The relationship between health-specific self-efficacy and five-year change in blood pressure in young adults

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Dissertation accepted in fulfilment of the requirements for the degree Master of Health Science in Transdisciplinary Health Promotion at the North-West University

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Graduation: May 2022

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LIST OF ABBREVIATIONS

African-PREDICT	African Prospective study on the Early Detection and Identification of Cardiovascular disease and Hypertension
ANOVA	Analysis of Variance
APA	American Psychological Association
BMI	Body Mass Index
CFA	Confirmatory factor analysis
CFI	Comparative Fit Index
CMIN/DF	Chi-square test Minimum discrepancy divided Degrees of Freedom
COMPRES	Community Psychosocial Research
COPE	Committee on Publication Ethics
HAPA	Health Action Process Approach
HREC	Health Research and Ethics Committee
mmHg	Millimetre of mercury
NWU	North-West University
r	Correlation coefficient
RMSEA	Standard Root Mean Square Error of Approximation
SAJP	South African Journal of Psychology
SEM	Structural Equation Model
TLI	Tucker-Lewis Index
WHO	World Health Organization

ACKNOWLEDGEMENTS

I would like to acknowledge the following people:

- Professor Karel Botha, thank you for being my mentor and supervisor. It is both your knowledge and wit to which I aspire in this intriguing field of psychology.
- Anchenique Papenfus, my partner in research. Thank you for your efforts to move us through the research process as efficiently as possible. I owe you many coffees.
- Shiva, my 11-year-old cat, who, without fail, sat next to me at my desk while I was working on my research for hours on end. I found such comfort in your presence.
- My father, Professor Everhardus Johannes Louw. Thank you for always believing in me and for being in my corner. Your strength has been my inspiration.
- Thank you to the Africa-PREDICT team, as well as the participants in the study. It is in our shared search for knowledge that I was lucky enough to work with data that had already been collected and waiting to be explored.
- And lastly, I want to acknowledge Professor Albert Bandura, known for his contributions to the field of self-efficacy and social-cognitive theory, the psychological concepts on which this study is based. Professor Bandura passed away on the 26th of July 2021, may he rest in peace.

SUMMARY

Hypertension, defined as a persistently elevated blood pressure of 140/90 mmHg (Raymond & Couch, 2017), is one of the leading causes of secondary disease and premature death. This study is a sub-study of the longitudinal *African Prospective study on the Early Detection and Identification of Cardiovascular Disease and Hypertension* (African-PREDICT) study (Schutte et al., 2019). From the literature, health-specific self-efficacy seems to be a promising departure point for understanding the role psychosocial factors play in health and disease outcomes but has not been previously explored in a South African study on identifying early hypertension risk factors. The research question was therefore formulated as: *Is baseline health-specific self-efficacy associated with a change in blood pressure over five years in young adults? To what extent do sex and ethnicity influence the relationship between health self-efficacy and change in blood pressure?*

A stratified sample of 384 apparently healthy young adults (mean age 25.07 years at baseline), with a clinic brachial blood pressure of <140 and <90 mmHg took part in the study. Both systolic and diastolic blood pressure was measured at baseline and 5-year follow up in a clinic setting with the CardioXplore® 24-h ambulatory blood pressure monitoring apparatus and the Dinamap Procare 100 Vital Signs monitor. Baseline health-specific self-efficacy was measured with the Health-specific Self-Efficacy Scale (Schwarzer & Renner, 2005). Pearson product moment correlations were calculated to determine associations between changes in blood pressure and health-specific self-efficacy, while a 2 x 2 factorial Analysis of Variance was calculated to determine the effect of sex and ethnicity on changes in blood pressure.

Results show a slight decrease in blood pressure within normal limits for the age group. No significant correlations were found between health-specific self-efficacy and change in blood pressure, most probably due to self-efficacy's dependence on, and interrelation with other factors like risk perception, motivation, and social support. A significant but practically small main effect was found for sex on change in systolic blood pressure (SBP) (independent of both nutrition- and alcohol self-efficacy) with female participants showing a smaller decrease in SBP than male participants. A significant, but practically small difference was found between the mean increase in diastolic blood pressure ($\bar{x}$ = 1.36) in black participants with high nutrition self-efficacy (NSE) compared to the mean decrease in diastolic blood pressure ($\bar{x}$ = -1.63) in white participants with high NSE. Some evidence thus emerged

suggesting ethnic differences regarding NSE and how it impacts on change in blood pressure. Overall, the results clearly illustrate the complex interaction between health-specific self-efficacy, sex, ethnicity, and changes in blood pressure. Although health-specific self-efficacy could not convincingly be identified as an early role player in the risk of developing hypertension, further research needs to be done to better understand its role. More specifically, the possible mediating role of risk perception, motivation, social support, and goal implementation should be investigated. Further, the importance of NSE should be explored to determine similar trends in other contexts, as well as the extent to which NSE is influenced by nutritional knowledge and ethnic identity. The Africa-PREDICT study provides this opportunity as there will be further 5-year interval follow-ups that may account for the effect of change over a longer period.

Keywords: *Hypertension, Blood Pressure, African-PREDICT study, Self-efficacy, Health-specific Self-efficacy, Nutrition, Alcohol, Physical activity, Gender, Ethnicity*

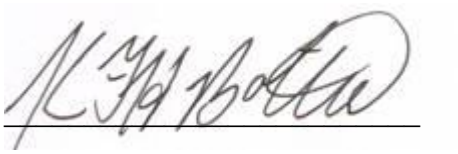
PREFACE

- This mini-dissertation forms part of the requirements for the completion of the degree Master of Arts in Clinical Psychology at the Potchefstroom Campus of the North-West University (NWU). It has been prepared in article format (manuscript to be submitted for publication) with three chapters and complies with the requirements set by the NWU in Rule A.4.4.2.9.
- Chapter 1 gives an in-depth literature review to offer the reader background information and to explicate the defining concepts relevant to this study. Chapter 2 presents the manuscript that will be submitted to the *South African Journal of Psychology* (SAJP) for possible publication. The manuscript itself includes a short introduction, the aims of the study, and the methodology followed. This is followed by the findings of the study and a discussion and conclusion based on these findings. Finally, Chapter 3 presents the researcher's critical reflection on the research process.
- The manuscript in Chapter 2 has been compiled in accordance with the requirements set out by the *SAJP*, with the goal of possibly submitting it for publication. The tables reflecting results accompany the relevant result discussion points to enhance reader convenience for the examiners. However, when the manuscript is submitted to the aforementioned journal, the tables will be added as addenda.
- The manuscript and the reference list are styled according to the publication guidelines of the American Psychological Association (APA) (7th edition) for the purpose of examination. Where journal specifications differ from the APA publication guidelines, the appropriate amendments will be made before submission for publication.
- For the purpose of examination, the pages are numbered chronologically from the Table of Contents page, ending with the Addenda.
- A language practitioner conducted the language editing of this mini-dissertation.
- Consent for the submission of this mini-dissertation for examination purposes (in fulfilment of the requirements for the Master of Arts Degree in Clinical Psychology) was provided by the research supervisor, Professor Karel Botha.
- Lastly, this mini-dissertation was submitted to TurnItIn, which established that its content fell within the norms of acceptability regarding plagiarism.

CONSENT TO SUBMIT

Letter of consent

I, the supervisor of this study, hereby declare that the article, titled *"The relationship between health-specific self-efficacy and five-year change in blood pressure in young adults: The African-PREDICT study"*, written by Lizé van Graan, does reflect the research regarding the subject matter. I hereby grant permission that she may submit the mini-dissertation for examination purposes, and I confirm that the mini-dissertation submitted is in fulfilment of the requirements for the degree Master of Arts in Clinical Psychology at the Potchefstroom Campus of the North-West University. The article may also be sent to the *South African Journal of Psychology* for publication purposes.



Prof. K.F.H. Botha
Supervisor
University number: 10067973

DECLARATION BY RESEARCHER

Declaration by researcher

I, Lizé van Graan, hereby declare that this mini-dissertation, titled *"The relationship between health-specific self-efficacy and five-year change in blood pressure in young adults: The African-PREDICT study"*, is my own effort and has never been submitted for examination before. I further declare that the sources consulted in writing this dissertation are properly referenced and acknowledged. Furthermore, I declare that this mini-dissertation was edited and proofread by a qualified language editor, as prescribed. I lastly declare that this research study was submitted to the TurnItIn software system, and a satisfactory report was received with regard to plagiarism.

Lizé van Graan
Student
University number: 20316836

GUIDELINES FOR AUTHORS

Description

The article (see Chapter 2) will be submitted for possible publication in the *South African Journal of Psychology (SAJP)*. The *SAJP* is owned by SAGE Publications, which publishes a variety of Southern African and African journal titles. The journal publishes contributions from all fields of psychology in English. Empirical research is emphasised; however, the journal accepts theoretical and methodological papers, review articles, short communications, book reviews, and letters commenting on articles published in the journal. Articles relevant to Africa which address psychological issues of social change and development are prioritised.

Instructions for authors

General

In general, the manuscript must be written in a high grammatical standard in English. It must follow the specific technical guidelines that are stipulated in the submission guidelines. The American Psychological Association (APA) 7th edition is followed in the preparation of the manuscript. The research within the manuscript should comply with the accepted standards of ethical practice, presented by the Committee on Publication Ethics (COPE). The journal endeavours to publish accurate, transparent, and ethically sound research.

Manuscript style

The *SAJP* follows the SAGE house style guidelines stipulated in the SAGE UK house style guidelines. The following format is required for research-based manuscripts:

- The introductory/literature review section requires no heading.
- The following headings/subheadings are necessary:
    - Method: Participants; Instruments; Procedure; Ethical considerations; Data analysis (which includes the statistical techniques or computerised analytic programmes, if applicable); Results; Discussion; Conclusion; References.
- Within the “Ethical considerations” section, the name of the institution that granted ethical approval of the study must be stipulated.

Format

Only electronic files that adhere to the stipulated guidelines are accepted. The format of the manuscript may either be Microsoft Word or LaTex files. All manuscripts must be

double-spaced throughout and with a minimum of 3 cm for left and right-hand margins, as well as 5 cm at the head and foot. The text should be a standard 12 points.

