeh, G. (2016). Healthy and unhealthy dietary patterns are related to pre-diabetes: a case-control study. *British Journal of Nutrition*, *116*(5), 874–881.
- Baltzis, D., Eleftheriadou, I., & Veves, A. (2014). Pathogenesis and Treatment of Impaired Wound Healing in Diabetes Mellitus: New Insights. *Advances in Therapy*, *31*(8), 817–836.
- Barry, E., Roberts, S., Oke, J., Vijayaraghavan, S., Normansell, R., & Greenhalgh, T. (2017). Efficacy and effectiveness of screen and treat policies in prevention of type 2 diabetes: systematic review and meta-analysis of screening tests and interventions. *British Medical Journal*, *356*, i6538.
- Bellou, V., Belbasis, L., Tzoulaki, I., & Evangelou, E. (2018). Risk factors for type 2 diabetes mellitus: An exposure-wide umbrella review of meta-analyses. *PLOS ONE*, *13*(3), e0194127.
- Belza, B., Walkwich, J., Schwartz, S., LoGerfo, J., Shiu-Thornton, S., & Taylor, M. (2004). Peer reviewed: older adult perspectives on physical activity and exercise: voices from multiple cultures. *Preventing Chronic Disease*, *1*(4).
- Best Practice Advocacy Centre New Zealand (2018) A rising tide of type 2 diabetes in young people: what can primary care do?. Bpac NZ better medicine.  
<https://bpac.org.nz/2018/diabetes.aspx>
- Biedenweg, K., Meischke, H., Bohl, A., Hammerback, K., Williams, B., Poe, P., & Phelan, E. A. (2013). Understanding Older Adults' Motivators and Barriers to Participating in

Organized Programs Supporting Exercise Behaviors. *The Journal of Primary Prevention*, 35(1), 1–11.

Bird, S. R., & Hawley, J. A. (2017). Update on the effects of physical activity on insulin sensitivity in humans. *BMJ Open Sport & Exercise Medicine*, 2(1).

Browne, J. L., Ventura, A., Mosely, K., & Speight, J. (2013). 'I call it the blame and shame disease': a qualitative study about perceptions of social stigma surrounding type 2 diabetes. *BMJ Open*, 3(11), e003384.

Bweir, S., Al-Jarrah, M., Almalty, A.-M., Maayah, M., Smirnova, I. V., Novikova, L., & Stehno-Bittel, L. (2009). Resistance exercise training lowers HbA1c more than aerobic training in adults with type 2 diabetes. *Diabetology & Metabolic Syndrome*, 1(1), 27.

Carruth, L., & Mendenhall, E. (2018). Social aetiologies of type 2 diabetes. *BMJ*, k1795.

Chang, C., Khurana, S., Strodel, R., Camp, A., Magenheimer, E., & Hawley, N. (2018). Perceived Barriers to Physical Activity Among Low-Income Latina Women at Risk for Type 2 Diabetes. *The Diabetes Educator*, 44(5), 444–453.

Chudyk, A., & Petrella, R. J. (2011). Effects of Exercise on Cardiovascular Risk Factors in Type 2 Diabetes: A meta-analysis. *Diabetes Care*, 34(5), 1228–1237.

Colberg, S. R., Sigal, R. J., Yardley, J. E., Riddell, M. C., Dunstan, D. W., ... & Tate, D. F. (2016). Physical activity/exercise and diabetes: a position statement of the American Diabetes Association. *Diabetes care*, 39(11), 2065-2079.

- Coppell, K. J., Kataoka, M., Williams, S. M., Chisholm, A. W., Vorgers, S. M., & Mann, J. I. (2010). Nutritional intervention in patients with type 2 diabetes who are hyperglycaemic despite optimised drug treatment--Lifestyle Over and Above Drugs in Diabetes (LOADD) study: randomised controlled trial. *BMJ*, *341*(jul20 2), c3337.
- Dave, D., Soni, S., & Irani, A. (2015). Identification of barriers for adherence to exercise in type 2 diabetes mellitus—a cross sectional observational study. *Physiotherapy*, *101*, e297.
- Deci, E. L., & Ryan, R. M. (2020). *Handbook of Self-Determination Research* (1st ed.). University of Rochester Press.
- Diabetes Prevention Program Research Group. (2002). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *New England Journal of Medicine*, *346*(6), 393-403.
- Dube, J. J., Fleishman, K., Rousson, V., Goodpaster, B. H., & Amati, F. (2012). Exercise dose and insulin sensitivity: relevance for diabetes prevention. *Medicine and science in sports and exercise*, *44*(5), 793.
- Duclos, M., Dejager, S., Postel-Vinay, N., di Nicola, S., Quere, S., & Fiquet, B. (2015). Physical activity in patients with type 2 diabetes and hypertension – insights into motivations and barriers from the MOBILE study. *Vascular Health and Risk Management*, *11*, 361.