Keywords and abstracts

An abstract of no more than 250 words should be included and should aid readers in finding the article online. Up to six alphabetised keywords should be included in the abstract and always highlighted. Key descriptive phrases should be repeated and focused on in the abstract. Thus, the abstract must be written in such a way that it conveys the necessary information/data which assists search engines in finding the article and ranking it on the search results page.

Artwork, figures, and other graphics

Illustrations, pictures, and graphs should be provided in the highest quality and in electronic format. Further guidelines include:

- Format: TIFF, JPEG: Common format for pictures (containing no text or graphs).
- EPS is the preferred format for graphs and line art as it retains quality when enlarging/zooming in.
- Placement: Figures/charts and tables created in Microsoft Word should be included in the main text rather than at the end of the document.
- Figures and other files created outside Microsoft Word (i.e., Excel, PowerPoint, JPEG, TIFF, EPS, and PDF) should be submitted separately.
- Resolution: Rasterised based files (i.e., with .tiff or .jpeg extension) require a resolution of at least 300 dpi (dots per inch). Line art should be supplied with a minimum resolution of 800 dpi.
- Colour: Images supplied in colour will be published in colour online and black and white in print.
- Dimension: The artworks supplied must not exceed the dimensions of the journal. Images cannot be scaled up after origination.
- Fonts: The lettering used in the artwork should not vary too much in size and type (usually sans serif font as a default).

Reference style

The journal adheres to the APA referencing style. Specific guidelines are provided, and it is the author's responsibility to produce an accurate reference list. The references are listed alphabetically at the end of the article, while in-text references are referred to by name and year in parentheses. The references are structured as follows:

- Last name and initials of all authors (up to 20)
- The year the reference item was published (in brackets)
- The title of the article
- The name of the publication
- The volume number
- An issue number (if provided)
- The inclusive pages
- Digital object identifier (DOI)

The Publication Manual of the APA 7th edition can be consulted for accurate formatting of reference. The style and punctuation of the references should conform to the APA style. Illustrated below are examples of different styles:

• Journal article

Gower, M. (2013). Revenge: Interplay of creative and destructive forces. *Clinical Social Work Journal*, *41*(1), 112-118. https://doi.org/10.1007/s10615-012-0407-0

• Book

Calfee, R. C., & Valencia, R. R. (1991). *APA guide to preparing manuscripts for journal publication*. Washington, DC: American Psychological Association.

English language editing services

The language used in the manuscript has to be accurate and of adequate quality to be understood by the editors and reviewers during the assessment of the manuscript. The author should consider having a colleague (whose home language is English) review the manuscript for clarity. Submit the manuscript for professional editing. Consider utilising the SAGE Language Service, which can format the manuscript to the specifications of the journal.

Chapter 1: Literature Review

Introduction

The aim of this chapter is to provide a literature review on the key variables relevant to this study. First, blood pressure and hypertension are defined and described. Thereafter research on the risk factors for hypertension are discussed, with reference to both modifiable factors such as diet, alcohol consumption and exercise, as well as non-modifiable factors such as ethnicity and gender. Next, self-efficacy, health-specific self-efficacy, and the relation between health-specific self-efficacy and blood pressure are reviewed. The African-PREDICT study, the larger study of which the current study is part, is then briefly contextualised. The chapter concludes with a brief preview of Chapters 2 and 3.

Blood Pressure and Hypertension

Blood pressure refers to the force that blood exerts on the walls of the arteries as it is pumped from the heart throughout the body (Centre of Disease Control and Prevention, 2020). It is critically important for an individual's health that blood pressure remains within normal/healthy parameters, as this will ensure effective delivery of vital oxygen and nutrients to the tissues and organs of the body to maintain adequate health and functioning. Hypertension can be defined as blood exerting a persistently elevated pressure of 140 millimetre of mercury (mmHg) systolic over 90 mm Hg diastolic on the arterial walls (Raymond & Couch, 2017). Hypertension is one of the leading causes of premature death, as it is a condition that can lead to brain, renal, cardiovascular, and other diseases. However, only one fifth of persons with the condition has it controlled (WHO, 2019). As a result of this, the World Health Assembly (WHA), the decision-making body of the World Health Organization (WHO), has set the target of reducing the prevalence of increased blood pressure across the globe by 25 % in 2025. The WHO therefore needs consistent worldwide data to compare countries and understand blood pressure trends (Zhou et al., 2017).

According to the WHO (2019), individuals worldwide with hypertension number an estimated 1.13 billion, with approximately two-thirds residing in low- and middle-income countries. A pooled analysis of worldwide blood pressure trends showed an increase in blood pressure in sub-Saharan countries between 1975 and 2015, with the 2015 data placing these countries among the highest blood pressure levels in the world (Zhou et al., 2017). In a study

comparing low- and middle-income countries, the highest prevalence of hypertension in adults over 50 years of age was South Africa at a high of 78%. This was compounded by a mere 4.1% to 14.1% of the participants achieving blood pressure control (Lloyd-Sherlock et al., 2014). Increased blood pressure is also a rising concern in younger populations, affecting one in eight adults between the ages of 20 and 40 years old (Hinton et al., 2020). According to the South African Demographic and Health Survey (Statistics SA, 2017), 46% of women and 44% of men over 15 years of age suffer from high blood pressure. Of those with normal blood pressure due to taking antihypertensive medication, 9% were women and 6% were men.

Change in blood pressure

It is important to remember that in this study, the focus was on change in blood pressure, rather than on high blood pressure or hypertension. Change in blood pressure is defined as the difference in systolic (SBP) and diastolic blood pressure (DBP) between the baseline and the five-year follow-up measurement. The decision to focus on change in blood pressure was prompted by the relatively young age of the sample (24.53 years at baseline; 29.53 years at follow-up). The expectation was that there would not be enough hypertensive individuals to justify statistical comparisons. Further, the focus was on exploring if health-specific self-efficacy at baseline would be associated with a change in blood pressure over the five years, thus, to understand if health-specific self-efficacy may be identified as an early role player in the risk for developing hypertension. This is in line with previous research showing that young persons with elevated blood pressure are likely to have elevated blood pressure in later life (Hinton et al., 2020). It is therefore reasonable to expect that a higher increase in blood pressure, compared to a lower increase or decrease in blood pressure in this sample, could be an early indicator of potential hypertension later in life (Chen & Wang, 2008; Lackland, 2017; Mayo Clinic, 2021). The fact that blood pressure usually decreases slightly during early adulthood (Lin et al., 2016), provides further support for an increase in blood pressure as a potential early indicator of hypertension later in life.

Risk Factors in Hypertension

Blood pressure increases naturally with older age (Lin et al., 2016; Steinbaum, 2019), but factors like unhealthy lifestyle choices, genetic predisposition, medication, stress, low potassium and calcium intake, high alcohol and salt intake, obesity, and cardiovascular and kidney disease, can heighten blood pressure in individuals (Carretero & Oparil, 2000; Virani

et al., 2020; Zhou et al., 2017). Many of these factors, like obesity and alcohol consumption, are of an additive nature, meaning that they compound one another in the incidence of hypertension.

Risk factors for hypertension can be divided into non-modifiable and modifiable factors. Non-modifiable factors include family history, increasing age, co-existing conditions such as renal disease and diabetes (WHO, 2019), as well as male biological sex and black ethnicity (Raymond & Couch, 2017). Inherited factors relate to genes that are over- or under-expressed in the individual. Although not much is known about these genes, the multitude of consequences of their dysfunctional expression include those that regulate salt and water retention, behavioural patterns such as alcoholism and obesity, hypertensive syndromes, hormones, the physiological structure of the cardiac system, and the autonomic nervous system (Carretero & Oparil, 2000). The increase of blood pressure related to advancing age, is due to the natural thickening and stiffening of the blood vessels, thus creating an increased resistance to the force of the blood (Williams, 2015).

Modifiable factors include excessive body weight, tobacco use, alcohol consumption, lack of exercise, unhealthy dietary patterns (WHO, 2019), as well as chronic stress (Harmell et al., 2011). Essential or primary hypertension, which is elevated blood pressure where secondary causes such as disease are not present, is a major modifiable risk factor for cardiovascular disease, and accounts for 95% of all hypertension cases (Carretero & Oparil, 2000). Although these factors are modifiable, success with controlling blood pressure in this regard seems to be poor.

Poor blood pressure control can be attributed to three major categories of barriers: 1) patient-related barriers, 2) physician-related barriers, and 3) the medical environment or factors related to the health care system (Khatib et al., 2014; Ogedegbe, 2008). These categories of barriers encompass poor medication adherence related to beliefs about hypertension and its treatment, emotional and motivational aspects, self-efficacy, health literacy and knowledge, comorbidity, social influence, failure of health care providers to initiate or intensify drug therapy, and the availability, affordability, and acceptability of health care (Khatib et al., 2014: Ogedegbe, 2008). In South Africa, inadequate detection and management of hypertension due to aspects such as deficient public health care, adds to the burden of this condition (Rayner, 2010).

In this study, the focus was on the role of ethnicity, gender / biological sex and health-specific self-efficacy in blood pressure change. Each of these are discussed in more depth below.

Ethnicity

Black people seem to have a disproportionately high prevalence of high blood pressure compared to other ethnic groups (Ferdinand & Nasser, 2015; Lackland, 2014). According to the American Heart Association (Virani et al., 2020), the lifetime risk of high blood pressure is 86% for black males, 85% for black females, 83% for white males, and 69% for white females. In America, black persons have a 41% incidence of high blood pressure compared to the 27% among white persons (Beckerman, 2021). Black ethnicity has shown to be a risk factor for hypertension due to factors such as health behaviours related to urbanisation and stress (Schutte et al., 2019), higher salt sensitivity, higher incidence of overweight and obesity, increased resistance to anti-hypertensive agents, and other factors such as pre-natal and early life influences, access to health care, and social factors (Lackland, 2014). Not only do black individuals have a higher susceptibility to hypertension, they also have a susceptibility to rapid progression. This is evident from the South African study of Schutte et al. (2012) in which hypertension developed in almost 25% of black participants in transition over a five-year period. Research also shows that black South Africans suffer from more malignant hypertension due to genetic components when compared to white South Africans (Rayner, 2010).

Increased blood pressure affects many black South Africans due to the phenomenon of nutrition transition (Bourne et al., 2002). This refers to a population level shift in dietary patterns from the more traditional African diet of whole grains, vegetables, and legumes, to a more “western diet” high in saturated fat, sugar, salt, and unrefined carbohydrates (Steyn & Mchiza, 2014; Mbogori & Mucherah, 2019). This change is the result of rapid urbanisation, technological advancements, and socio-economic developments in once rural populations. It can affect the metabolic and epigenetic programming of many black individuals (Mbogori & Mucherah, 2019; Vorster et al., 2011). This poor-quality diet and the decreased physical activity seen during nutrition transition, not only promotes high blood pressure directly, but also indirectly by contributing to an increase in overweight and obesity (Steyn & Mchiza, 2014).

Gender and Sex

To distinguish, the term "sex" refers to the physiological and genetic differences between men and women, whereas "gender" refers to the experience of being male or female and includes the traditionally differentiated social roles (Mayor, 2015). Some studies show that hypertension is more prevalent in males than females of the same age (Gillis & Sullivan, 2016, Zhou et al., 2017, Doumas et al., 2013). Others show that men struggle more with high blood pressure than women, although menopause tends to eliminate this discrepancy (Yanes & Reckelhoff, 2011). Women also develop hypertension-related cardiovascular complications such as ischaemic heart disease, heart failure, cardiomyopathy, and aortic valve stenosis, at a much later stage compared to men, and thus have a higher life expectancy (Doumas et al., 2013; Regitz-Zagrosek et al., 2016). A possible mechanism for this may be the female immune system, which has a higher anti-inflammatory state. This may act as a compensatory mechanism in relation to increased blood pressure, whereas males have a more pro-inflammatory response (Gillis & Sullivan, 2016). Other factors could be higher awareness, treatment and control in women, the protective effects of oestrogen and other sex hormones, lower salt sensitivity, lower obesity levels, and lower prevalence of hypertension-related organ damage (Doumas et al., 2013).

A study analysing datasets from the WHO Multi-Country Studies Data Archive (Lloyd-Sherlock et al., 2014), however, showed the contrary – high blood pressure was more prevalent in women than men, and yet women were more likely to maintain effective blood pressure control. This corresponds with the most recent South African statistics (Statistics SA, 2017) that found hypertension to be highest in women at 46%, compared to men at 44%. Yet, looking at gender from an ethnic perspective, white women had a lower prevalence than white men at 60% and 66% respectively, but black women had a higher prevalence than black men at 44% and 41% respectively (Statistics SA, 2017).

Other research indicates that gender differences in blood pressure is dependent on age. Ahmad and Oparil (2017) found that high blood pressure has a lower prevalence in women compared to men, but only in those under the age of 65 years; the inverse indicates that women are more likely to develop hypertension than men once over the age of 65 years. A study by Choi et al. (2017) also found that the prevalence of hypertension was higher in men (34.6%) than in women (30.8%), but after the age of 60 years, the inverse was true. The discrepancies in the results with respect to the prevalence of hypertension between genders and between black

and white ethnicities, further supports the need for this research study in exploring those dimensions.

Self-efficacy

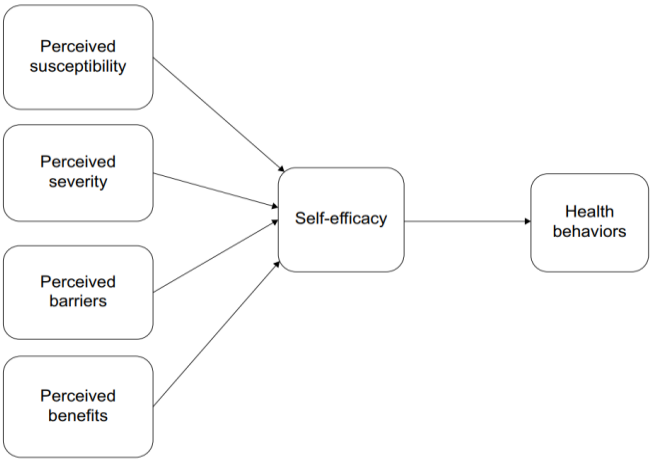
Self-efficacy is defined as the belief people have in their own abilities to affect events and change outcomes in their lives (Bandura, 2009). According to De Wit (2006), self-efficacy reflects a person's conviction that a specific behaviour or action can successfully be executed. It further determines the effort one expends and how long one would persist in the face of obstacles toward goal achievement. Self-efficacy may influence changes in blood pressure, either by directly affecting health behaviour, or through its role in stress and illness (Roddenberry & Renk, 2010).

Self-efficacy may be relevant to blood pressure via two different pathways – namely (i) stress; and (ii) self-regulation. First, stress is the appraisal of a stimulus as threatening and as greater than the person's ability to cope with it effectively (Lazarus & Folkman, 1984). The experience of stress is significantly influenced by an individual's perception in that the person's appraisal of the stressful stimuli can either enhance or diminish its physical and psychological effect. While primary appraisal allocates meaning and significance to the stimulus, secondary appraisal is a cognitive process of evaluating one's own coping style, the situational variables, and coping resources such as self-efficacy (Lazarus & Folkman, 1984). It can thus be argued that perceived self-efficacy in controlling the stressor is more important than the stressor itself, as it inherently determines whether stressors appear manageable or overwhelming (Harmell et al., 2011; Sebastian, 2013). High levels of coping self-efficacy have been shown to decrease cardiac reactivity and blood pressure, both in the short and long run (Harmell et al., 2011). It also mitigates the effects of a stressor on the individual's immune system, thus serving a protective function with respect to the immune responses seen in hypertension (Roddenberry & Renk, 2010).

Self-efficacy may also influence blood pressure control with respect to how individuals self-regulate their behaviour, that is, the ability to adjust one's own behaviour according to changing circumstances (Luszczynska & Schwarzer, 2015). Self-efficacy influences four major components of self-regulatory behaviour, namely motivational, cognitive, emotional, and selection processes (Bandura, 2009). The motivational component is achieved through self-regulation of beliefs about one's own potential for success (Bandura, 2009). The cognitive

component is expressed as goal setting, predictive thought processes, and analytical thinking (Bandura, 2009). According to Luszczynska and Schwarzer (2015), self-efficacy links to self-regulatory cognitions as it requires thinking about whether actions will be started, how much effort will be used, and for how long it will be sustained in relation to experiencing failures and obstructions. Emotionally, self-regulation of affective states is crucial to direct attentional biases, anxiety-provoking thought processes, and actions to reduce threatening situations (Bandura, 2009). Finally, the selection process determines approach and avoidance behaviour with regard to activities people believe are either within or beyond their abilities (Bandura, 2009). The relationship between self-efficacy and health behaviour can be divided into two phases; the first phase denoting behavioural intention, which is based on self-belief; and the second phase based on self-regulation with regard to preparation, starting, sustaining, and relapse management of actual health behaviour (Schwarzer & Renner, 2005). According to Tshuma et al. (2017), perceived susceptibility and perceived benefits did not mediate health-related behaviours in light of non-communicable disease such as high blood pressure, unless associated with self-efficacy (see Figure 1). This supports the potential importance of health-specific self-efficacy in this study.

Figure 1: Conceptualisation of Self-efficacy and Health Behaviour



Source: Tshuma et al. (2017, p. 31)

Health-specific Self-efficacy

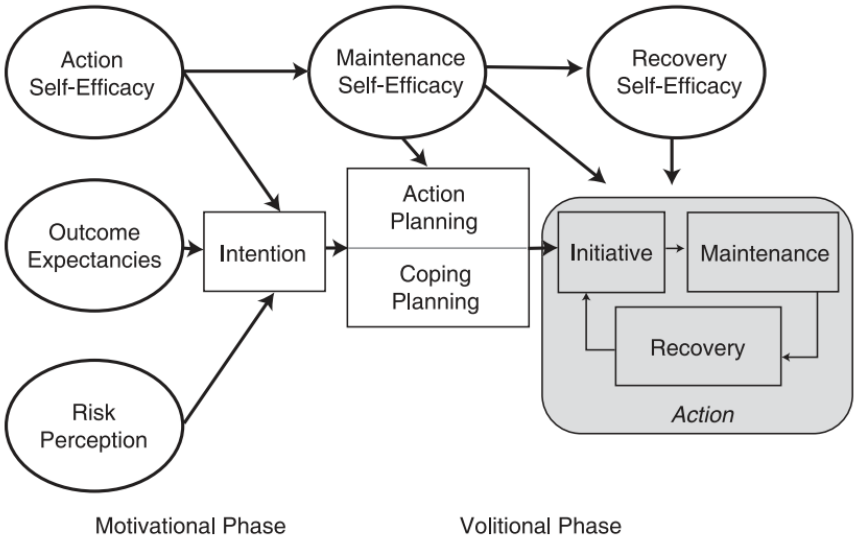
Health-specific self-efficacy can be conceptualised as a "person's optimistic self-belief about being capable to resist temptations and to adopt a healthy lifestyle" (Schwarzer & Renner, 2005, p. 2), or to "an individual's confidence that he or she can successfully engage in

a specific behavior or achieve a desired goal" (Zhao et al., 2021, p.1782). These aspects are discussed more comprehensively later, but first, it is important to indicate that the relationship between perceived self-efficacy, behavioural intentions and reported health behaviours forms part of different health behaviour theories, including the Health Belief Model, the Theory of Reasoned Action (Ajzen & Fishbein, 1980); the Theory of Planned Behavior (Ajzen, 1985; 2015); Social Cognitive Theory (Bandura, 2005) and the Health Action Process Approach (Schwarzer, 2008; Schwarzer & Luszczynska, 2008). The latter two approaches will briefly be discussed to illustrate how self-efficacy links to health behaviour.

Social cognitive theory. The basic premise of social cognitive theory is that human behaviour is intentionally guided by goals that reflect the expected outcomes of a specific behaviour (Bandura, 2005). Goals, in turn, according to Bandura, can only be achieved through cognitive regulation of affect, motivation and action. The basis for human motivation and action is forethought, which is an anticipatory control mechanism (Luszczynska & Schwarzer, 2015). Motivation is dependent on 1) perceived self-efficacy; 2) outcome expectancies; and 3) goals and sociocultural factors (Luszczynska & Schwarzer, 2015). Self-efficacy in particular, is a judgment of personal capability (Bandura (2005) that influences preparation for action, increase or decrease motivation, and shape human behaviour (Luszczynska & Schwarzer, 2015).