- Duncan, L. R., Hall, C. R., Wilson, P. M., & O, J. (2010). Exercise motivation: a cross-sectional analysis examining its relationships with frequency, intensity, and duration of exercise. *International Journal of Behavioral Nutrition and Physical Activity*, 7(1), 7.
- Dunkley, A. J., Bodicoat, D. H., Greaves, C. J., Russell, C., Yates, T., Davies, M. J., & Khunti, K. (2014). Diabetes prevention in the real world: effectiveness of pragmatic lifestyle interventions for the prevention of type 2 diabetes and the impact of adherence to guideline recommendations: a systematic review and meta-analysis. *American Diabetes Association*, 37(4). 922-933.
- Durie, M. (1994). Māori perspectives on health and illness. *Social dimensions of health and disease: New Zealand perspectives*, 194-203.
- Egan, A. M., Mahmood, W. A. W., Fenton, R., Redziniak, N., Kyaw Tun, T., Sreenan, S., & McDermott, J. H. (2013). Barriers to exercise in obese patients with type 2 diabetes. *QJM*, 106(7), 635–638.
- Egli, T., Bland, H. W., Melton, B. F., & Czech, D. R. (2011). Influence of Age, Sex, and Race on College Students' Exercise Motivation of Physical Activity. *Journal of American College Health*, 59(5), 399–406.
- Elkington, T. J., Cassar, S., Nelson, A. R., & Levinger, I. (2017). Psychological Responses to Acute Aerobic, Resistance, or Combined Exercise in Healthy and Overweight Individuals: A Systematic Review. *Clinical Medicine Insights: Cardiology*, 11, 117954681770172.

- Evert, A. B., Dennison, M., Gardner, C. D., Garvey, W. T., Lau, K. H. K., MacLeod, J., Mitri, J., Pereira, R. F., Rawlings, K., Robinson, S., Saslow, L., Uelmen, S., Urbanski, P. B., & Yancy, W. S. (2019). Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report. *Diabetes Care*, *42*(5), 731–754.
- Finch, C., Owen, N., & Price, R. (2001). Current injury or disability as a barrier to being more physically active. *Medicine and Science in Sports and Exercise*, *33*(5), 778-782.
- Firth, J., Rosenbaum, S., Stubbs, B., Gorchynski, P., Yung, A. R., & Vancampfort, D. (2016). Motivating factors and barriers towards exercise in severe mental illness: a systematic review and meta-analysis. *Psychological Medicine*, *46*(14), 2869–2881.
- Franken, R. E., & Brown, D. J. (1995). Why do people like competition? The motivation for winning, putting forth effort, improving one's performance, performing well, being instrumental, and expressing forceful/aggressive behaviour. *Personality and Individual Differences*, *19*(2), 175–184.
- Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behaviour*, *26*(4), 331–362.
- Galvim, A. L., Oliveira, I. M., Martins, T. V., Vieira, L. M., Cerri, N. C. et al. (2019). Adherence, Adhesion, and Dropout Reasons of a Physical Activity Program in a High Social Vulnerability Context. *Journal of Physical Activity and Health*, *16*(2), 149–156.
- Gavin, J., McBrearty, M., & Seguin, D. (2006). The psychology of exercise: a review of the latest research provides clues about what motivates people to exercise and what keeps them coming back. *IDEA Fitness Journal*, *3*(2), 38-48.

*Get ripped, not ripped off: gym memberships compared.* (2020). Consumer NZ.