Health Action Process Approach (HAPA). The HAPA (see Figure 2) discerns between two processes relating to behaviour, the 1) pre-intentional motivation that directs behavioural intention; and 2) post-intentional volition that directs definite health behaviour (Schwarzer & Luszczynska, 2008). The first process entails risk awareness, and although this is not sufficient to create intention for change, it sets the stage for continued consideration and evaluation of the situation. Pros and cons are weighed during this motivational phase, with positive outcome expectancies and perceived self-efficacy with regard to health behaviour playing an important role. Thereafter, thorough instructions to move towards the positive intention that has been formed, should be developed. These goal-directed actions are then maintained through self-regulatory skills and strategies, and thus forms the post-intentional phase of this approach (Schwarzer & Luszczynska, 2008).

Figure 2: Conceptualisation of Health Action Process Approach



Source: Schwarzer (2008, p. 6)

Although both Social Cognitive Theory and the HAPA show the importance self-efficacy plays in motivational aspects of behaviour, it is clear that self-efficacy should not be seen in isolation from other processes like risk perception, planning, and self-regulation in the implementation of health behaviours.

Health-specific Self-efficacy and Blood Pressure

Research has shown that there is a link between self-efficacy and health behaviours that can lead to an increased blood pressure risk, such as poor nutrition (Gase et al., 2016; Hassan et al., 2017; Muturi et al., 2016; Raymond & Couch, 2017), lack of physical activity (Luszczynska et al., 2010; Raymond & Couch, 2017; Shieh et al., 2015; Williams et al., 2011), and alcohol consumption (Chavarria et al., 2012; Connor et al., 2011; Oei et al., 2007; Raymond & Couch, 2017). The Health-specific Self-Efficacy Scale (Schwarzer & Renner, 2005) used in this study (see chapter 2) was specifically developed to measure self-efficacy related to nutrition, physical exercise, and alcohol resistance.

Nutrition. Poor or malnutrition, such as high salt intake, low fruit and vegetable intake, and high saturated fat intake, has an adverse effect on cardiovascular health and blood pressure (Raymond & Couch, 2017). Having a high body mass index (BMI) that falls within the range of overweight or obese, is a form of malnutrition, and is strongly related to increased blood

pressure (Raymond & Couch, 2017, Steyn & Mchiza, 2014). Overweight and obesity can be defined as having a BMI that falls between 25 to 29.9 kg/m², and over 30 kg/m², respectively (Raymond & Couch, 2017). The picture in South Africa is that 68% of women and 31% of men are overweight or obese (Statistics SA, 2017). Twenty percent of women are in the severely obese category, compared to only 3% of men (Statistics SA, 2017). Severe obesity is more prevalent among black women (20%) than their white counterparts, although the opposite is true for males (Statistics SA, 2017).

The South African food-based dietary guidelines conceptualise good nutrition as consuming vegetables and fruits on a daily basis, whole grain starches regularly, legumes regularly, dairy daily, eggs and lean meats daily, and using salt, sugar, and fat sparingly (Vorster et al., 2013). The changes in dietary patterns related to the South African nutrition transition phenomenon among the black population show a decline in fibre and whole grains, legumes, and vegetables, and an increase in total and saturated fat, salty foods, energy-rich, micronutrient-deficient snacks, and convenience foods, as well as sugary carbonated beverages (Vorster et al., 2011). A study among college students indicated that a higher healthy-eating self-efficacy was significantly associated with less saturated fat, less total sodium, and increased fruit intake in their diets (Stephens et al., 2017). A study on self-efficacy and preventative nutrition showed that women reported healthier dietary patterns than men with regard to protecting their health (Renner et al., 2000). This is corroborated by a study of 18- to 25-years-olds, which showed that men had a lower healthy eating self-efficacy than women, which included a higher sodium intake (Stephens et al., 2017).

Physical activity. A study done among South Africans with respect to their physical activity, indicated that 57.4% reported a sedentary lifestyle (Mlangeni et al., 2018). Physical activity was seen as any energetic activity that caused increased breathing or heart rate, engaged in three times a week for at least 30 minutes at a time (Mlangeni et al., 2018). With regard to gender, physical inactivity was highest among women at 67.1%, and in relation to ethnicity, highest among black Africans at 59.9% (Mlangeni et al., 2018). Individuals who live a more physically sedentary lifestyle are 30 to 50 % more likely to develop hypertension (Raymond & Couch, 2017). Stephens et al. (2017) found that high exercise self-efficacy was associated with a lifestyle of daily exercising, and that there was no difference between genders with regard to physical activity self-efficacy. Regular physical activity is an important recommendation in the South African food-based dietary guidelines to achieve a healthy lifestyle (Vorster et al., 2013).

Regular physical activity has shown to be associated with a decrease in cardiovascular mortality, risk of developing cardiovascular disease, and lower blood pressure by suppressing atherogenesis and improving the availability of vasodilatory mediators (Nystoriak & Bhatnagar, 2018).

Alcohol consumption. Individuals who indulge in excessive alcohol use account for up to 5 to 7% of those with hypertension; where excessive alcohol use can be three or more drinks per day. It is enough to cause a significant rise in blood pressure (Raymond & Couch, 2017). Risky alcohol use, defined as five or more standard alcohol measures per single occasion in the past 30 days, is pervasive among South Africans, though more common in men than women (Statistics SA, 2017). The first set of South African food-based dietary guidelines also encouraged sensible drinking, although this was later removed so as not to confuse the recommendation for endorsement (Vorster et al., 2013). South Africa as a country has been labelled as exhibiting one of the most maladaptive patterns of alcohol abuse in the world, and for the youth age group between 15 to 19 years, South Africa has the third highest rate of alcohol use in Africa (WHO, 2018). Five percent of women over the age 15 years reported risky drinking, compared to 28% of men (Statistics SA, 2017). Risky drinking was more common in urban than rural areas in general, but similar across black and white ethnicity (Statistics SA, 2017). Drinking refusal self-efficacy serves as a reliable predictor of both quantity and frequency of alcohol consumption (Oei et al., 2007). Self-efficacy related to alcohol resistance not only predicted the quantity of alcoholic substances consumed, it did so for a 12-month time frame (Kadden & Litt, 2011). It was also related to the frequency of partaking in alcohol consumption and binge drinking episodes (Kadden & Litt, 2011).

The African-PREDICT Study

Although hypertension can be prevented through modifiable factors, the success in this regard seems to be low. This is a clear indication of a need to study young, relatively healthy adults in relation to hypertension and cardiovascular health, as most studies focus on the elderly and those that have confirmed cardiovascular disease (Schutte et al., 2019). The *African Prospective study on the Early Detection and Identification of Cardiovascular disease and hypertension* (African-PREDICT) study (Schutte et al., 2019) was initiated in response to the lack of information with regard to individual-specific cardiovascular pathophysiology and the lack of longitudinal monitoring of the early development of hypertension in black populations. It is a longitudinal study to examine young South-African men and women of both black (or

African descent) and white ethnicity to monitor the development of hypertension in this population (Schutte et al., 2019).

Increased blood pressure in younger populations is associated with higher rates of left ventricular hypertrophy of the heart, changes in brain white matter hyperintensity and volume, as well as an increased likelihood of cardiovascular events by middle age (Hinton et al., 2020). Not only are the diagnosis rates in young populations lower, with delayed treatment, but it has been shown that young persons with elevated blood pressure are likely to have elevated blood pressure in later life (Hinton et al., 2020). Some identified barriers to adequate blood pressure control in these young individuals included concerns about the pros and cons of treatment, management issues, fear of misdiagnosis, adherence, follow-up, resource allocation, and psychosocial themes (Hinton et al., 2020).

The African-PREDICT study was launched in 2013 and started with the collection of baseline data of 1202 black and white men and women, aged between 20 to 30 years and screened to be healthy and clinically normotensive. A scheduled follow-up of these participants and collection of data after every five years for the next 10 to 20 years was planned, with the first follow-up phase presently occurring for the period of 2018 to 2022, and the next planned for 2023 to 2027 (Schutte et al., 2019). The data collection included questionnaires about physical activity, sleep apnoea, diet, and psychosocial aspects (including the health-specific self-efficacy scale used in this sub-study), biological sampling and analysis, body composition, blood pressure, and early organ damage. Initial investigations already identified prehypertension in 28% of participants and masked hypertension in 15% of participants, thus lending predictive power that a significant proportion will develop clinically significant elevated blood pressure by the first five-year follow-up, with an upward trend seen at the 10-year follow-up (Schutte et al., 2019). Ethnic differences indicated early vascular aging in black participants, as well as a mean heart rate of two beats per minute higher than the white participants, but the white participants showed an average 2 mmHg higher 24-hour systolic blood pressure than black participants (Schutte et al., 2019). No significant differences were found between the ethnicities in the self-reported smoking and alcohol use. Of all the participants, 46% were classified as either overweight or obese, with obesity most prevalent in black women and white men (Schutte et al., 2019).

Research Question and Preview of Chapters 2 and 3

The role psychosocial factors play in the change in blood pressure over five years in the African-PREDICT sample is currently unknown. The theoretical contribution of health-specific self-efficacy as implied in international research has therefore not yet been confirmed in a South African study on hypertension. More specifically, we do not know to what extent ethnicity and gender influence the relationship between health-specific self-efficacy and a change in blood pressure.

It is expected that this research will contribute to the understanding of early hypertension development as related to health-specific self-efficacy in this young population. It could further shed more light on the role ethnicity and gender play in the relationship between health-specific self-efficacy and risk of developing high blood pressure. This may have a public health benefit by providing a better understanding that may be used for health- and psychoeducation, as well as the potential for policy adaptations to support the vulnerable population at large. Based on the background and problem statement, the following questions emerged: *Is baseline health-specific self-efficacy associated with a change in blood pressure over five years in young adults? To what extent do sex and ethnicity influence the relationship between self-efficacy and change in blood pressure?*

Chapter 2 presents the manuscript to be submitted to the *South African Journal of Psychology (SAJP)*. The manuscript provides a synopsis of the problem statement, explains the methodology, results, discussion, and conclusion. In Chapter 3 the researcher offers a critical reflection on the research process, the outcomes, and her experience of the process. A complete reference list is provided at the end.