[https://www.consumer.org.nz/articles/gym-contracts?gclid=CjwKCAiAiML-BRAAEiwAuWVggkCb11gpq6wvB5MUPfnYB9B0ACK3W7f2Ukwpk4-frvULGjgXKDROhoCyY4QAvD\\_BwE](https://www.consumer.org.nz/articles/gym-contracts?gclid=CjwKCAiAiML-BRAAEiwAuWVggkCb11gpq6wvB5MUPfnYB9B0ACK3W7f2Ukwpk4-frvULGjgXKDROhoCyY4QAvD_BwE)

Gredig, D., & Bartelsen-Raemy, A. (2016b). Diabetes-related stigma affects the quality of life of people living with diabetes mellitus in Switzerland: implications for healthcare providers. *Health & Social Care in the Community*, 25(5), 1620–1633.

Gregg, E. W., Chen, H., Wagenknecht, L. E., Clark, J. M., Delahanty, L. M., Bantle, J., ... & Pi-Sunver, F. X. (2012). Association of an intensive lifestyle intervention with remission of type 2 diabetes. *Jama*, 308(23), 2489-2496.

Gredig, D., & Bartelsen-Raemy, A. (2016). Diabetes-related stigma affects the quality of life of people living with diabetes mellitus in Switzerland: implications for healthcare providers. *Health & Social Care in the Community*, 25(5), 1620–1633.

Hagberg, L. A., Lindahl, B., Nyberg, L., & Hellénus, M.-L. (2009). Importance of enjoyment when promoting physical exercise. *Scandinavian Journal of Medicine & Science in Sports*, 19(5), 740–747.

Hameed, I., Masoodi, S. R., Mir, S. A., Nabi, M., Ghazanfar, K., & Ganai, B. A. (2015). Type 2 diabetes mellitus: From a metabolic disorder to an inflammatory condition. *World Journal of Diabetes*, 6(4), 598.

- Hansen, E., Landstad, B. J., Hellzén, O., & Svebak, S. (2010). Motivation for lifestyle changes to improve health in people with impaired glucose tolerance. *Scandinavian Journal of Caring Sciences*, 25(3), 484–490.
- Heinrich, K. M., Patel, P. M., O’Neal, J. L., & Heinrich, B. S. (2014). High-intensity compared to moderate-intensity training for exercise initiation, enjoyment, adherence, and intentions: an intervention study. *BMC Public Health*, 14(1), 789.
- Heisz, J. J., Tejada, M. G. M., Paolucci, E. M., & Muir, C. (2016). Enjoyment for High-Intensity Interval Exercise Increases during the First Six Weeks of Training: Implications for Promoting Exercise Adherence in Sedentary Adults. *PLOS ONE*, 11(12), e0168534.
- Higgs, C., Gisselman, A. S., Hale, L., & Mani, R. (2017). Health outcomes of the Dunedin Community Exercise Programme for people with type 2 diabetes and prediabetes: a single-group study. *European Journal of Physiotherapy*, 19(sup1), 64–65.
- Hordern, M. D., Dunstan, D. W., Prins, J. B., Baker, M. K., Singh, M. A. F., & Coombes, J. S. (2012). Exercise prescription for patients with type 2 diabetes and pre-diabetes: A position statement from Exercise and Sport Science Australia. *Journal of Science and Medicine in Sport*, 15(1), 25–31
- Joshay, G., & Simmons, D. (2006). Epidemiology of diabetes in New Zealand: revisit to a changing landscape. *NZ Med J*, 119.
- Jenkins, D. W., & Jenks, A. (2017). Exercise and Diabetes: A Narrative Review. *The Journal of Foot and Ankle Surgery*, 56(5), 968–974.

Jekauc, D. (2015). Enjoyment during Exercise Mediates the Effects of an Intervention on Exercise Adherence. *Psychology, 06*(01), 48–54.

Jutel, A. G., & Conrad, P. (2014). *Putting a Name to It: Diagnosis in Contemporary Society* (Reprint ed.). Johns Hopkins University Press.

Kato, A., Fujimaki, Y., Fujimori, S., Izumida, Y., Suzuki, R., Ueki, K., Kadowaki, T., & Hashimoto, H. (2016). A qualitative study on the impact of internalized stigma on type 2 diabetes self-management. *Patient Education and Counseling, 99*(7), 1233–1239.

Khazaei-pool, M., Sadeghi, R., Majlessi, F., & Rahimi Foroushani, A. (2014). Effects of physical exercise programme on happiness among older people. *Journal of Psychiatric and Mental Health Nursing, 22*(1), 47–57.