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Chapter 2: Manuscript for Submission to South African Journal of Psychology

The relationship between health-specific self-efficacy and five-year change in blood pressure in young adults: The African-PREDICT study

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Abstract

The aims of this study were to determine if (i) health-specific self-efficacy related to nutrition, physical exercise, and alcohol consumption, is associated with a change in blood pressure; and if (ii) sex and ethnicity influences this relationship. Demographic information, 24-hour blood pressure monitoring at baseline and 5-year follow-up visits; as well as baseline health-specific self-efficacy scores were collected from a stratified sample of 384 normotensive young adults. Results show a slight decrease in blood pressure within normal limits for the age group. No correlations were found between health-specific self-efficacy and change in blood pressure, most probably due to self-efficacy's dependence on, and interrelation with other factors like risk perception, motivation, and social support. Some evidence emerged suggesting ethnic differences regarding nutrition self-efficacy and how it impacts on change in blood pressure. Although health-specific self-efficacy could not convincingly be identified as an early role player in the risk of developing hypertension, further research needs to be done to better understand its role.

Keywords: *Hypertension, Blood Pressure, African-PREDICT study, Health-specific Self-efficacy, Sex, Ethnicity*

High blood pressure or hypertension, defined as a persistently elevated pressure of 140/90 mm Hg exerted by blood on the arterial walls (Raymond & Couch, 2017), is on the rise all over the world. It can cause chronic and debilitating cardiovascular, renal, brain, and other diseases, that may lead to premature death (Zhou et al., 2017; WHO, 2019). A 2019 WHO report documented that an estimated 1.13 billion people suffer from hypertension, with approximately two-thirds residing in low- and middle-income countries such as South Africa. The South African Demographic and Health Survey (Statistics SA, 2017) reported hypertension in nearly 50% of the population over 15 years of age. This is indicative of the need to study young, relatively healthy adults in relation to blood pressure changes, as most research is done on older adults with known cardiovascular conditions (Schutte et al., 2019).

The African Prospective study on the Early Detection and Identification of Cardiovascular disease and hypertension (African-PREDICT) was launched at the North-West University (NWU) in South Africa in response to the lack of information on individual-specific cardiovascular pathophysiology and the lack of longitudinal monitoring of early hypertension development, specifically in black populations (Schutte et al., 2019). Given its focus on early hypertension development, the current study, a sub-study of African-PREDICT, specifically focused on changes in blood pressure rather than on hypertension itself, as an elevation in blood pressure during early adulthood may provide an early indication of a risk for developing hypertension (Chen & Wang, 2008; Lackland, 2017; Mayo Clinic, 2021).

Hypertension risk can be divided in non-modifiable and modifiable factors. Non-modifiable factors include genetic, biological, and physiological components. While these factors may have different effects in different individuals, findings show males and black people to be generally more at risk (Raymond & Couch, 2017). Studies mostly indicate that elevated blood pressure is more prevalent in men when accounting for age, and that this relation only changes after menopause in women (Gillis & Sullivan, 2016). Potential reasons for this discrepancy may be the anti-inflammatory immune response in females; higher health awareness, treatment and control of blood pressure changes; the protective effect of the female sex hormones; lower sensitivity to salt; and lower incidence of overweight (Doumas et al., 2013; Gillis & Sullivan, 2016).

Black people are specifically at risk due to factors such as an increase in the population's experience of stress, health-specific behaviours related to urbanisation, higher salt sensitivity, higher incidence of overweight, increased resistance to anti-hypertensive agents, pre-natal and early life influences, access to health care, and social factors (Lackland, 2014; Schutte et al., 2019, Beckerman, 2021). According to a study done by Schutte et al. (2012),

almost 25% of the black participants in transition had a change to elevated blood pressure within five years, indicative of a susceptibility for rapid progression.

Modifiable factors include excessive alcohol consumption, a sedentary lifestyle, and unhealthy nutritional profiles (WHO, 2019). Data on how much alcohol would increase a significant rise in blood pressure differs, ranging from two or more drinks (Steinbaum, 2019), to three or more drinks (Raymond & Couch, 2017), while others indicate that a moderate consumption could even be a protective factor (Fisher et al., 2018; Sesso et al., 2008). A sedentary lifestyle can lead to a 30 to 50% higher likelihood of developing chronically elevated blood pressure (Raymond & Couch, 2017). Poor nutrition, such as high salt and saturated fat intake and low fruit and vegetable intake, promotes increase in blood pressure (Khalesi et al., 2016; Raymond & Couch, 2017; Steinbaum, 2019). Often overlooked when considering nutrition, alcohol intake, and physical activity, is self-efficacy, an important component in initiating and maintaining healthy behaviours to manage blood pressure.

Self-efficacy is defined as the individual's belief in their own abilities to affect change in their own lives, which in turn affects their efforts to do so (Bandura, 2009). It is a cognition that may influence the physiological presentation of blood pressure changes because of a direct impact on health behaviour (Roddenberry & Renk, 2010) related to alcohol consumption (Chavarria et al., 2012; Connor et al., 2011; Oei et al., 2007), nutrition (Gase et al., 2016; Hassan et al., 2017; Muturi et al., 2016), and physical activity (Luszczynska et al., 2010; Shieh et al., 2015; Williams et al., 2011). Health-specific self-efficacy focuses specifically on these three modifiable domains, and the individual's optimistic belief in their ability to control their health-related behaviours (Schwarzer & Renner, 2005). A South African study (Fincham et al., 2015) supports the hypothesis that alcohol use, exercise, and nutrition self-efficacy correlated with health-promoting behaviour such as abstinence from alcohol, improved physical activity and healthy food choices in an ethnically diverse sample.

Despite the theoretical importance of self-efficacy in health behaviour, no previous research could be found that explores the relationship between health-specific self-efficacy, changes in blood pressure, sex and ethnicity in a South African context. This study may therefore contribute to a better understanding of the dynamic interplay between demography, health behaviour and hypertension risk. The aim is therefore to determine if health-specific self-efficacy is associated with changes in blood pressure over the course of five years in a sample of young adults. The specific aims are to (i) determine if health-specific self-efficacy related to *nutrition*, *physical exercise*, and *alcohol consumption,* is associated with a change in blood pressure; and (ii) if sex and ethnicity influences this relationship.

Method

The methodology of the African-PREDICT study has already been discussed in detail in previous work (Craig et al., 2020; Mokwatsi et al., 2019; Schutte et al., 2019; Strauss et al., 2018; Thompson et al., 2016). Only the aspects relevant to the part of the research reported here are reiterated below.

Participants

Participants were recruited by 1) field workers; and through 2) workplace access; and 3) advertisements. They had to be between 20 and 30 years old, from both gender groups, black and white ethnicity, apparently healthy, with a clinic brachial blood pressure of <140 and <90 mmHg (Schutte et al., 2019). Possible candidates were excluded if they were not residents of Potchefstroom or the surrounding area; if they were infected with the human immunodeficiency virus (HIV); had a previous diagnosis of any chronic disease; were using medication for a chronic disease, had a fever, were pregnant or breastfeeding, had a needle phobia, or were unable to read or understand English (Schutte et al., 2019).

Stratified sampling was done to ensure comparable numbers with respect to sex and ethnicity. The study received 1 886 volunteers from the advertisements and invitations. Of those, 1 262 that were eligible and underwent detailed baseline data collection. Due to loss of participants, only 1 198 were left as active participants for follow-up (Schutte et al., 2019). Of these, 384 were eligible to take part in this sub-study as complete baseline and follow-up blood pressure data as well as complete baseline health-specific self-efficacy data were available for these participants. The sample consisted of 209 (54.4%) females and 175 (45.6%) males of which 214 (55.7%) were black and 170 (44.3%) were white. At baseline, the mean age of participants was 25.07 years, at follow-up, 30.1 years.

Measures and procedure

Demographic information, 24-hour blood pressure monitoring at the baseline and follow-up visits; as well as baseline health-specific self-efficacy were collected. Demographic data on age, sex, ethnicity, and socio-economic status were collected by means of a questionnaire that participants completed during their initial visit to the clinic. For this study, only age, biological sex, and ethnicity were used as data.

To measure 24-hour blood pressure, each participant was equipped with a CardioXplore® 24-h ambulatory blood pressure monitoring (ABPM) apparatus (CE0120,

Meditech, Budapest, Hungary) on the non-dominant arm. This device was programmed to record measurements every 30 minutes during the day (from 06h00 to 22h00) and every hour at night (from 22h00 to 06h00). The clinic brachial blood pressure was measured with the Dinamap Procare 100 Vital Signs Monitor (GE Medical Systems, Milwaukee, USA) with appropriately sized cuffs. Prior to the measurement, participants were requested to not have smoked, exercised, or eaten. They were in a seated, resting state with the arm supported at heart level. Both systolic and diastolic pressure was taken early in the morning while the participant was lying down on a bed. It was measured twice, once on each arm, by placing a cuff around their upper arm. Another blood pressure measurement was also done by placing a small blood pressure cuff around their finger and upper arm. At the end of the measurement day, a portable blood pressure monitor was fitted to the participant, which assessed their blood pressure over the next 24 hours. It was important for the device not to be removed during this time to ensure a reliable measurement. A total of four measurements was therefore taken to get the participant's mean blood pressure, ensuring that the data would reflect the possible development of cardiovascular disease over time, and not the course of existing disease (Schutte et al., 2019). Changes in blood pressure were then determined by blood pressure at follow-up, minus blood pressure at baseline.

The **Health-specific Self-Efficacy Scale** (Schwarzer & Renner, 2005) consists of 13 statements divided into the three self-efficacy factors: nutrition (NSE), physical exercise (PSE), and alcohol resistance (ASE). The statements are based on the question: "How certain are you that you could overcome the following barriers?", to which the participant has to respond on a Likert scale, with 1 = very uncertain, 2 = rather uncertain, 3 = rather certain, and 4 = very certain. A principal component analysis was done to examine the dimensionality of the three scales of the 13 items, which accounted for 68% of the total variance (Schwarzer & Renner, 2005). Internal consistencies reported as Cronbach's alpha for the alcohol resistance, preventative nutrition, and physical exercise scales were 0.79, 0.87, and 0.88 respectively (Schwarzer & Renner, 2005). A study done in South-Africa with a multi-ethnic group found the internal consistencies for the Health-specific Self-Efficacy Scale to be 0.84, 0.88, and 0.85, respectively for alcohol consumption, nutrition, and exercise self-efficacy (Fincham et al., 2015). The scale was completed in private rooms in the clinic by a trained registered psychologist or trained intern psychologist with the assistance of the research nurse, trained research assistant or trained postgraduate students (Schutte et al., 2019).

Data Analysis

Descriptive statistics was calculated for all items in the questionnaire and categorical variables were reported as frequencies and percentages. The means and standard deviations were reported for question items measured on the Likert scale. The use of the Cronbach alpha was done to establish the internal consistency of the Health-specific Self-Efficacy questionnaire. Pearson product moment correlations were calculated to determine associations between changes in blood pressure and health-specific self-efficacy. A 2 x 2 factorial Analysis of Variance (ANOVA) that allowed for the simultaneous testing of two different hypotheses, and tested for main and interaction effects between the variables, were calculated to determine the effect of sex and ethnicity on changes in blood pressure. For comparison, participants were divided into three tertiles (< 25^{th} percentile; 25-75^{th} percentile; & > 75^{th} percentile) according to their health-specific self-efficacy scores.

All statistical tests were two-tailed, and the type I error rate was set to $\alpha = 0.05$, while effect sizes were based on (i) *r* for the practical significance of correlations with r = 0.1 (small); r = 0.3 (moderate) and r = 0.5 (large) (Steyn, 2009); and (ii) on *Partial Eta Squared* for factorial ANOVAS, with $\eta p^2 = 0.01$ (small); $\eta p^2 = 0.06$ (medium); and $\eta p^2 = 0.14$ or higher (large) (Cohen, 1988).

Ethical Issues

The African-PREDICT study was carried out in accordance with the Helsinki Declaration of 1975 (as revised in 2008) for the investigation of human participants and was endorsed by the South African National Department of Health (Schutte, 2019). Approval was granted by the North West Department of Health and the North-West University's Health Research and Ethics Committee (HREC), with approval number NWU-00001-12-A1 for the larger African PREDICT study and NWU-02074-20-A1 for this sub-study. The participants were volunteers who all provided informed written consent for the data collection and the use of the data for various sub-studies, including this one (Schutte et al., 2019). Since there was no direct interaction with the participants in this sub-study, there was minimal risk involved with respect to additional ethical issues. Data from the hard copy questionnaires were recorded on an anonymous database by a statistical consultant, and the hard copies were then privately and securely stored in a room at the Hypertension in Africa Research Team facility (Schutte et al., 2019). If debriefing was necessary, the Institute for Psychology and Wellbeing of the Potchefstroom Campus of the North-West University provided the service at no cost, or participants could be referred to their preferred psychologist (Schutte et al., 2019).

Results

Table 1 shows the demographic characteristics of the sample (number of participants in each group) as well as the descriptive statistics of systolic and diastolic blood pressure, change in blood pressure and health-specific self-efficacy (mean scores, standard deviations, and scale reliability index).

Table 1

Demographic and Descriptive Characteristics of the Total Sample (n=384) at Baseline and Five-year Follow-up

	Total (n=384)		Female (n=209)		Male (n=175)		Black (n=214)		White (n=170)		
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*α*
SBP 1	118.71	12.10	113.86	11.01	124.51	10.74	119.72	11.93	117.45	12.24	n/a
SBP 2	116.46	12.75	112.56	11.31	121.11	12.84	118.11	13.01	114.38	12.13	n/a
SBP Δ	-2.25	-	-1.30	-	-3.40	-	-1.61	-	-3.07	-	n/a
DBP 1	78.96	8.17	77.23	8.08	81.02	7.81	79.90	8.20	77.78	8.00	n/a
DBP 2	78.75	9.23	76.90	9.25	80.96	8.74	80.06	9.72	77.10	8.33	n/a
DBP Δ	-0.21	-	-0.33	-	-0.06	-	0.16	-	-0.68	-	n/a
NSE	2.92	0.87	2.91	0.72	2.92	0.70	2.85	0.73	3.00	0.68	.88
PSE	2.72	0.93	2.62	0.74	2.85	0.72	2.67	0.76	2.79	0.71	.86
ASE	3.43	0.90	3.52	0.73	3.31	0.78	3.35	0.80	3.53	0.70	.81

Note. SBP=Systolic Blood Pressure; DBP=Diastolic Blood Pressure; 1=Baseline; 2=Five-year follow-up; SBPΔ=Change in SBP (SBP2 – SBP1); DBPΔ=Change in DBP (DBP2 – DBP1); NSE=Nutrition Self-efficacy (Baseline); PSE=Physical Self-efficacy (Baseline); ASE=Alcohol Self-efficacy (Baseline)

It is important to first note that baseline measurement of health-specific self-efficacy was reliable for NSE, PSE and ASE ($\alpha > 0.8$). Second, mean blood pressure for the total group

decreased from 118.71/78.96 mm Hg at baseline to 116.46/78.75 mm Hg at five-year follow up (SBP Δ = -2.25; DBP Δ = -0.21). A decrease in both SBP and DBP was also observed in male, female, and white participants. The only exception was an increase in DBP (Δ = 0.16) for black participants.

Table 2 shows the correlation matrix for the association between health-specific self-efficacy (NSE, PSE & ASE) and change in SBP and DBP. Pearson product-moment correlations show no significant positive correlations between health-specific self-efficacy and change in SBP or DBP for the total sample or for any of the sex- or ethnic subgroups.

Table 2

Correlation Matrix for Health-specific Self-efficacy and Change in Blood Pressure for Total Sample, Sex and Ethnic Groups

		NSE	**PSE**	**ASE**
SBP Δ	*Total*	-0.075	0.011	0.055
	Female	-0.095	0.037	-0.033
	Male	-0.055	0.020	0.106
	Black	-0.033	0.004	0.055
	White	-0.125	0.038	0.081
DBP Δ	*Total*	-0.014	0.002	-0.002
	Female	-0.035	-0.004	-0.041
	Male	0.013	0.005	0.047
	Black	-0.014	-0.030	-0.038
	White	0.000	0.068	0.081

Note. SBPΔ=Change in SBP (SBP2 – SBP1); DBPΔ=Change in DBP (DBP2 – DBP1); NSE=Nutrition Self-efficacy; PSE=Physical Self-efficacy; ASE=Alcohol Self-efficacy

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Factorial (two-way) ANOVAS were done to determine the main and interaction effects of (i) sex and health-specific self-efficacy on blood pressure change; and (ii) ethnicity and health-specific self-efficacy on change in blood pressure.

NSE. No interaction effects were found between NSE and sex on either change in SBP or DBP. A significant main effect was found for sex on change in SBP (independent of NSE) with $F(1, 378) = 3.889$, $p = .049$, $\eta p^2 = .01$ (small effect). Female participants ($\bar{x} = -1.37$) show

a significant smaller change in SBP than males ($\bar{x}$ = -3.33). A significant interaction effect (table 3) was found between NSE and ethnicity on change in DBP F(2, 378) = 4.52; p= .012, ηp^2 = .023 (small effect); with the mean increase in DBP in high NSE black participants ($\bar{x}$ = 1.36) significantly different from the mean decrease in DBP in high NSE white participants ($\bar{x}$ = -1.63).

Table 3

Two-way ANOVA for Interaction Effect of Ethnicity and NSE on DBP-change

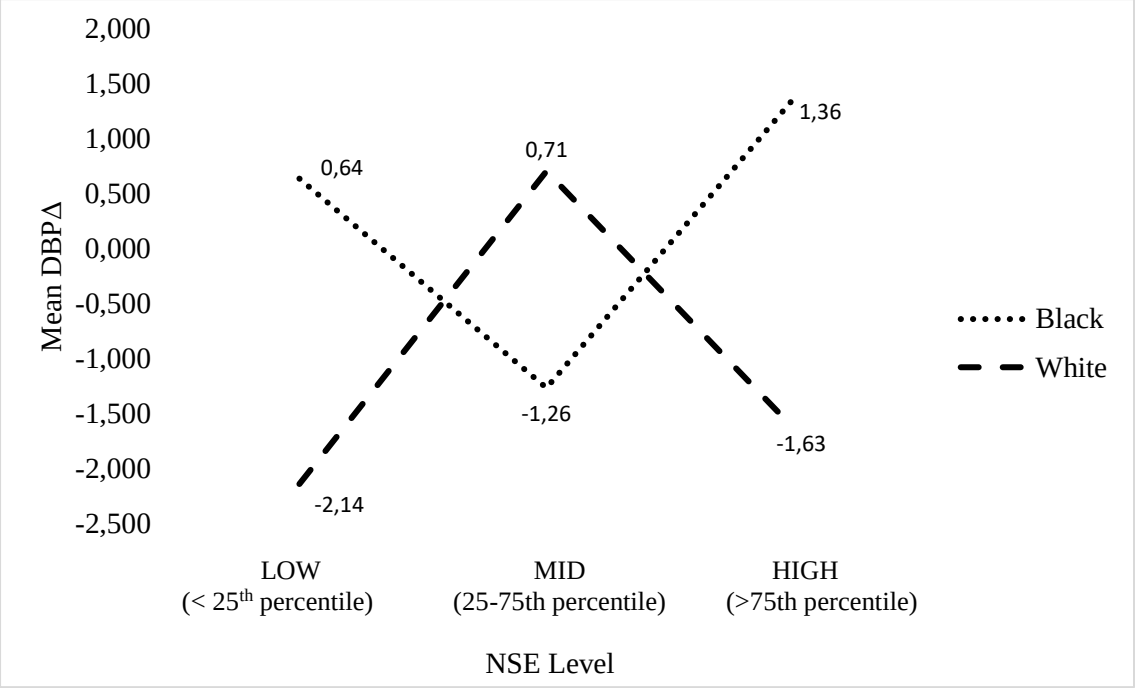
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	612.700a	5	122.540	2.078	0.067	0.027
Intercept	54.254	1	54.254	0.920	0.338	0.002
Sex	145.062	1	145.062	2.459	0.118	0.006
NSE_tertile	23.386	2	11.693	0.198	0.820	0.001
Ethnicity * ASE_tertile	532.640	2	266.320	4.515	0.012	0.023
Error	22295.132	378	58.982			
Total	22924.188	384				
Corrected Total	22907.832	383				

a. R Squared = .015 (Adjusted R Squared = .011)

Although there is only a small practical difference, the interaction graph is shown in Figure 3 to visually show how the two ethnic groups differ on each of the three tertile groups. For all three tertile groups, black and white participants show opposite changes – mean DBP *increased* for black participants high and low in NSE, as well as for white participants within the mid-range, while mean DBP *decreased* for white participants high and low in NSE, and for black participants in the mid-range.