Kirwan, J. P., Sacks, J., & Nieuwoudt, S. (2017). The essential role of exercise in the management of type 2 diabetes. *Cleveland Clinic Journal of Medicine, 84*(7 suppl 1), S15–S21.

Korkiakangas, E. E., Alahuhta, M. A., Husman, P. M., Keinänen-Kiukaanniemi, S., Taanila, A. M., & Laitinen, J. H. (2011). Motivators and barriers to exercise among adults with a high risk of type 2 diabetes - a qualitative study. *Scandinavian Journal of Caring Sciences, 25*(1), 62–69.

Larson, H. K., McFadden, K., McHugh, T.-L. F., Berry, T. R., & Rodgers, W. M. (2017). You can't always get what you want: expectations, outcomes, and adherence of new exercisers. *Qualitative Research in Sport, Exercise and Health, 9*(3), 389–402.

- Larson, H. K., McFadden, K., McHugh, T. L. F., Berry, T. R., & Rodgers, W. M. (2018). When you don't get what you want – and it's really hard: Exploring motivational contributions to exercise dropout. *Psychology of Sport and Exercise, 37*, 59-66.
- Little, R. M. D., Paterson, D. H., Humphreys, D. A., & Stathokostas, L. (2013). A 12-month incidence of exercise-related injuries in previously sedentary community-dwelling older adults following an exercise intervention. *BMJ Open, 3*(6), e002831.
- Liu, N. F., Brown, A. S., Younge, M. F., Guzman, S. J., Close, K. L., & Wood, R. (2017). Stigma in people with type 1 or type 2 diabetes. *Clinical Diabetes, 35*(1), 27-34.
- Long, A. N., & Dagogo-Jack, S. (2011). Comorbidities of Diabetes and Hypertension: Mechanisms and Approach to Target Organ Protection. *The Journal of Clinical Hypertension, 13*(4), 244–251. <https://doi.org/10.1111/j.1751-7176.2011.00434.x>
- Look AHEAD Research Group. (2010). Long term effects of a lifestyle intervention on weight and cardiovascular risk factors in individuals with type 2 diabetes: four-year results of the Look AHEAD trial. *Archives of internal medicine, 170*(17), 1566.
- Look AHEAD Research Group. (2013). Cardiovascular effects on intensive lifestyle intervention in type 2 diabetes. *New England Journal of Medicine, 369*(2), 145-154.
- Macniven, R., Pye, V., Merom, D., Milat, A., Monger, C., Bauman, A., & van der Ploeg, H. (2014). Barriers and Enablers to Physical Activity Among Older Australians Who Want to Increase Their Physical Activity Levels. *Journal of Physical Activity and Health, 11*(7), 1420–1429.

- Mainous, A. G., Yadav, S., Xie, Z., Huo, J. (2020). Cost or revenue: is diabetes prevention doomed due to misalignment of incentives? *Family Medicine and Community Health*, 8(1).
- Mathews, A. E., Laditka, S. B., Laditka, J. N., Wilcox, S., Corwin, S. J., Liu, R., Friedman, D. B., Hunter, R., Tseng, W., & Logsdon, R. (2009). Older Adults' Perceived Physical Activity Enablers And Barriers: A Multicultural Perspective. *Medicine & Science in Sports & Exercise*, 41, 373–374.
- Mendes, R., Sousa, N., Almeida, A., Subtil, P., Guedes-Marques, F., Reis, V. M., & Themudo-Barata, J. L. (2015). Exercise prescription for patients with type 2 diabetes—a synthesis of international recommendations: narrative review: Table 1. *British Journal of Sports Medicine*, 50(22), 1379–1381.
- Miller, W., & Brown, P. R. (2017). Motivators, Facilitators, and Barriers to Physical Activity in Older Adults. *Holistic Nursing Practice*, 31(4), 216–224.
- National Diabetes Prevention Program | Diabetes | CDC. (2019). Centers for Disease Control and Prevention. <https://www.cdc.gov/diabetes/prevention/index.html>
- O'Hagan, C., De Vito, G., & Boreham, C. A. G. (2012). Exercise Prescription in the Treatment of Type 2 Diabetes Mellitus. *Sports Medicine*, 43(1), 39–49.
- Peirce, N. S. (1999). Diabetes and exercise. *British Journal of Sports Medicine*, 33(3), 161–172.