Figure 3

Interaction effect between NSE and ethnicity on change in DBP



Note. DBPΔ=Change in DBP (DBP2 – DBP1); NSE=Nutrition Self-efficacy

PSE. No interaction effects were found between PSE and sex or between PSE and ethnicity on either change in SBP or DBP. A significant main effect was found for sex on change in SBP, but as significance was obtained for Levene's test ($p < .05$), homogeneity of variance cannot be assumed. This was therefore not considered for further interpretation.

ASE. No interaction effects were found between ASE and sex or ASE and ethnicity on change in SBP. A significant main effect was found for sex on change in SBP (independent of ASE) with $F(1, 380) = 4.63$, $p= .032$, $\eta p2 = .012$ (small effect). Female participants ($\bar{x}$ = -1.30) show a significant smaller change in SBP than males ($\bar{x}$ = -3.64).

Discussion

The first important observation is that blood pressure (both SBP and DBP) decreased for the total group as well as for the sex- and ethnic subgroups, exception for an increase in DBP in black participants. Although a decrease in blood pressure over time appears

contradictory to the expectation, a mean increase in blood pressure usually only develops after the age of 40 (Lin et al., 2016). The decrease in blood pressure in the current sample is therefore in line with the slightly lowered blood pressure norms usually seen between the ages of 20 and 35 (Lin et al., 2016). Despite the decrease in blood pressure, it still stayed within the normal range for this age group. The mechanisms causing this curvilinear correlation between age and blood pressure are yet to be fully understood, however, one explanation could be the Hawthorne effect, referring to changes in participants' behaviour when they know they are being observed. However, research shows mixed results regarding the Hawthorne effect in relation to health behaviours, with only some confirmed evidence (Deutekom et al., 2011; McCambridge et al., 2014). It can therefore not be assumed to have played a possible role in this case. As there was a mean decrease in blood pressure overall, yet within the normal limits of good blood pressure control, the rest of the results have been carefully interpreted.

Main effects indicated that females show a significant smaller decrease in SBP than males, from baseline to follow-up (independent from health-specific self-efficacy), while no differences were observed regarding ethnicity. As the difference between male and female only show a small practical effect, and as this difference is independent of health-specific self-efficacy, it will not be explored in-depth in this study. Future research should perhaps determine if this is a general trend, and if so, what the mechanisms and implications are.

No significant correlations were found between health self-efficacy and change in blood pressure in the total, sex, or ethnic subgroups. This is a somewhat surprising result, as it was expected that there would be a negative correlation between health-specific self-efficacy and change in blood pressure. NSE was expected to be associated with change in blood pressure as it influences healthy food behaviours, which in turn affect blood pressure management (Kawamura, 2020; Raymond & Couch, 2017). Higher NSE was significantly associated with a lower intake of saturated fat and sodium, as well as an increased intake of fruit in a sample of 18- to 25-year-olds (Stephens et al., 2017). Other factors may, however, play role – according to Kang et al., (2020) for example, the relationship between dietary self-efficacy and dietary adherence may be moderated by social support. In addition, the role nutrition knowledge play is increasingly indicated as key factor that may influence NSE (Kyoungok & Heeyoung, 2008; Xazela et al., 2021) Neither social support nor nutrition knowledge was included and controlled for in this study and should be explored in future research.

PSE was expected to be related to changes in blood pressure, because physical exercise is associated with lower blood pressure as it suppresses atherogenesis and improves the

availability of vasodilatory mediators (Nystoriak & Bhatnagar, 2018). The reason why PSE was not associated with blood pressure in any of the groups in this study is therefore difficult to explain. One reason might be related to the age group of participants in this study, the type and frequency of exercise, and the fact that a lack of physical exercise or low perceived efficacy related to physical health may only affect blood pressure later in life (Diaz & Shimbo, 2014; Parker et al., 2007).

Finally, ASE was expected to be associated with a decrease in blood pressure as higher alcohol intake, even a small deviation from recommended guidelines is associated with an increase in blood pressure (Basdeki et al., 2021). In a systematic review, Roerecke et al. (2017) found that in people who drank more than two drinks per day, a reduction in alcohol consumption is associated with a decrease in blood pressure. Further, higher ASE has been shown to be associated with a decrease in alcohol consumption, although primarily with motivation as mediator (Müller et al., 2019). Therefore, ASE without appropriate motivation to change health behaviour may be inadequate to change alcohol-related health behaviours. Another factor that may play a role here is social desirability, something that is often encountered in research on alcohol consumption (Davis et al., 2010). A South African study (Vellios & Van Walbeek, 2017) indicated that there is significant underreporting of socially undesirable activities such as alcohol consumption, especially among black participants. Women also have been found to over-report on social desirability on self-report measures in general (Dalton & Oertegren, 2011), because they have a higher acquiescence and extreme response styles on Likert item questionnaires compared to men (Weijters et al.,2010).

Taken together, it seems that health self-efficacy (whether NSE, PSE or ASE) may not be directly related to change in blood pressure due to its dependence on, and interrelation with other factors. According to De Wit (2006) and Zhao et al. (2021), self-efficacy reflects a person’s conviction that a specific course of action can be executed, however, it does not guarantee actual execution and goal achievement. This is clearly illustrated by a recent study of the Health Belief Model in which Alagili and Bamashmous (2021) found that perceived benefits, perceived barriers and cues to action play a more important role than self-efficacy in Covid-19 prevention practices. To the same effect, Teleki et al. (2021) found a synergistic effect between risk perception, self-efficacy and planning in coronary heart patients and concluded that although one's self-efficacy can put necessary action plans in place, it does not help in overcoming obstacles related to implementing those plans.

Self-efficacy may also only be related to actual behaviour change once there is a perception of risk (Mohammadi Zeidi et al., 2021). Participants in this study were healthy, young normotensive individuals whose health-specific self-efficacy were perhaps not linked to a specific health goal or clear target that one would expect in those with a serious or chronic disease. Therefore, even though self-efficacy plays an important role in motivational aspects of behaviour, it should perhaps not be seen in isolation from other processes like risk perception, planning, and self-regulation in the implementation of health behaviours. The results of this study therefore support Tan et al. (2021) who indicate that evidence for the association between self-efficacy and self-care is limited, and that there is a need for further well-designed interventional studies to investigate this association.

The finding that Black participants with high NSE show an increase in DBP, compared to the decrease in DBP in white participants with high NSE only had a small practical effect and will therefore be carefully interpreted. The result implies a potential difference in how black and white participants' nutrition self-efficacy associates with change in DBP over 5 years. The decrease in DBP in white participants with high NSE is not surprising, for the reasons already alluded to showing the importance of nutrition in blood pressure control. For white participants, it can therefore probably be argued that high NSE does indeed relates to healthier eating habits and subsequent decrease in blood pressure. The opposite is true for black participants in this sample, those with high NSE shows an increase in DBP, for them, self-efficacy does not relate to healthier eating habits.

Possible explanations may be linked to the role nutritional knowledge play – this is important because people have different perceptions of what a healthy diet consists of. The items in the Health-Specific Self-Efficacy scale only refers to "healthy diet", without specifying what a healthy diet consists of. The importance of nutritional knowledge for NSE is supported by Kyoungok and Heeyoung (2008) who found nutrition education to have significantly improved self-efficacy, frequency of food selection, gustation of salt, systolic blood pressure, and serum total-cholesterol. Pawlak and Colby (2009) indicate that although African Americans in the USA showed high self-efficacy of eating and purchasing healthy foods, they had low awareness of recommendations for fruits and vegetables. Based on a study among 15-35-year-olds in rural South African, Xazela et al (2021), support the idea that self-efficacy obtained through knowledge, understanding, and skill development is vital in facilitating healthy eating habits. One implication of these studies is that nutritional knowledge may be related to social or ethnic context, based on the idea that individuals tend

to retreat to familiar settings, food, behaviours and circumstances congruent with their social identity or in-group. To explore this possibility, Floyd (2019) studied the relationship between black identity, nutrition self-efficacy and self-rated healthiness of the diet of black college students in the USA. Based on their findings, they indicate that there is reason to believe that black identity may be associated with a higher self-rated healthiness. Although these findings are promising, further research needs to be done to better understand the dynamics between ethnicity, NSE, and blood pressure, specifically in the South African context.

Limitations

Before a conclusion can be drawn, some limitations should be considered briefly. First, only healthy young adults were included in the study, as a result, the change in blood pressure observed were within normal ranges and thus a maintenance of baseline normotensive states. It is therefore difficult to come to any specific conclusion within a 5-year period. Second, it is clear from the results that other psychological factors like risk perception, motivation, social support, and goal implementation need to be included to understand the role self-efficacy play. In addition, we did not control for the possible effect of behavioural factors like smoking, alcohol use and level of fitness. Finally, the contributing effects of the three health-specific self-efficacy components (NSE, PSE, and ASE) were only considered independently from each other, resulting in a somewhat narrow perspective on self-efficacy as a general skill .

Conclusion and Recommendations

The aim of this study was to determine the extent to which health-specific self-efficacy related to nutrition, physical exercise, and alcohol consumption, is associated with changes in blood pressure over a 5-year period, and if sex and ethnicity influence the association between health-specific self-efficacy and changes in blood pressure. The main results showed a slight decrease in blood pressure, but within normal limits for the age group. No correlations were found between health-specific self-efficacy and change in blood pressure, most probably due to self-efficacy's dependence on, and interrelation with other factors like risk perception, motivation, and social support. It supports the perception that although health self-efficacy is vital to our understanding of health behaviour, it should not be explored in isolation. Finally, some evidence emerged that there might be ethnic differences in NSE and how it impacts on

change in blood pressure, possibly due to differences in nutritional knowledge and/or ethnic identity.