- Potter, L., Wallston, K., Trief, P., Ulbrecht, J., Juth, V., & Smyth, J. (2015). Attributing discrimination to weight: associations with well-being, self-care, and disease status in patients with type 2 diabetes mellitus. *Journal of Behavioral Medicine, 38*(6), 863–875.
- Pojednic, R. M., Polak, R., Arnstein, F., Kennedy, M. A., Bantham, A., & Phillips, E. M. (2017). Practice patterns, counseling and promotion of physical activity by sports medicine physicians. *Journal of Science and Medicine in Sport, 20*(2), 123–127.
- Ren, Y., & Li, M. (2020). Influence of physical exercise on social anxiety of left-behind children in rural areas in China: The mediator and moderator role of perceived social support. *Journal of Affective Disorders, 266*, 223–229.
- Schabert, J., Browne, J. L., Mosely, K., & Speight, J. (2013). Social stigma in diabetes. *The Patient-Patient-Centred Outcomes Research, 6*(1), 1-10.
- Sohal, T., Sohal, P., King-Shier, K. M., & Khan, N. A. (2015). Barriers and Facilitators for Type-2 Diabetes Management in South Asians: A Systematic Review. *PLOS ONE, 10*(9), e0136202.
- Stigma, discrimination and mental illness | betterhealth.vic.gov.au.* (2015, September 18). Better Health Channel.  
<https://www.betterhealth.vic.gov.au/health/servicesandsupport/stigma-discrimination-and-mental-illness>

*Te Whare Tapa Wha*. (2020). [Image].

<https://tearairresearchgroup.wordpress.com/2020/02/21/the-bicultural-whare-tapa-wha-older-persons-palliative-care-model/>

Teixeira, M. E., & Budd, G. M. (2010). Obesity stigma: A newly recognized barrier to comprehensive and effective type 2 diabetes management. *Journal of the American Academy of Nurse Practitioners*, 22(10), 527–533.

Thoman, N., Alder, E., & Leese, G. P. (2004). Barriers to physical activity in patients with diabetes. *Postgraduate medical journal*, 80(943), 287-291.

Tiev, M., Manire, S.A., Robert, J. R., & Barbara, W. (2010). Effect of music and dialogue on perception of exertion, enjoyment, and metabolic responses during exercise. *International Journal of Fitness*, 6(2).

Unick, J. L., Gaussoin, S. A., Hill, J. O., Jakicic, J. M., Bond, D. S., Hellgren, M., ... & Bossart, S. (2016). Four-year physical activity levels among intervention participants with type 2 diabetes. *Medicine and science in sports and exercise*, 48(12), 2437.

van der Vlist, B., Bartneck, C., & Mäueler, S. (2011). moBeat: Using Interactive Music to Guide and Motivate Users During Aerobic Exercising. *Applied Psychophysiology and Biofeedback*, 36(2), 135–145.

Viljoen, J. E., & Christie, C. J. A. (2015). The change in motivating factors influencing commencement, adherence and retention to a supervised resistance training programme in previously sedentary post-menopausal women: a prospective cohort study. *BMC public health*, 15(1), 1-8.

- Visram, S., Bremner, A. S., Harrington, B. E., & Hawthorne, G. (2008). Factors affecting uptake of an education and physical activity programme for newly diagnosed type 2 diabetes. *European Diabetes Nursing*, 5(1), 17–22.
- Williams, D. M., Papandonatos, G. D., Napolitano, M. A., & Marcus, B. H. (2006) Perceived enjoyment moderated the efficacy of an individually tailored physical activity intervention. *Journal of Sport and Exercise Psychology*, 28(3), 300-309.
- Wilmot, E., & Idris, I. (2014). Early onset type 2 diabetes: risk factors, clinical impact and management. *Therapeutic Advances in Chronic Disease*, 5(6), 234–244.
- Winkley, K., Ewierhoma, C., Amiel, S. A., Lempp, H. K., Ismail, K., & Forbes, A. (2014b). Patient explanations for non-attendance at structured diabetes education sessions for newly diagnosed Type 2 diabetes: a qualitative study. *Diabetic Medicine*, 32(1), 120–128.
- Zelege Negera, G., & Charles Epiphany, D. (2020). Prevalence and Predictors of Nonadherence to Diet and Physical Activity Recommendations among Type 2 Diabetes Patients in Southwest Ethiopia: A Cross-Sectional Study. *International Journal of Endocrinology*, 2020, 1–8.