Although health-specific self-efficacy could not convincingly be identified as an early role player in the risk of developing hypertension, further research needs to be done to better understand its role. More specifically, the possible mediating role of risk perception, motivation, social support, and goal implementation should be investigated. Further, the importance of NSE should be explored to determine similar trends in other contexts, as well as the extent to which NSE is influenced by nutritional knowledge and ethnic identity. The Africa-PREDICT study provides this opportunity as there will be further 5-year interval follow-ups that may account for the effect of change over a longer period.

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Chapter 3: Personal Reflection

Introduction

This chapter is a brief reflection on my personal journey and development over the course of the research process. It serves as a phenomenological illustration of the research experience and gives testament to my personal and academic growth. I start by reflecting on my choice of the specific topic, the process, the results, and then, as with all new beginnings, the end.

Personal Reflection

I started my psychology journey a bit later in life, although one could argue that one's psychology journey is intertwined with one's life journey. I had always felt my vocation to be helping others, but I was never quite sure which career path to follow. So, I studied a health science curriculum of dietetics, which combined two passions: one for helping others, and the other a fascination with the physiology of humans. It was during my time practicing as a dietitian and helping others that I became increasingly interested in what I found to be an even more important component of people's health than their bodies – their minds. Being an advocate for a holistic approach to health and feeling as if I was limited to only the physiology of the person, I started studying psychology, which instantly became my third passion. At the time, I did not know how arduous the journey on which I had embarked, would be. Finally finding myself in the master's programme left me with a feeling of actualisation. Yet my journey was not over. During the master's programme and internship year I have come to truly grasp that my journey in psychology will never be over. As the daunting task of choosing a research topic awaited me, my desire was to find something that resonated with me. Due to my exposure and personal experiences, I was immediately drawn to Professor Karel Botha's field of study, being self-regulation. Not only was I determined to become his student, studying with him would offer me the unique opportunity of being a part of a very large study, the Africa-PREDICT study. It was if this chance was tailor-made for me, because not only did it relate to the minds of the participants in the form of self-regulation, and more specifically, self-efficacy, it also entailed working with the body through investigations of blood pressure changes. More accurately, the study explored the relationship between the mind and the body. Not only did I have the chance to work with my mentor, it was also the confluence of all my passions: helping, psychology and physiology. I would love to continue this journey with more opportunities to explore the mind-body relationship, and by so doing fulfil my vocation and change others' lives for the better.

The Process

Despite being thrilled by the opportunity, I was a fledgling researcher with little confidence in my own research skills. I was determined to make my research a priority and to ensure that I do not hold the research process back. Consequently, I was quick off the starting blocks as I tried to keep the proverbial ball out of my hands by immediately working on amendments and sending it back to my supervisor. The process at this point largely centred on working through as much literature pertaining to my study as possible, familiarising myself with the larger Africa-PREDICT study, and tending to the ins and outs of the research process at the North-West University. I challenged myself by deciding that despite my uncertainty about doing research at master's level, the gloves will be coming off and I will stand face to face with *My Anxieties*.

And then, Covid-19 came, and my process came to a screeching halt. I was all dressed up but nowhere to go. Gradually, my research process did pick up again, all due to the support of a determined supervisor and another master's research student who was also doing her research within the Africa-PREDICT study. I was also fortunate that the data related to my research topic had already been collected as part of the larger study, so my data collection was not affected by the Covid-19 regulations and lockdowns as was the case for some of my colleagues. Yet, my timeline had taken a serious knock, and it was a win for *My Anxieties*, but I had not yet lost the war. I brushed myself off and tried to use *My Anxieties* as an impetus to make up for lost time. My Small Group approval was received in June, and my Community Psychosocial Research (COMPRESS) was done in July. All that stood between me and truly gaining momentum with my research was my Health Research and Ethics Committee (HREC) approval, which I was confident would be in place by August. Take that *My Anxieties*! Or so I thought...

I am sure, dear reader, you note the tone in that last sentence that gives away the fact that this resolve was a mere preamble to my next setback, the delay in my HREC approval and the continuous re-submission of amended documents. I did not realise that this process could be so timeous, and I had to sink or swim in this new subjective ambivalent experience of being so close, while at the same time being so far. A sense of urgency fuelled my anxieties, and I was desperate to counteract my unpleasant feelings of hurrying up and waiting. I started sinking my teeth into my first chapter and forced my mind not to fixate on what was at that point beyond my control. Perhaps a saving grace, life still goes on: case study presentations, exam preparations, and dealing with the effects of the pandemic on my master's year. These were all fighting for my attention. I had a semblance of what it may feel like to be a mother, with each

child demanding time and energy when it was a very scarce resource for me. I was doing screening and triaging when it came to my work and my personal life, and inevitably many things fell by the wayside. Then I was met with another strange ambivalent sensation; after a year that had gone on forever, it felt like I had only blinked, and we were busy with year-end examinations.

I was forced to adapt my exceedingly hopeful goals from being done with my literature study, data analysis, article, and critical reflection by the end of December 2020, to at least having HREC approval. Yet hope was restored when I received HREC approval in the beginning of my internship year of 2021, and I breathed a sigh of relief as I believed that it would be all downhill from there. Yes, that was another preamble, because life introduced me to my fourth curve ball in this research process, and that was the data analysis. Due to the adapted timelines, my data analysis stage found my statistician on maternity leave, and a new plan had to be made. The delays accumulated, and finally I found myself five months into the new year with almost no progress.

Still, I had faith, and the pressure was on to find a new statistician. Despite our best attempts, communication was a challenge, and time, as it does, paid no heed to my desperate pleas to slow down. Looming was the reality that according to the Health Professions Council of South Africa, I would need my final research mark to register for my board examinations. I had to pass the examination process to register before I would be allowed to start my community service year. The examinations are only available three times a year, so if you miss one deadline, your career as a psychologist is set back by months before a next opportunity arises. To me, this felt like an unacceptable turn of events. Not only was I eager to fully immerse myself in my new career as psychologist, but the financial implications would be near impossible to mitigate.

The Results

The deadline to register for board examinations is tomorrow, and I am still writing up my final results. It is difficult to have come so close, yet feel so far away. Discussing the results and finally having my research journey come to fruition, has been a surreal experience. The research results were not what I expected they would be when I chose my topic, and neither was this journey. Working so long and hard on something to be met with an unexpected end, has encouraged me to reflect, not only on the research process, but on my personal process. Both journeys started out with certain expectations. In exploring the research results, which were not what was expected, and trying to make meaning of it, I find myself having to make meaning of the personal journey as well.

The End

Reader, you meet me now at the end of my research journey, an end that seemed to evade my reach every time I drew near, almost as if taunting me. In recounting to you what it is I have learned from this endeavour, I could tell you about how the research process works from beginning to end, I could tell you about the administrative work, the ethics when working with psychological data, the components of data analysis, and the nuances of scientific writing. And it would be a truthful account, as I have learned about all of these things during this process. However, it is the personal journey that was perhaps most enriching. Although I am still a novice when it comes to research, I have to confess that *My Anxieties* have ultimately been conquered as I am so much better versed in doing research. In essence, I can relay to you that I have learned the basic requirements for research of the Master's Clinical Psychology Programme. Yet it is the psychological impact, the part that is not prescribed, that has been most life-changing. Afterall, is it not the subjective human experience that we seek in the field of psychology?

My narrative of the process relayed all of the unexpected setbacks and delays that I have had to deal with. I had a neatly laid out plan, structured timeline, already collected data, and a determination to prioritise my research work above all else, how did I end up missing the deadline to register for my board examinations for 2021? Why was I racked with feelings of failure, urgency, disappointment, anxiety, and failure, when I was trying my best? It was during my fourth setback in the beginning of 2021 when a realisation dawned on me: life happens. Throughout my research process, I wanted to have control. Maybe this was due to *My Anxieties* related to my confidence in doing research, a belief that control is required for success, or the self-imposed expectations I had of myself as a master's student, or all of the above and more. According to one study, our desire to exert control over the environment is a biological and psychological (body and mind) imperative, and whatever undermines this perception of control, may negatively affect our psychological state (Leotti et al., 2010). Yet the great philosopher, Epictetus (2004), warned against this. His Stoic philosophy includes the *dichotomy of control*, which emphasises our awareness of what is within our control, and what is not, and to focus our minds on what it is we can control.

Ultimately, the delays and setbacks in my research process were teachers who presented themselves as forces beyond my control so that I could finally learn to relinquish my psychological distress and practice acceptance. Even though I had set plans and expectations and tried so hard to enforce control to achieve them, that was not the ultimate point of the research process. I became better acquainted with the distress as I tried to protect myself from

the truth: that there are some things that are within my control, and some things that are not. Once I came to understand this, *My Anxieties* started to wither, and I realised the true irony of the fact that although I was trying to control the process, I was actually allowing it to control me by being a slave to my defences and distress. So, I end this Chapter 3 with the ultimate lesson I have learned. Even though this teaching has been around for as long as humanity has existed and it is only through my experience of this process that I could truly learn it for myself: "Forces beyond your control can take away everything you possess except one thing, your freedom to choose how you will respond to the situation" (Frankl, 1984).

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Appendix A: Health-specific Self-efficacy Scale

"How certain are you that you could overcome the following barriers?"
Response format: (1) very uncertain, (2) rather uncertain, (3) rather certain, and (4) very certain.

The Nutrition Self-efficacy Scale

I can manage to stick to healthy foods, ...

1 ...even if I need a long time to develop the necessary routines.
2 ...even if I have to try several times until it works.
3 ...even if I have to rethink my entire way of nutrition.
4 ...even if I do not receive a great deal of support from others when making my first attempts.
5 ...even if I have to make a detailed plan.

The Physical Exercise Self-efficacy Scale

I can manage to carry out my exercise intentions, ...

1 ...even when I have worries and problems.
2 ...even if I feel depressed.
3 ...even when I feel tense.
4 ...even when I am tired.
5 ...even when I am busy.

The Alcohol Resistance Self-efficacy Scale

I am certain that I can control myself to...

1 ...reduce my alcohol consumption.
2 ...not to drink any alcohol at all.
3 ...drink only at special occasions. (Schwarzer & Renner, 2005).